



EMC TEST REPORT For CE

Test Report No. : KES-EM-21T1240-R2
Date of Issue : Feb. 24, 2023
Product name : NETWORK MICROPHONE
Model/Type No. : SPA-M1000
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
Date of Receipt : Dec. 07, 2021
Test date : Dec. 23, 2021 ~ Dec. 27, 2021
Test Results : ☒ **In Compliance** ☐ **Not in Compliance**

Tested by

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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
Dec. 30, 2021	KES-EM-21T1240	Issued
Jan. 27, 2023	KES-EM-21T1240-R1	Change Manufacturer
Feb. 24, 2023	KES-EM-21T1240-R2	Change the Applicant at the request of the customer

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1.0 General Product Description

Main Specifications of EUT are:

WISNET AMS	Specification	SPA-M1000
Product	Type	SIP Microphone
MIC Input	Input Sensitivity	-50dBV ± 3dB
	Frequency Response	100Hz ~ 18kHz
Line Output	Output Level	0dBV± 3dB
	Frequency Response	100Hz ~ 18kHz
	THD + N Ratio	less than 0.1%
	S/N Ratio (20Hz HPF, 20kHz LPF)	greater than 75dB
Power Amp	Output Power (8Ω, 1kHz Sine wave)	-
	Frequency Response (1W, 8Ω)	-
	S/N Ratio (20Hz HPF, 20kHz LPF)	-
Network	Ethernet	100/1000 Base-T
Memory	External Memory (Micro SD)	-
Contact	Contact Input	-
	Contact Output (Rating : 1A DC 30V, 0.3A AC 125V)	-
General	Operating Temperature	-10 ~ 40°C (14°F ~ 104°F)
	Operating Humidity	10~100% RH Non-condensing
	IP code	-
	Weight	1.29Kg
	Size	200(W) x 73(H) x 206(D)mm
	Color	Black & Gray
	Certificate	EMC : KN 32/ 35, EN 55032/ 55035, FCC Part 15, Subpart B
Power	PoE	Max.10W, DC24V
	PoE+	PoE (IEEE 802.3 af type 1 Class 3)
Audio	Built-in microphone	-
	Audio Streaming	-
	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	-
Amplifier	Amplifier	-
Network	Security	-
	Supported Protocols	IPv4, HTTP, SIP, Bonjour, DNS, NTP, TCP, UDP, DHCP, ARP, SSH, ICMP, Network Bonding
System Integration	API (Application Programming Interface)	-
	Multi-source Dynamic PA control	-
	Voice Announcement	-
	VoIP	-
	TTS	-
	Intelligent Audio	-
	Event Triggers	-
	Functional Monitoring	-
	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 230 V, 50Hz ☒ PoE

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 MICROPHONE	SPA-M1000	-	Inter-M Corporation	EUT

1.5 Support Equipments

Description	Model Number	Serial Number	Manufacturer	Remarks
AC / DC Adapter	KPL-060M-VI	-	Channel Well Technology (Guangzhou) Co.,Ltd.	-
WALL SPEAKER	SPA-W100B	-	Inter-M Corporation	-
AUDIO MODULE	SPA-D1000	-	Inter-M Corporation	-
Notebook	P98F004	21599158359	DELL INC.	-
Notebook Adapter	LA240PM190	-	LITE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	-
PoE Switch	GS728TPP	3AR3595700005	NETGEAR®	-
Smartphone 1	SM-N960N	0364287	SAMSUNG	-
Smartphone 2	G8441	-	SONY	-

1.6 External I/O Cabling

■ DC 24 V Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK MICROPHONE (EUT)	DC jack	AC / DC Adapter	Line out	1.5	U
	AUX IN	Smartphone 1	3.5 mm	1.2	U
	-	Smartphone 2	-	-	-
PoE Switch	RJ-45	NETWORK MICROPHONE (EUT)	RJ-45	20.0	U
	RJ-45	WALL SPEAKER	RJ-45	4.0	U
	RJ-45	AUDIO MODULE	RJ-45	4.0	U
Notebook	DC Jack	Notebook Adapter	Line out	1.5	U

* Unshielded=U, Shielded=S

■ PoE Mode

Start		END		Cable Spec.	
Description	I/O Port	Description	I/O Port	Length	Shield
NETWORK MICROPHONE (EUT)	AUX IN	Smartphone 1	3.5 mm	1.2	U
	-	Smartphone 2	-	-	-
PoE Switch	RJ-45	NETEWORK MICROPHONE (EUT)	RJ-45	20.0	U
	RJ-45	WALL SPEAKER	RJ-45	4.0	U
	RJ-45	AUDIO MODULE	RJ-45	4.0	U
Notebook	DC Jack	Notebook Adapter	Line out	1.5	U

* Unshielded=U, Shielded=S

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1.7 EUT Operating Mode(s)

Test Mode	operating
DC 24 V, PoE	1. Run a PING test on the laptop to check if the EUT is connected normally, access the web page of the AUDIO MODULE, and check whether the EUT is activated. 2. We checked whether the 1 kHz tone sound played on smartphone 1 connected to EUT and the 1 kHz tone sound played on smartphone 2 are normally output to EUT's speakers and WALL SPEAKER.

