



EMC TEST REPORT

Test Report No. : KES-EM-23T0032-R2
Date of Issue : Feb. 24, 2023
Product name : AUDIO MODULE
Model/Type No. : SPA-D1000
Variant Model : -
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 : 73, Hwahap-ro 1402beon-gil, Yangju-si, Gyeonggi-do
Equipment authorization : **Supplier's Declaration of Conformity**
Date of Receipt : Dec. 26, 2022
Test date : Jan. 03, 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. 09, 2023	KES-EM-23T0032	Issued
Jan. 27, 2023	KES-EM-23T0032-R1	Change Manufacturer
Feb. 24, 2023	KES-EM-23T0032-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-D1000 
Product	Type		Network Audio Module
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		-
	Weight		0.26Kg
	Size		123(W)*80(H)*30(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 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
	Audio Compression		
Speaker	Speaker Component		-
	Max. Sound Pressure Level (PoE : 7 Watt)		-
	Max. Sound Pressure Level (PoE+ : 15 Watt)		-
	Max. Power (Peak)		-
	Frequency Response		-
	Sensitivity (1Watt)		-
	Coverage Pattern		-
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 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 ↑ , Big Sur 11.1 ↑
	Supported Web viewer		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

Not applicable

1.3 Device Modifications

Not applicable

1.4 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
AUDIO MODULE	SPA-D1000	-	Inter-M Corporation	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
CEILING SPEAKER	SPA-C100W	-	Inter-M Corporation	
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
AUDIO MODULE (EUT)	RJ-45	PoE INJECTOR	RJ-45	3.0	U
	SPEAKER	CEILING SPEAKER	2 pin	0.2	U
	Micro SD card Slot	Micro SD card	Micro SD card Slot	-	-
	LINE OUT	Speaker	XLR	2.0	U
	Alarm IN	Button Alram	Line	3.0	U
	Alarm OUT	LED Alram	Line	3.0	U
	Ground Port	Ground	Ground Port	2.0	U

* Unshielded = U, Shielded = S

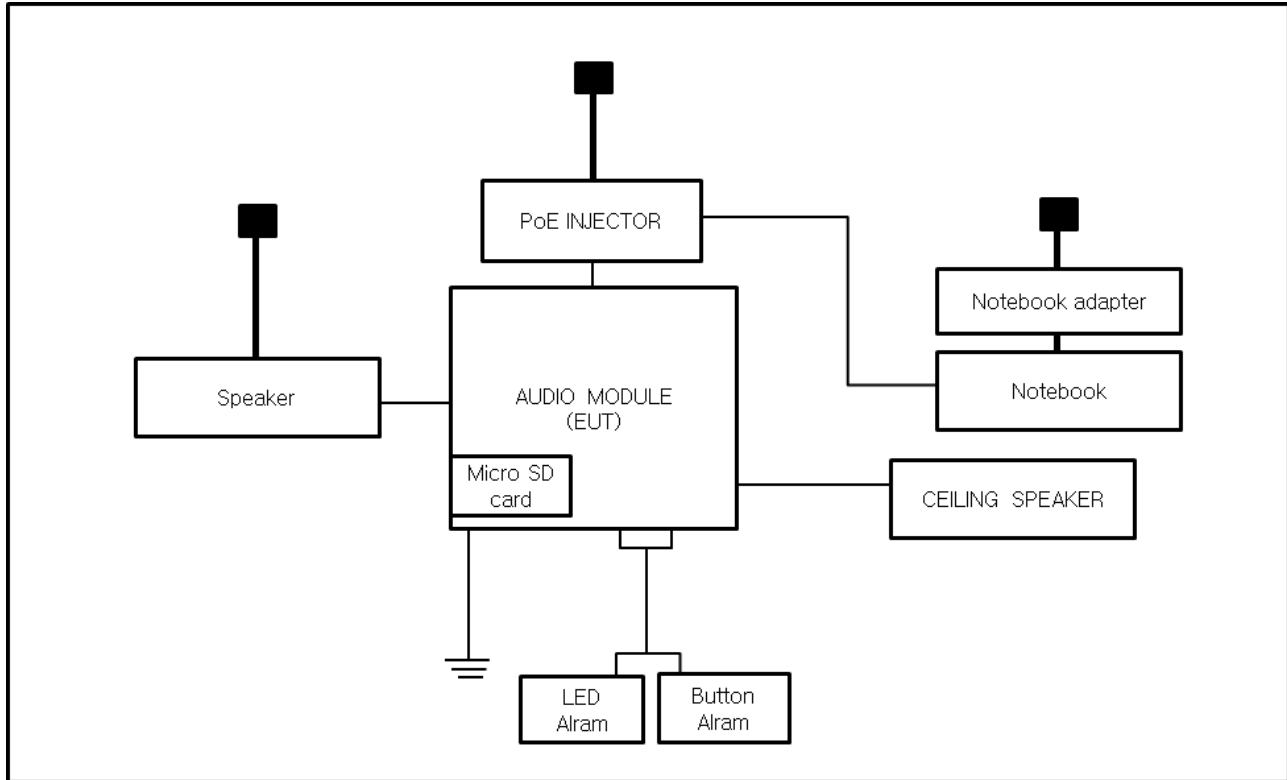
1.7 EUT Operating Mode(s)

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**

☐ 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

Jan. 03, 2023

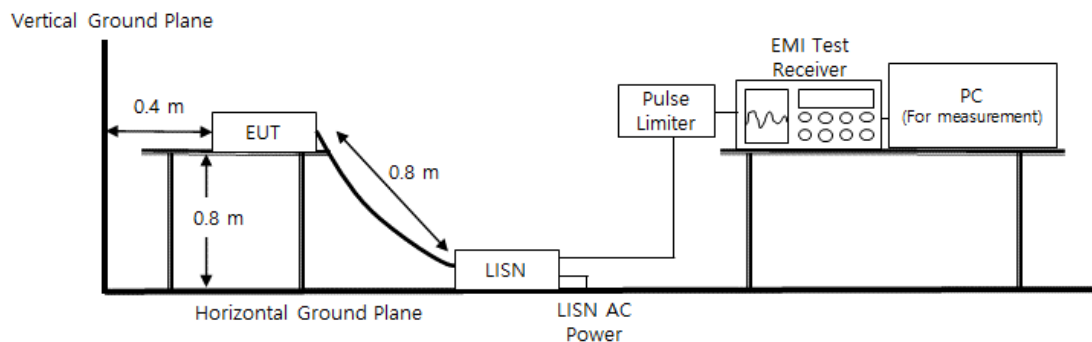
Test Location

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	11, 11, 2023
☒	LISN	ENV216	R & S	101787	11, 10, 2023
☒	LISN	ESH2-Z5	R & S	100450	11, 10, 2023
☒	PULSE LIMITER	ESH3-Z2	R & S	101915	11, 10, 2023

Diagram of test setup





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Test Conditions

Temperature: (22,6 ± 0,1) °C
Relative Humidity: (46,1 ± 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. 03, 2023

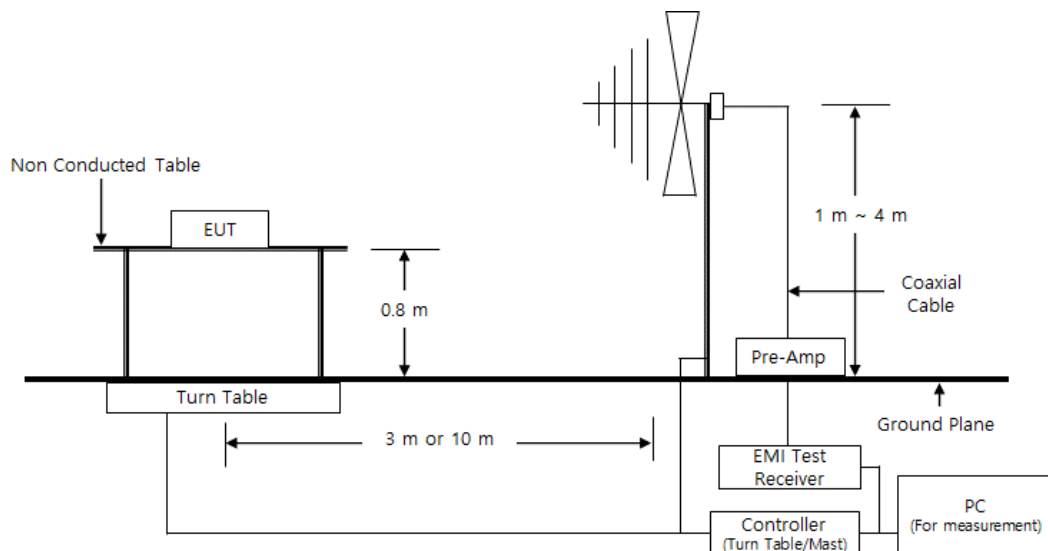
Test Location

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

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	EP5/RE	TOYO Corporation	6.0.0	-
☒	EMI TEST RECEIVER	ESU26	R & S	100551	03, 31, 2023
☒	AMPLIFIER	SCU 01	R & S	100603	11, 10, 2023
☒	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	11, 17, 2024
☒	ATTENUATOR	8491A	HP	32173	03, 08, 2023

Diagram of test setup





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Test Conditions

Temperature: $(22,8 \pm 0,1) ^\circ\text{C}$
Relative Humidity: $(45,1 \pm 0,1) \% \text{ R.H.}$

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

Jan. 03, 2023

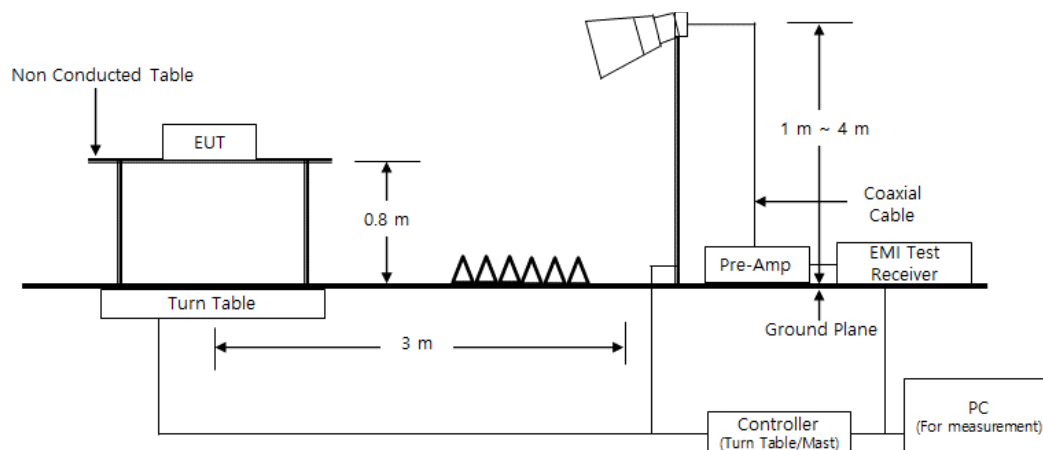
Test Location

SEMI ANECHOIC CHAMBER #5

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
☒	EMI Test S/W	ES10/RE	TOYO Corporation	2022.01.000	-
☒	EMI TEST RECEIVER	ESU26	Rohde & Schwarz	100552	03, 31, 2023
☒	HORN ANTENNA	BBHA 9120D	SCHWARZBECK	9120D-1802	11, 28, 2023
☒	PREAMPLIFIER	8449B	HP	3008A00538	06, 02, 2023
☒	ATTENUATOR	8491B	HP	23094	04, 21, 2023

Diagram of test setup





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Test Conditions

Temperature: $(23,5 \pm 0,1) ^\circ\text{C}$
Relative Humidity: $(44,2 \pm 0,1) \% \text{ R.H.}$

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.