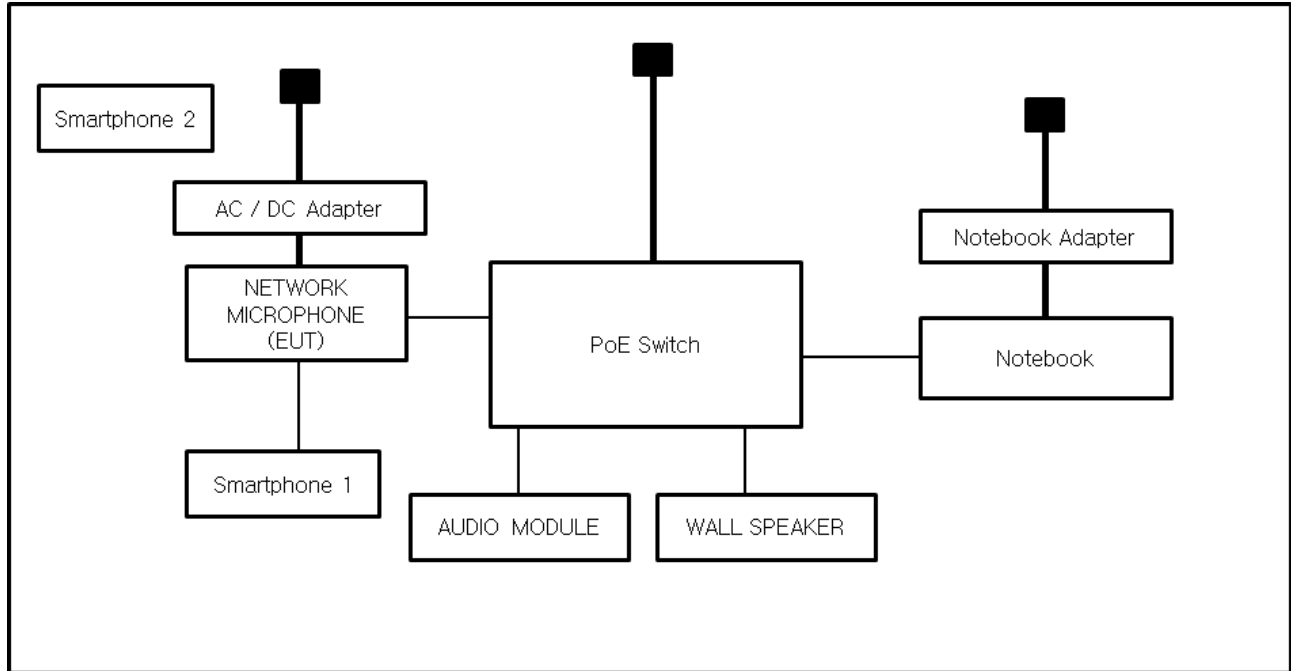
EUT Test operating S/W		
Name	Version	Manufacture Company
Web Viewer	-	Hanwha Vision Co., Ltd

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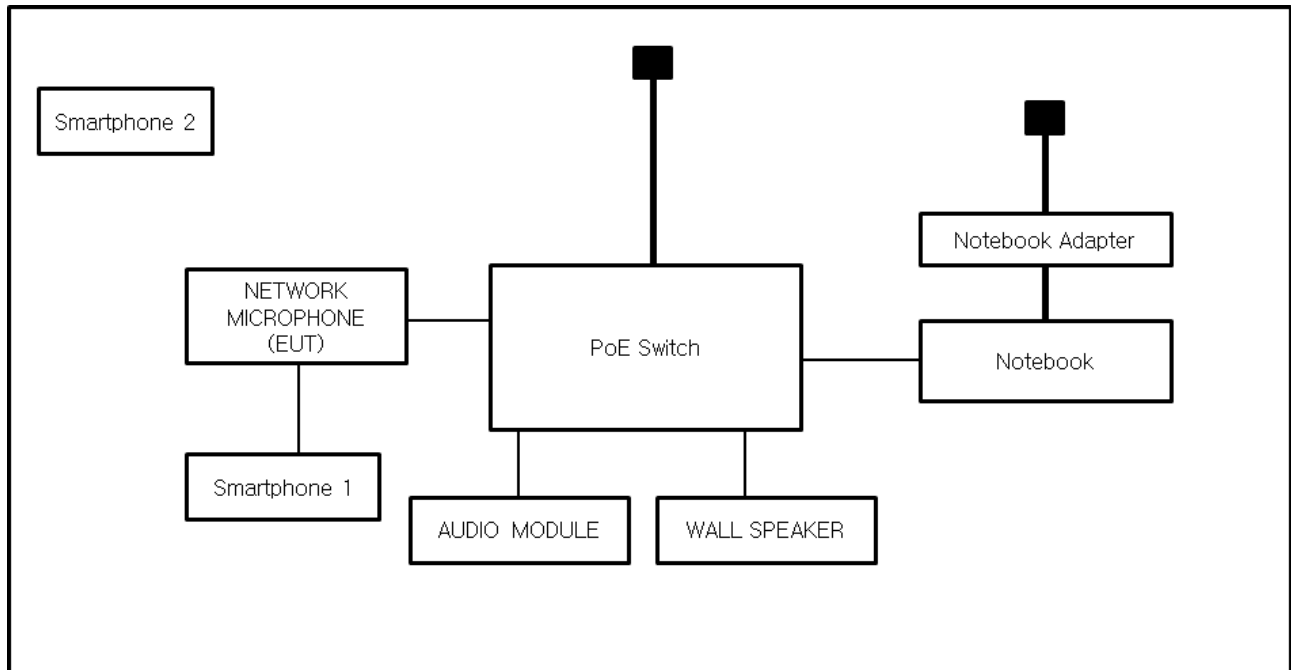
1.8 Configuration

■ AC Main
 □ DC Main

■ DC 24 V Mode



■ PoE Mode



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**

☒ **EMC – Regulations 2016/1091**

☒ EN 55032:2015/A11:2020

☒ BS EN 55032:2015/A11:2020

☒ Class A

☒ Class A

☐ Class B

☐ Class B

☒ EN 55035:2017/A11:2020

☒ BS EN 55035:2017/A11:2020

☒ EN 61000-3-2:2014

☒ BS EN 61000-3-2:2014

☒ EN 61000-3-3:2013

☒ BS EN 61000-3-3:2013

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2.1 Conducted Emissions at Mains Power Ports

Test Date

Dec. 23, 2021

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	01, 15, 2022
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	12, 29, 2021
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021

Test Conditions

Temperature: (22,7 ± 0,1) °C

Relative Humidity: (43,0 ± 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

RemarksSee Appendix A for test data.

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2.2 Conducted Emissions at Telecommunication Ports

Test Date

Dec. 23, 2021

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	01, 15, 2022
<input checked="" type="checkbox"/>	LISN	ENV216	R & S	101787	12, 29, 2021
<input checked="" type="checkbox"/>	LISN	ESH2-Z5	R & S	100450	12, 29, 2021
<input checked="" type="checkbox"/>	PULSE LIMITER	ESH3-Z2	R & S	101915	12, 29, 2021
<input type="checkbox"/>	8-WIRE ISN CAT3,5	ENY81	R & S	100174	12, 30, 2021
<input checked="" type="checkbox"/>	8-WIRE ISN CAT6	ENY81-CAT6	R & S	101665	12, 30, 2021

Test Conditions

Temperature: (22,7 ± 0,1) °C

Relative Humidity: (43,0 ± 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

Dec. 23, 2021

Test Location

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

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, 01, 2022
<input checked="" type="checkbox"/>	AMPLIFIER	SCU 01	R & S	100603	11, 24, 2022
<input checked="" type="checkbox"/>	TRILOG-BROADBAND ANTENNA	VULB9163	Schwarzbeck	715	12, 08, 2022
<input checked="" type="checkbox"/>	ATTENUATOR	8491A	HP	32173	03, 10, 2022

Test Conditions

Temperature: (22,7 ± 0,1) °C
Relative Humidity: (43,0 ± 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

Dec. 25, 2021

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, 03, 2022
<input checked="" type="checkbox"/>	PREAMPLIFIER	8449B	AGILENT	3008A01967	04, 07, 2022
<input type="checkbox"/>	ATTENUATOR	8491A	HP	35496	03, 10, 2022
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2022

Test Conditions

Temperature: (22,2 ± 0,1) °C

Relative Humidity: (42,9 ± 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.



2.5 Harmonic Current Emissions

Test Date

Dec. 27, 2021

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	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2022
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (22,3 ± 0,1) °C

Relative Humidity: (43,4 ± 0,1) % R.H.

Classification of Equipment for Harmonic Current Emissions

- ☒ Class A
☐ Class B
☐ Class C(Below 25 W)
☐ Class C(Above 25 W)
☐ Class D

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.6 Voltage Fluctuations and Flicker

Test Date

Dec. 27, 2021

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	net.control	EM TEST	2.1.4	-
<input checked="" type="checkbox"/>	DIGITAL POWER ANALYZER	DPA 500N	EM TEST	V1024106759	04, 06, 2022
<input checked="" type="checkbox"/>	POWER SOURCE	ACS 500N6	EM TEST	V1024106760	-

Test Conditions

Temperature: (22,3 ± 0,1) °C
Relative Humidity: (43,4 ± 0,1) % R.H.

Test Results

The requirements are:

- ☒ PASS
☐ NOT PASS
☐ NOT APPLICABLE

Remarks

See Appendix A for test data.

3.0 Criteria for compliance

General performance criteria

General performance criteria are defined in 8.2, 8.3 and 8.4. These criteria shall be used during the testing of primary functions where no relevant annex is applicable.

When assessing the impact of a disturbance on a function, the assessment should take into consideration the function's performance prior to the application of the disturbance and only identify as failures those changes in performance that are a result of the disturbance.

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended.

The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.

Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3.1 Electrostatic Discharge

Reference Standard

EN 61000-4-2:2009
BS EN 61000-4-2:2009

Test Date

Dec. 27, 2021

Test Location

EMS-ESD: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	ESD SIMULATOR	ESS-2000	Noise Ken	ESS01Z0454	02, 01, 2022
<input checked="" type="checkbox"/>	HCP	-	KES	-	-
<input checked="" type="checkbox"/>	VCP	-	Noise Ken	-	-

Test Conditions

Temperature: (22,2 ± 0,1) °C
Relative Humidity: (43,2 ± 0,1) % R.H.
Atmospheric Pressure: (100,3 ± 0,0) kPa

Test Specifications

Discharge Factor: ≥ 1 s

Discharge Impedance: 330 ohm / 150 pF

Kind of Discharge: Air, Contact (direct and indirect)

Polarity: Positive and Negative

Number of Discharge: 10 at all locations for Air discharge
10 at all locations for Contact discharge

Discharge Voltage:	Contact <input type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	Air <input checked="" type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input checked="" type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	HCP <input type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV	VCP <input type="checkbox"/> 2 kV <input checked="" type="checkbox"/> 4 kV <input type="checkbox"/> 6 kV <input type="checkbox"/> 8 kV <input type="checkbox"/> 15 kV
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Notes: HCP: Horizontal coupling plane

VCP: Vertical coupling plane

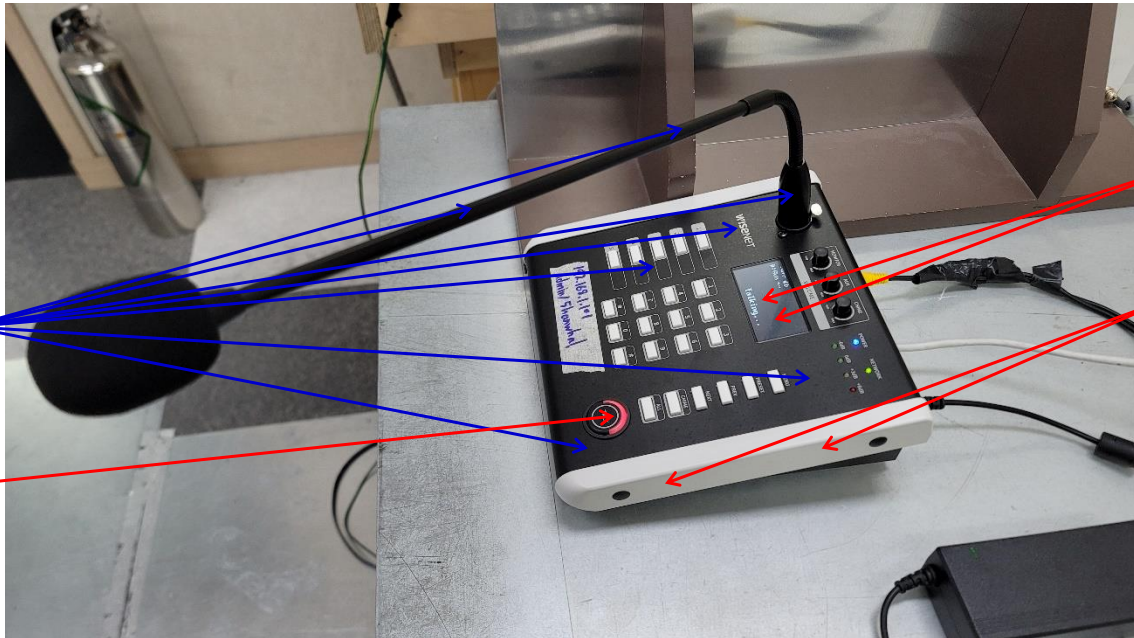
Required Performance Criteria: ☒ B

Location of Discharge:

Air
Contact

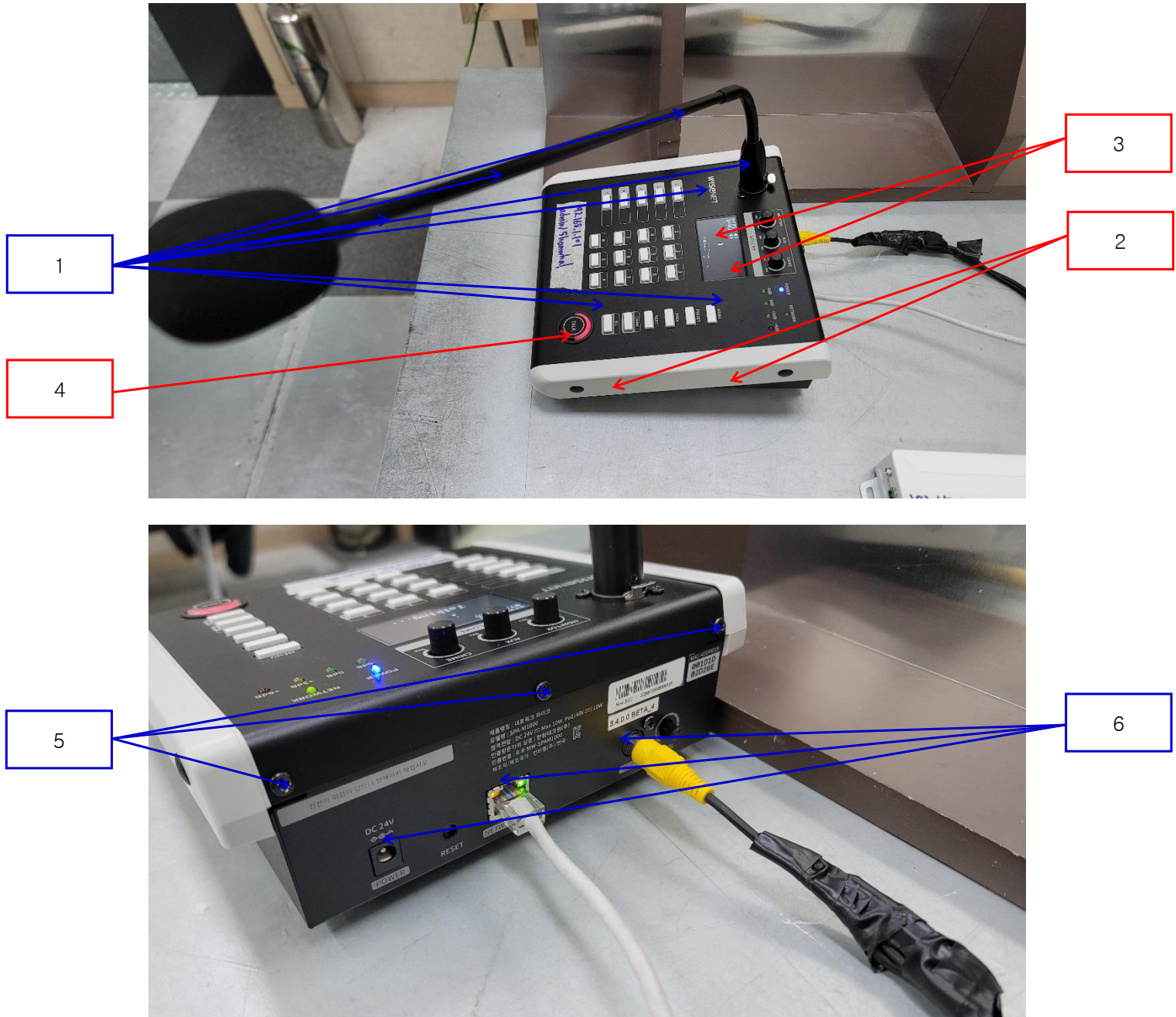


■ DC 24 V Mode



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■ PoE Mode



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Test Data**■ DC 24 V Mode**

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HCP Contact	Contact Discharge	B	A	-
2	VCP Contact	Contact Discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	Enclosure 1	Contact Discharge	B	A	-
2	Enclosure 2	Air Discharge	B	A	-
3	Display	Air Discharge	B	A	-
4	Button	Air Discharge	B	A	-
5	Screw	Contact Discharge	B	A	-
6	Around the port	Contact Discharge	B	A	-

■ PoE Mode**Indirect Discharge**

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	HCP Contact	Contact Discharge	B	A	-
2	VCP Contact	Contact Discharge	B	A	-

Direct Discharge

No.	Test Point	Discharge Method	Performance		Remarks
			Criteria	Results	
1	Enclosure 1	Contact Discharge	B	A	-
2	Enclosure 2	Air Discharge	B	A	-
3	Display	Air Discharge	B	A	-
4	Button	Air Discharge	B	A	-
5	Screw	Contact Discharge	B	A	-
6	Around the port	Contact Discharge	B	A	-

Note: "Blank" = Not performed

Results:

- A – No degradation of function
- B – Distortion/Error of function (self-recoverable)
- C – Loss of function

Test Results

- ☒ PASS Required Performance Criteria
- ☐ NOT PASS Required Performance Criteria