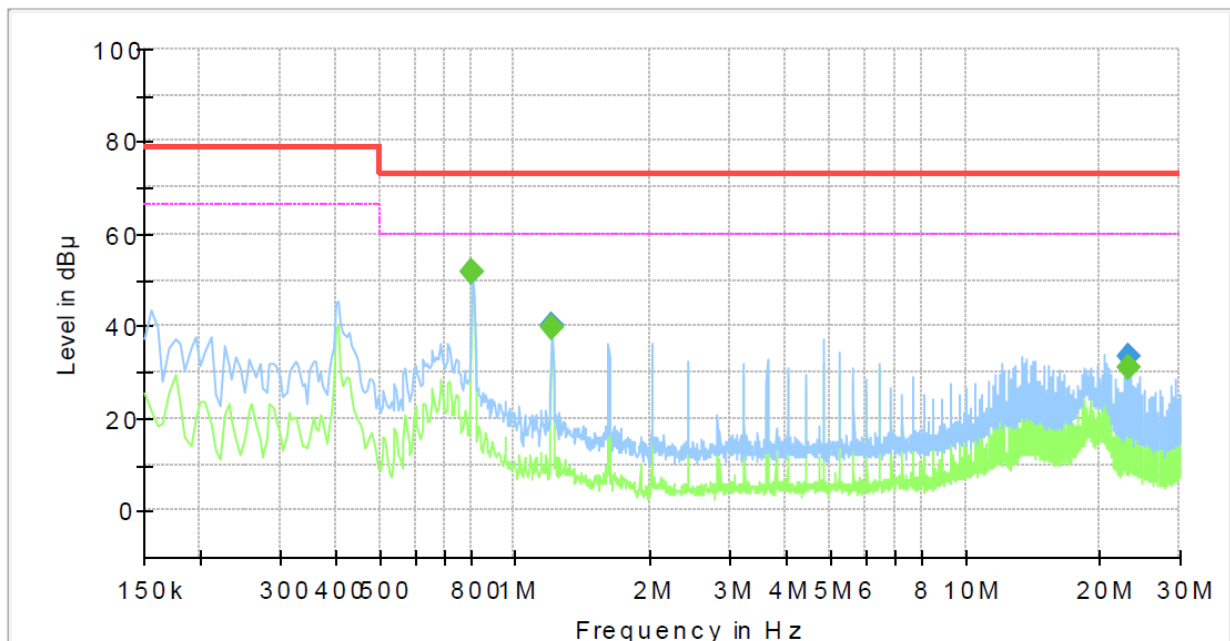
APPENDIX A – TEST DATA

Conducted Emissions at Mains Power Ports

HOT LINE

Common Information

Test Description: Conducted Emission
 Model No.: SPA-D1000
 Phase: L1
 Mode:
 Operator Name: KES



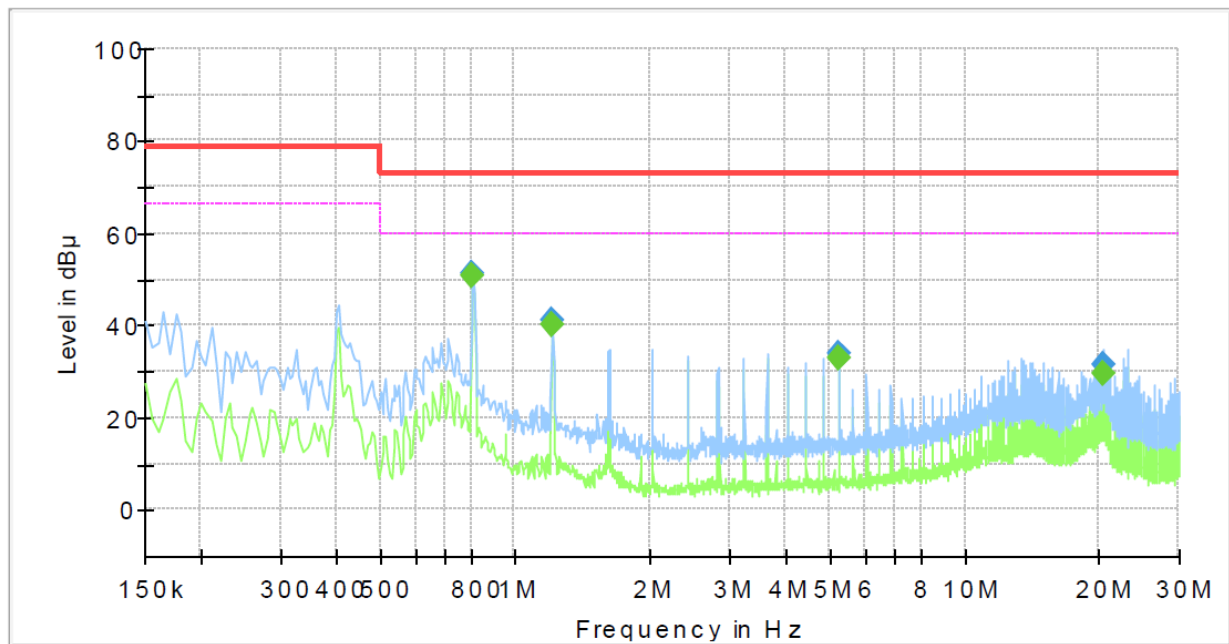
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.805000	---	51.68	60.00	8.32	1000.0	9.000	L1	20.0
0.805000	51.73	---	73.00	21.27	1000.0	9.000	L1	20.0
1.210000	---	39.62	60.00	20.38	1000.0	9.000	L1	20.1
1.210000	40.34	---	73.00	32.66	1000.0	9.000	L1	20.1
23.130000	---	31.22	60.00	28.78	1000.0	9.000	L1	20.2
23.130000	33.32	---	73.00	39.68	1000.0	9.000	L1	20.2