Remarks

N/A

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3.2 Radiated Electric Field Immunity

Reference Standard

EN 61000-4-3:2006 +A2:2010
BS EN 61000-4-3:2006 +A2:2010

Test Date

Dec. 24, 2021

Test Location

EMS-RS: ☐ SEMI ANECHOIC CHAMBER #2 ☒ SEMI ANECHOIC CHAMBER #3

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	EMC32	R & S	10.10.02	-
<input checked="" type="checkbox"/>	SIGNAL GENERATOR	SMB 100A	Rohde & Schwarz	108252	08, 03, 2022
<input checked="" type="checkbox"/>	HIGH POWER DUAL AMP	SSA532	SUNGSAN	SSA532-001	-
<input checked="" type="checkbox"/>	POWER METER	E4419B	Agilent	GB40203000	04, 01, 2022
<input checked="" type="checkbox"/>	CW POWER SENSOR	E4412A	Agilent	US38488240	04, 01, 2022
<input checked="" type="checkbox"/>	CW POWER SENSOR	E4412A	Agilent	MY41501662	04, 01, 2022
<input checked="" type="checkbox"/>	STACKED DOUBLE LOG-PER- ANTENNA	STPL9128 E	Schwarzbeck	9128ES-121	-
<input checked="" type="checkbox"/>	DOUBLE RIDGED HORN ANTENNA	SAS-571	A.H.SYSTEM,INC	781	03, 11, 2022
<input checked="" type="checkbox"/>	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 02, 2022
<input checked="" type="checkbox"/>	MICROPHONE	MP201	BSWA	551675	11, 04, 2022

Test Conditions

Temperature: (22,6 ± 0,1) °C
Relative Humidity: (43,1 ± 0,1) % R.H.
Atmospheric Pressure: (100,6 ± 0,0) kPa



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Test Specifications

Antenna Polarization: Horizontal & vertical unless indicated otherwise

Antenna Distance: ☒ 3 m

Field Strength: ☐ 1 V/m ☒ 3 V/m
☐ 10 V/m

Frequency Range: ☒ 80 MHz to 1 GHz (swept test) ☐ 1,4 GHz to 2,7 GHz
☒ 1.8 GHz , 2.6 GHz , 3.5 GHz , 5 GHz ($\pm 1\%$) (spot test)

Modulation: ☒ AM, 80 %, 1 kHz sine wave
☐ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step: ☒ 1 % step

Dwell Time: ☒ 1 s ☐ 3 s

of Sides Radiated: ☒ 4

Required Performance Criteria: ☒ A

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Test Data

■ DC 24 V Mode

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

[Audio output function]

☐ Electrical Measurements / ☒ Acoustic Measurements

Measured parts	Test method	Level (dB)		Performance criteria	Observations	
		Criteria	Measured		Horizontal	Vertical
EUT Speaker	loudspeakers	90.14	Low	A	A	A

* The SOUND ACOUSTIC TESTER mark characteristics indicate low if less than 50 dB.

■ PoE Mode

Side Exposed	Performance Criteria	Results	
		Horizontal	Vertical
Front	A	A	A
Right	A	A	A
Back	A	A	A
Left	A	A	A

[Audio output function]

☐ Electrical Measurements / ☐ Acoustic Measurements

Measured parts	Test method	Level (dB)		Performance criteria	Observations	
		Criteria	Measured		Horizontal	Vertical
-	-	-	-	A	-	-

* The SOUND ACOUSTIC TESTER mark characteristics indicate low if less than 50 dB.

Note: "Blank" = Not performed

Results:

- A – No degradation of function
- B – Distortion/Error of function (self-recoverable)
- C – Loss of function

Test Results

- ☒ PASS Required Performance Criteria
- ☐ NOT PASS Required Performance Criteria

Remarks

N/A

3.3 Electrical Fast Transients/Bursts

Reference Standard

EN 61000-4-4:2012

BS EN 61000-4-4:2012

Test Date

Dec. 26, 2021

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
<input checked="" type="checkbox"/>	CAPACITIVE COUPLING CLAMP	HFK	EM TEST	P1633183115	12, 03, 2022

Test Conditions

Temperature: (22,4 ± 0,1) °C
Relative Humidity: (43,7 ± 0,1) % R.H.
Atmospheric Pressure: (100,1 ± 0,0) kPa

Test Specifications

Pulse Amplitude & Polarity: ☒ ± 1.0 kV ☐ ± 2.0 kV
(Power Lines) ☐ ± 4.0 kV

Pulse Amplitude & Polarity: ☒ ± 0.5 kV ☐ ± 1.0 kV
(Signal Lines) ☐ ± 2.0 kV

Burst Period: ☒ 300 ms ☐ 2 s

Repetition Rate: ☒ 5 kHz ☐ 100 kHz

Duration of Test Voltage: ☒ ≥ 1 min

Required Performance Criteria: ☒ B

Test Data

■ DC 24 V Mode

☒ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
L	B	A	A
N	B	A	A
PE	B	A	A
L – N	B	A	A
L – PE	B	A	A
N – PE	B	A	A
L – N – PE	B	A	A

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
RJ-45	B	A	A

☒ PoE Mode

☐ Input a.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
L	B	-	-
N	B	-	-
PE	B	-	-
L – N	B	-	-
L – PE	B	-	-
N – PE	B	-	-
L – N – PE	B	-	-

☐ Input d.c. power ports – Coupling/Decoupling Network used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
-	B	-	-

☒ Signal ports and telecommunication ports – Coupling Clamp used

Mode of Application	Performance Criteria	Results	
		(+) Burst (kV)	(-) Burst (kV)
RJ-45	B	A	A

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results

☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

N/A

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3.4 Surge Transients

Reference Standard

EN 61000-4-5:2014

BS EN 61000-4-5:2014

Test Date

Dec. 26, 2021

Test Location

EMS-EFT: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022

Test Conditions

Temperature: (22,4 ± 0,1) °C

Relative Humidity: (43,7 ± 0,1) % R.H.