NEUTRAL LINE

Common Information

Test Description: Conducted Emission
 Model No.: SPA-D1000
 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	---	51.01	60.00	8.99	1000.0	9.000	N	20.0
0.805000	51.08	---	73.00	21.92	1000.0	9.000	N	20.0
1.210000	---	40.17	60.00	19.83	1000.0	9.000	N	20.1
1.210000	40.94	---	73.00	32.06	1000.0	9.000	N	20.1
5.240000	---	33.10	60.00	26.90	1000.0	9.000	N	19.7
5.240000	33.91	---	73.00	39.09	1000.0	9.000	N	19.7
20.260000	---	29.48	60.00	30.52	1000.0	9.000	N	20.2
20.260000	31.71	---	73.00	41.29	1000.0	9.000	N	20.2

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

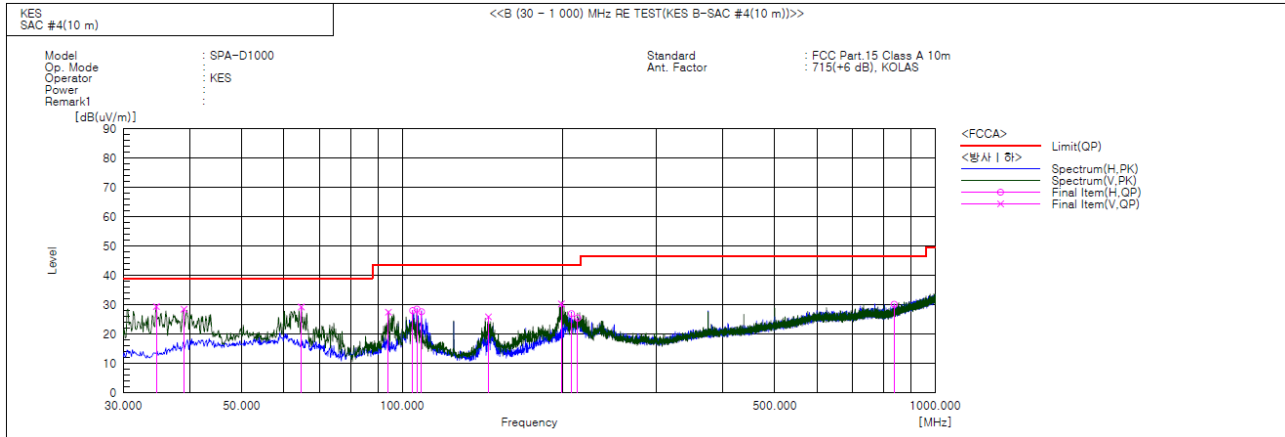
Reading Value : Not shown in the table.

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	34.608	V	53.7	-24.3	29.4	39.0	9.6	100.0	220.0	
2	38.973	V	51.2	-22.7	28.5	39.0	10.5	166.0	75.0	
3	64.678	V	52.0	-22.7	29.3	39.0	9.7	108.0	161.0	
4	94.263	V	50.1	-22.6	27.5	43.5	16.0	100.0	79.0	
5	104.690	H	50.1	-22.1	28.0	43.5	15.5	390.0	330.0	
6	106.630	H	50.8	-22.3	28.5	43.5	15.0	377.0	330.0	
7	108.813	H	50.1	-22.5	27.6	43.5	15.9	355.0	316.0	
8	145.188	V	50.9	-25.0	25.9	43.5	17.6	104.0	161.0	
9	198.901	V	51.4	-21.1	30.3	43.5	13.2	102.0	67.0	
10	207.874	H	47.3	-20.3	27.0	43.5	16.5	400.0	286.0	
11	213.451	H	45.5	-20.0	25.5	43.5	18.0	389.0	199.0	
12	837.646	H	36.0	-5.8	30.2	46.5	16.3	400.0	24.0	

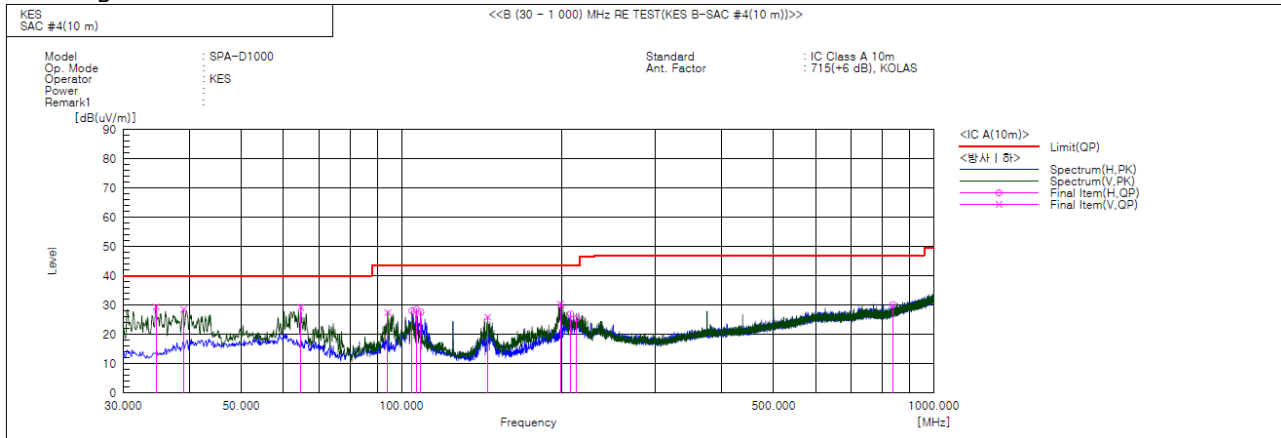


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- IC Regulation ICES-003 Issue 7



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	34.608	V	53.7	-24.3	29.4	40.0	10.6	100.0	220.0	
2	38.973	V	51.2	-22.7	28.5	40.0	11.5	166.0	75.0	
3	64.678	V	52.0	-22.7	29.3	40.0	10.7	108.0	161.0	
4	94.263	V	50.1	-22.6	27.5	43.5	16.0	100.0	79.0	
5	104.690	H	50.1	-22.1	28.0	43.5	15.5	390.0	330.0	
6	106.630	H	50.8	-22.3	28.5	43.5	15.0	377.0	330.0	
7	108.813	H	50.1	-22.5	27.6	43.5	15.9	355.0	316.0	
8	145.188	V	50.9	-25.0	25.9	43.5	17.6	104.0	161.0	
9	198.901	V	51.4	-21.1	30.3	43.5	13.2	102.0	67.0	
10	207.874	H	47.3	-20.3	27.0	43.5	16.5	400.0	286.0	
11	213.451	H	45.5	-20.0	25.5	43.5	18.0	389.0	199.0	
12	837.646	H	36.0	-5.8	30.2	47.0	16.8	400.0	24.0	

◆ 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)]

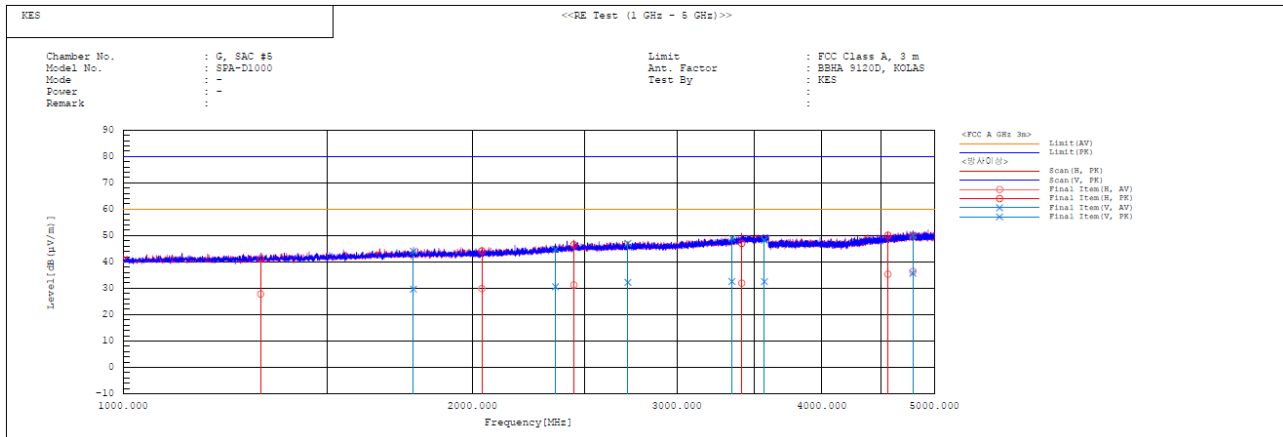
Reading(QP) : Reading value, Result(QP) : Reading value + Factor value

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

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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	1314.143	H	28.7	42.2	-0.9	27.8	41.3	60.0	80.0	32.2	38.7	377.0	275.4	
2	1779.665	V	28.5	42.8	1.2	29.7	44.0	60.0	80.0	30.3	36.0	155.0	121.8	
3	2038.256	H	27.8	42.1	2.1	29.9	44.2	60.0	80.0	30.1	35.8	366.0	63.6	
4	2358.679	V	27.5	41.7	3.1	30.6	44.8	60.0	80.0	29.4	35.2	100.0	267.9	
5	2446.098	H	27.9	43.1	3.4	31.3	46.5	60.0	80.0	28.7	33.5	278.0	222.0	
6	2723.256	V	27.9	42.7	4.3	32.2	47.0	60.0	80.0	27.8	33.0	109.0	276.7	
7	3347.699	V	27.2	43.6	5.4	32.6	49.0	60.0	80.0	27.4	31.0	188.0	263.7	
8	3412.507	H	26.4	41.5	5.5	31.9	47.0	60.0	80.0	28.1	33.0	353.0	196.9	
9	3569.588	V	26.6	42.3	5.9	32.5	48.2	60.0	80.0	27.5	31.8	157.0	98.5	
10	4560.442	H	26.3	41.1	9.0	35.3	50.1	60.0	80.0	24.7	29.9	398.0	346.8	
11	4792.055	V	25.7	40.1	10.0	35.7	50.1	60.0	80.0	24.3	29.9	100.0	246.2	
12	4792.124	H	26.4	40.0	10.0	36.4	50.0	60.0	80.0	23.6	30.0	272.0	279.9	