Atmospheric Pressure: (100,1 ± 0,0) kPa

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Test Specifications

AC Power Lines

Source Impedance: 12 ohm for common mode and 2 ohm for differential mode

Surge Amplitude :

Common Mode

☒ (0,5 / 1,0 / 2,0) kV

Differential Mode

☒ (0,5 / 1,0) kV

Number of Surges:

☒ 5 surges per angle

Angle:

☒ 90°, 270° (input a.c. power port)

Polarity:

☒ Positive & Negative

Repetition Rate:

☒ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☒ B

Signal Lines

Source Impedance:

42 ohm for common mode

Surge Amplitude:

Common Mode

☐ (1,0) kV

Number of Surges:

☐ 5 Surges

Polarity:

☐ Positive & Negative

Repetition Rate:

☐ 1 surge per min ☐ 1 surge per 30 sec.

Required Performance Criteria: ☐ B

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Test Data☒ DC 24 V Mode☒ Line to Line – Differential Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
L – N	B	A	A

☒ Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
L – PE	B	A	A
N – PE	B	A	A

Signal Lines☐ Line to Earth – Common Mode

Mode of Application	Performance Criteria	Results	
		(+) Surge (kV)	(-) Surge (kV)
-	B	-	-

Note: “Blank” = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria**Remarks**N/A

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3.5 Conducted Disturbance

Reference Standard

EN 61000-4-6:2014

BS EN 61000-4-6:2014

Test Date

Dec. 25, 2021

Test Location

EMS-CS: Electro wave Shieldroom #6

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	icd.control	EM TEST	5.3.12	-
<input checked="" type="checkbox"/>	CONTINUOUS WAVE SIMULATOR	CWS 500N1.4	EM TEST	P1602169880	11, 24, 2022
<input checked="" type="checkbox"/>	ATTENUATOR	ATT 6/80	EM TEST	P1614178148	11, 24, 2022
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43694	11, 24, 2022
<input checked="" type="checkbox"/>	CDN	CDN M016	TESEQ	43697	11, 24, 2022
<input checked="" type="checkbox"/>	CDN	CDN T800	TESEQ	42800	11, 24, 2022
<input type="checkbox"/>	EM CLAMP	KEMZ 801A	TESEQ	44099	11, 25, 2022
<input checked="" type="checkbox"/>	SOUND ACOUSTIC TESTER	TST-1000	TESTEK	150045	11, 02, 2022
<input checked="" type="checkbox"/>	MICROPHONE	MP201	BSWA	551675	11, 04, 2022

Test Conditions

Temperature: (22,6 ± 0,1) °C

Relative Humidity: (43,3 ± 0,1) % R.H.

Atmospheric Pressure: (100,0 ± 0,0) kPa



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Test Specifications

Frequency range:

☐ 150 kHz to 100 MHz

☒ 150 kHz to 80 MHz

Voltage Level:

☒ 3 Vrms (150 kHz to 10 MHz)

☒ 3 Vrms to 1Vrms (10 MHz to 30 MHz)

☒ 1 Vrms (30 MHz to 80 MHz)

Modulation:

☒ AM, 80 %, 1 kHz sine wave

☐ PM, 1 Hz (0,5 s ON : 0,5 s OFF)

Frequency step:

☒ 1 % step

Dwell Time:

☒ 1 s

☐ 3 s

Required Performance Criteria: ☒ A

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Test Data

■ DC 24 V Mode

☒ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
L – N – PE	CDN	A	A

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	A	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
RJ-45	CDN	A	A

[Audio output function]

☐ Electrical Measurements / ☒ Acoustic Measurements

Measured parts	Test method	Level (dB)		Performance criteria	Observations	
		Criteria	Measured		Horizontal	Vertical
EUT Speaker	loudspeakers	90.17	Low	A	A	A

* The SOUND ACOUSTIC TESTER mark characteristics indicate low if less than 50 dB.

■ PoE Mode
☐ Input a.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	A	-

☐ Input d.c. power ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
-	-	A	-

☒ Signal ports and telecommunication ports

Coupling Location (Line Stressed)	Coupling Method	Performance Criteria	Results
RJ-45	CDN	A	A

[Audio output function]

☐ Electrical Measurements / ☐ Acoustic Measurements

Measured parts	Test method	Level (dB)		Performance criteria	Observations	
		Criteria	Measured		Horizontal	Vertical
-	-	-	-	A	-	-

* The SOUND ACOUSTIC TESTER mark characteristics indicate low if less than 50 dB.

Notes: CDN = Coupling Decoupling Network
"blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results
☒ PASS Required Performance Criteria

☐ NOT PASS Required Performance Criteria

Remarks

N/A

3.6 Power Frequency Magnetic Field Immunity

Reference Standard

EN 61000-4-8:2010

BS EN 61000-4-8:2010

Test Date

Dec. 27, 2021

Test Location

EMS-Magnetic: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	12, 03, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022
<input checked="" type="checkbox"/>	MAGNETIC FIELD COIL	MS 100N	EM TEST	P1536163691	12, 07, 2022
<input checked="" type="checkbox"/>	CURRENT TRANSFORMER	MC 2630	EM TEST	P1629182219	12, 07, 2022

Test Conditions

Temperature: (22,2 ± 0,1) °C

Relative Humidity: (43,2 ± 0,1) % R.H.