◆ 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

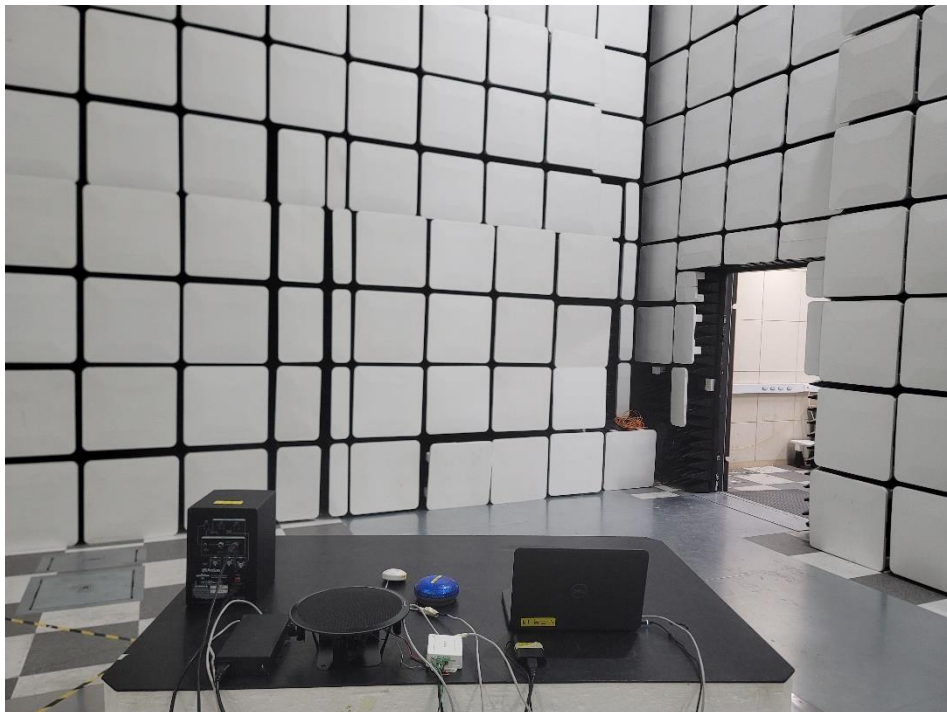
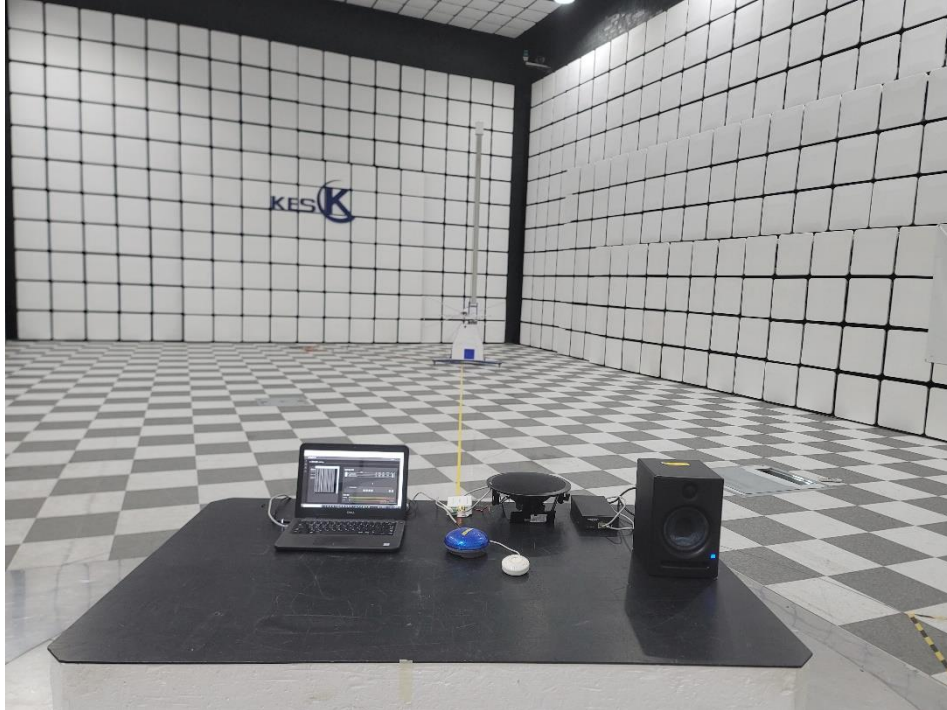
Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports



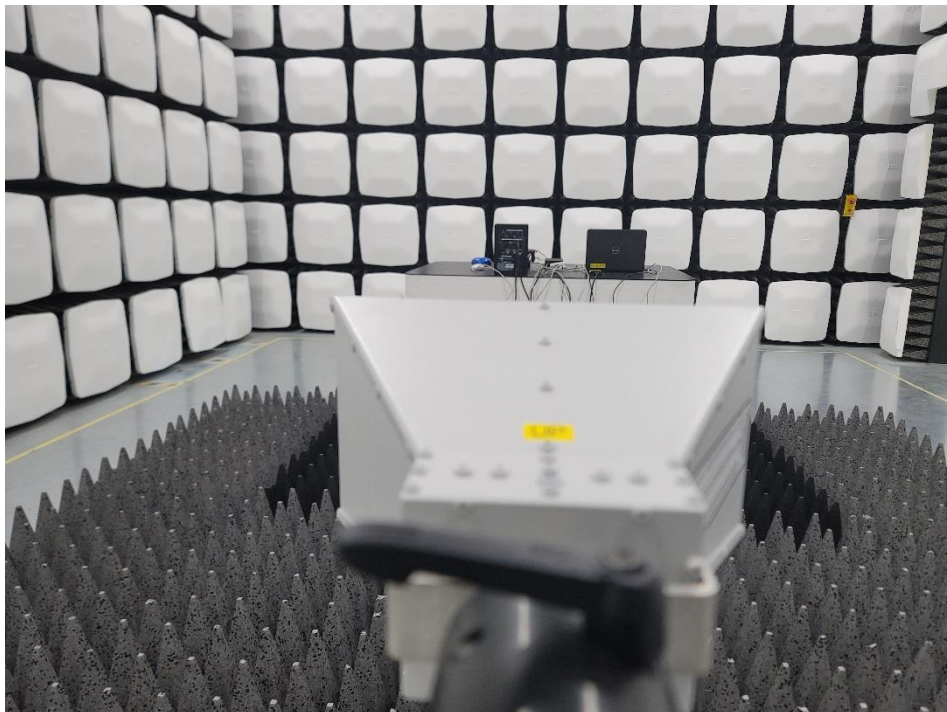
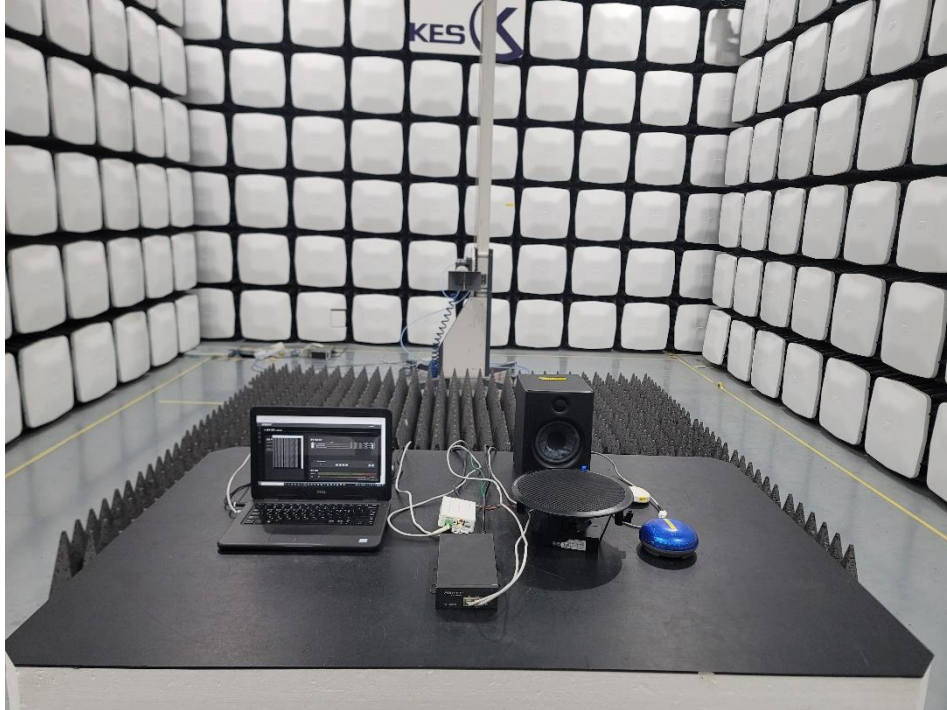
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Radiated Electric Field Emissions(Below 1 GHz)



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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

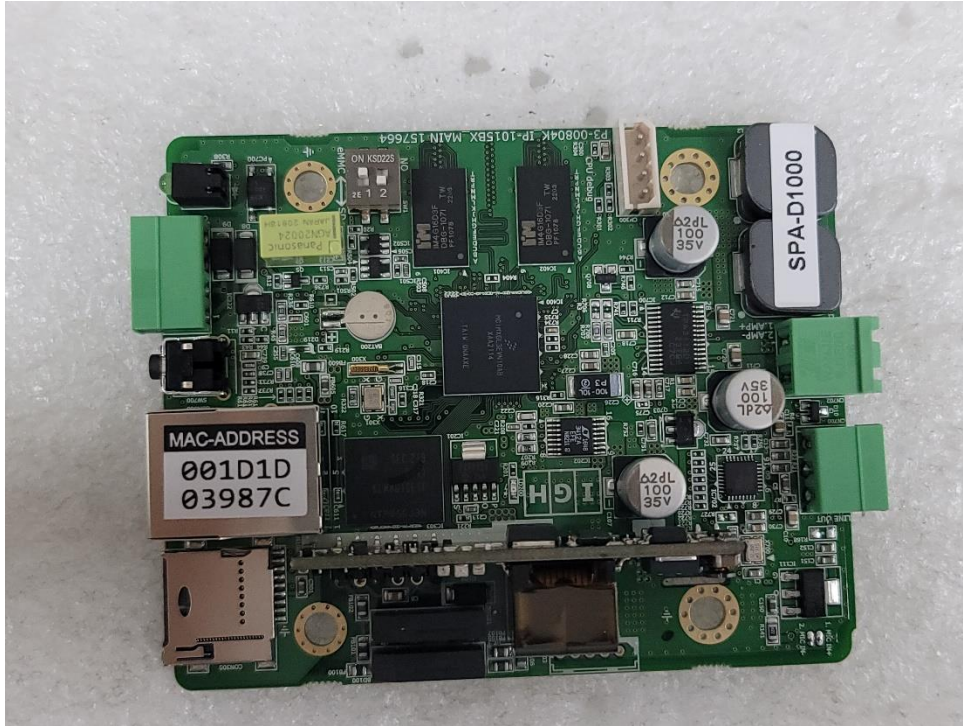
(Internal View)



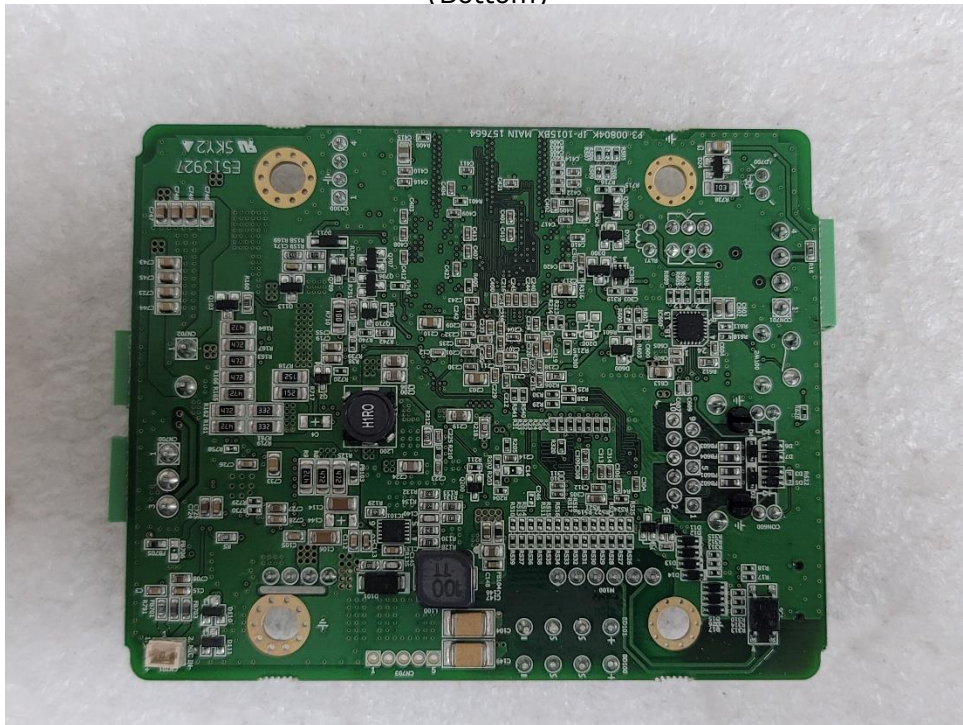
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EUT Internal View – Board 1