Atmospheric Pressure: (100,3 ± 0,0) kPa

Test SpecificationsField Strength: ☒ 1 A/m ☐ 3 A/m
☐ 30 A/mFrequency: ☒ 50 Hz ☐ 60 HzRequired Performance Criteria: ☒ A

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Test Data

■ DC 24 V Mode

☒ Immersion method

Coil orientation	Performance Criteria	Results
X - axis	A	A
Y - axis	A	A
Z - axis	A	A

■ PoE Mode

☒ Immersion method

Coil orientation	Performance Criteria	Results
X - axis	A	A
Y - axis	A	A
Z - axis	A	A

Note: "blank" = Not performed

Results:

A – No degradation of function

B – Distortion/Error of function (self-recoverable)

C – Loss of function

Test Results☒ PASS Required Performance Criteria☐ NOT PASS Required Performance Criteria☐ NOT APPLICABLE**Remarks**

N/A

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3.7 Voltage Dips and Short Interruptions

Reference Standard

EN 61000-4-11:2004+A1:2017

BS EN 61000-4-11:2004+A1:2017

Test Date

Dec. 17, 2021

Test Location

EMS-Voltage dip: Electro wave Shieldroom #7

Test Equipment

Used	Description	Model Number	Manufacturer	Serial Number	Cal. Due
<input checked="" type="checkbox"/>	EMS Test S/W	iec.control	EM TEST	5.4.8	-
<input checked="" type="checkbox"/>	ULTRA COMPACT SIMULATOR	UCS 500N7	EM TEST	P1608172950	04, 01, 2022
<input checked="" type="checkbox"/>	MOTOR VARIAC	MV2616	EM TEST	P1552169719	04, 01, 2022

Test Conditions

Temperature: (22,4 ± 0,1) °C

Relative Humidity: (43,7 ± 0,1) % R.H.

Atmospheric Pressure: (100,1 ± 0,0) kPa

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Test Data**■ DC 24 V Mode**

NO	Depth	Duration	Performance		Remarks
			Criteria	Results	
1	95 %	0.5	B	A	-
2	30 %	25	C	A	-
3	95 %	250	C	C	-

Results:

- A – No response observed from EUT
B – Unit shuts down then automatically restarts when full voltage is restored.
C – Unit shuts down then manually restarts when full voltage is restored or Loss of function.

Test Results

- ☒ PASS Required Performance Criteria
☐ NOT PASS Required Performance Criteria

Remarks

Unit shuts down then manually restarts when full voltage is restored or Loss of function.

APPENDIX A – TEST DATA

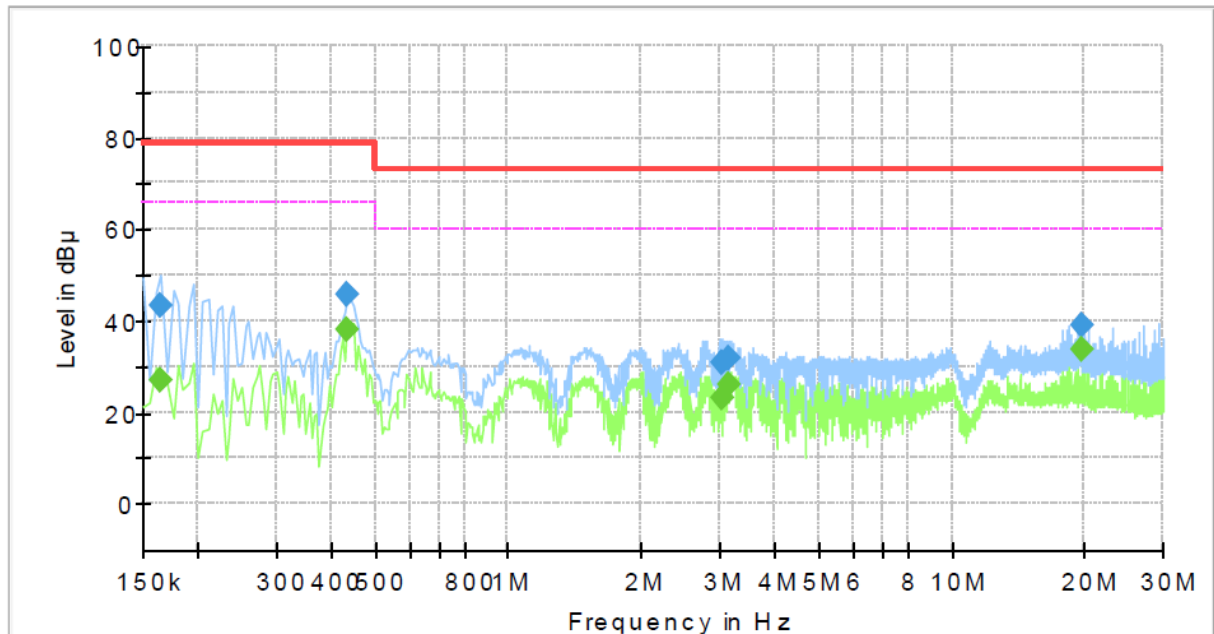
Conducted Emissions at Mains Power Ports

■ DC 24 V Mode

[HOT]

Common Information

Test Description:	Conducted Emission
Model No.:	SPA-M1000
Phase:	L1
Mode:	DC 24 V
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165000	---	26.95	66.00	39.05	1000.0	9.000	L1	19.5
0.165000	43.26	---	79.00	35.74	1000.0	9.000	L1	19.5
0.435000	---	38.19	66.00	27.81	1000.0	9.000	L1	19.7
0.435000	45.80	---	79.00	33.20	1000.0	9.000	L1	19.7
3.045000	---	23.07	60.00	36.93	1000.0	9.000	L1	20.2
3.045000	30.97	---	73.00	42.03	1000.0	9.000	L1	20.2
3.150000	---	26.17	60.00	33.83	1000.0	9.000	L1	20.2
3.150000	31.89	---	73.00	41.11	1000.0	9.000	L1	20.2
19.710000	---	33.94	60.00	26.06	1000.0	9.000	L1	20.2
19.710000	38.95	---	73.00	34.05	1000.0	9.000	L1	20.2