(Top)



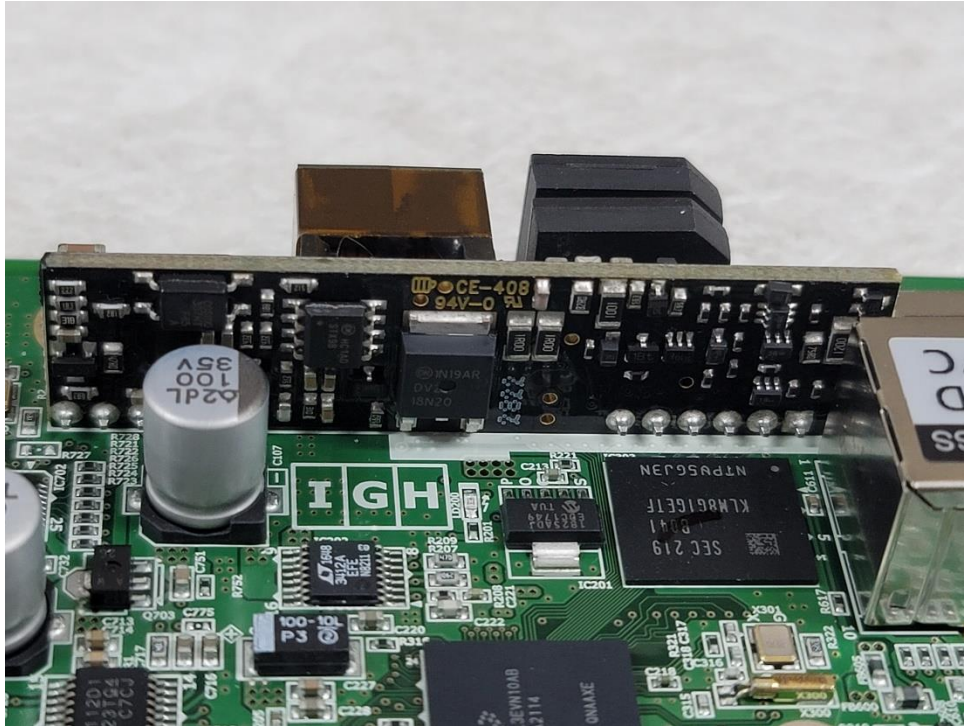
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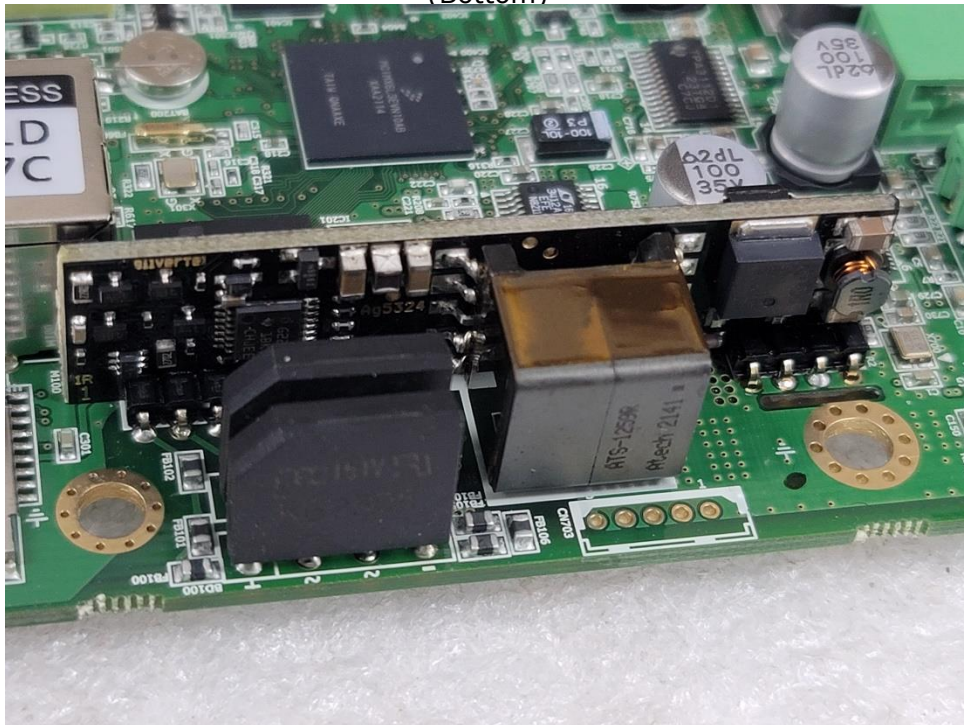
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EUT Internal View – Board 2

(Top)



(Bottom)



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Label Photographs

FCC Label



Hanwha Vision Co., Ltd

SPA-D1000

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.