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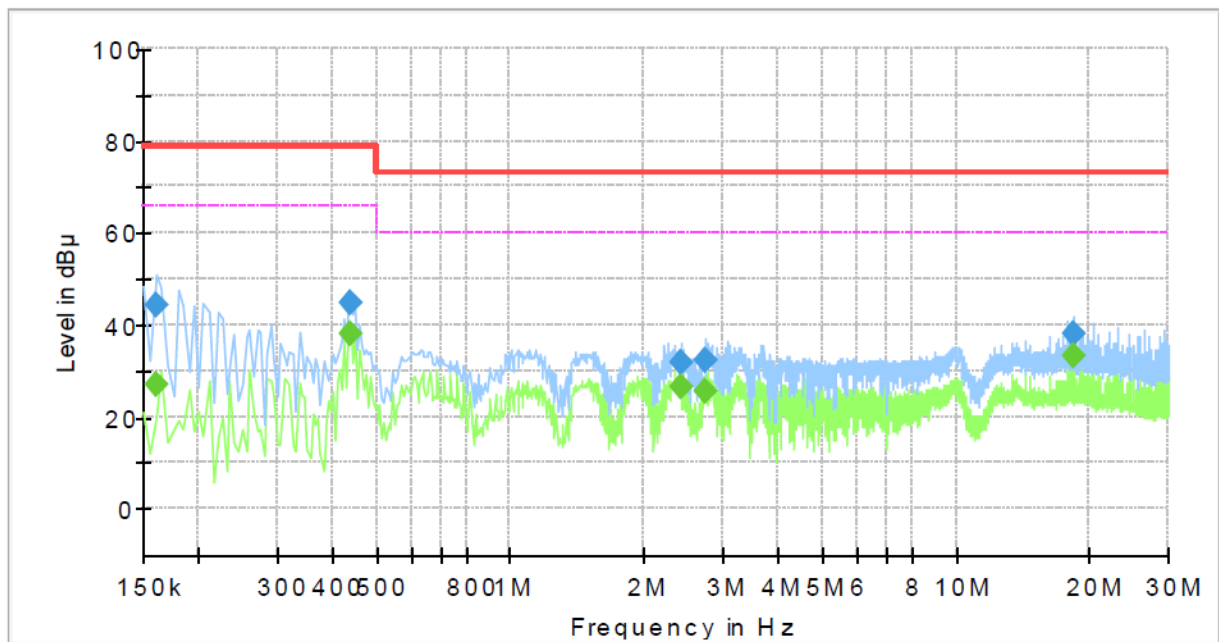
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[NEUTRAL]

Common Information

Test Description:	Conducted Emission
Model No.:	SPA-M1000
Phase:	N
Mode:	DC 24 V
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.160000	---	27.14	66.00	38.86	1000.0	9.000	N	19.4
0.160000	44.07	---	79.00	34.93	1000.0	9.000	N	19.4
0.440000	---	38.16	66.00	27.84	1000.0	9.000	N	19.7
0.440000	44.53	---	79.00	34.47	1000.0	9.000	N	19.7
2.410000	---	26.55	60.00	33.45	1000.0	9.000	N	20.3
2.410000	31.60	---	73.00	41.40	1000.0	9.000	N	20.3
2.745000	---	25.66	60.00	34.34	1000.0	9.000	N	20.2
2.745000	32.10	---	73.00	40.90	1000.0	9.000	N	20.2
18.305000	---	33.17	60.00	26.83	1000.0	9.000	N	20.1
18.305000	38.14	---	73.00	34.86	1000.0	9.000	N	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 (LISN FACTOR + (Cable Loss + Pulse Limiter FACTOR))

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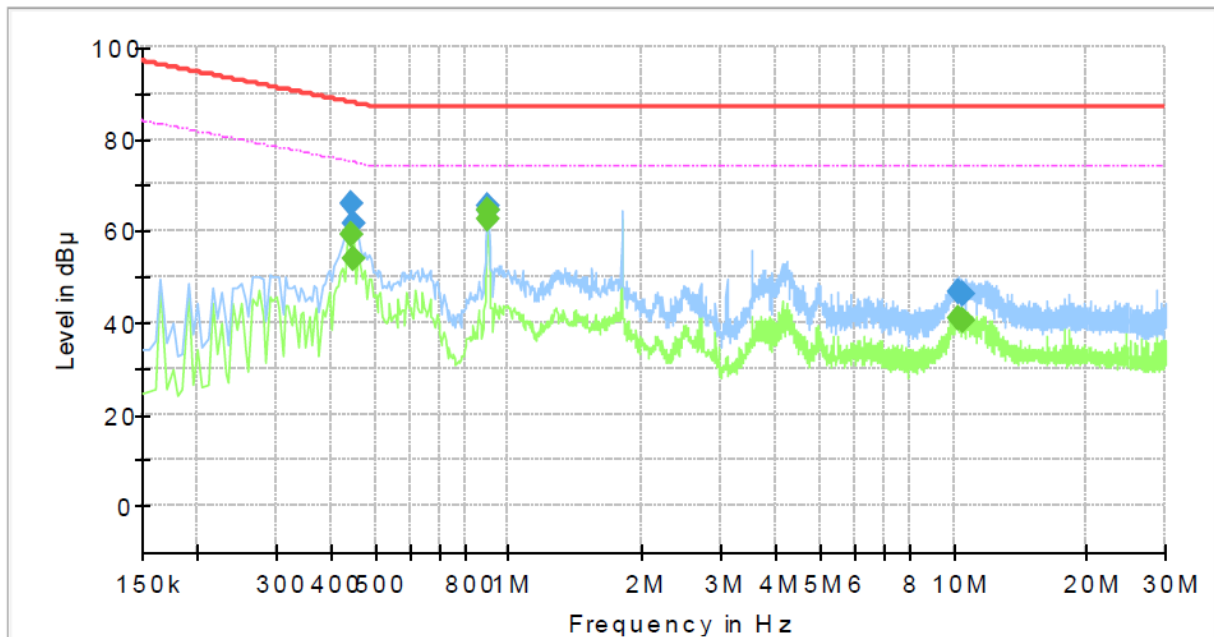
Conducted Emissions at Telecommunication Ports

■ DC 24 V Mode

[1 000 Mbps]

Common Information

Test Description:	Telecommunication Emission
Model No.:	SPA-M1000
Mode :	DC 24 V
Speed :	1 000 Mbps
Operator Name:	KES



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.445000	---	59.26	74.97	15.71	1000.0	9.000	Single Line	19.8
0.445000	66.02	---	87.97	21.95	1000.0	9.000	Single Line	19.8
0.450000	---	53.99	74.88	20.89	1000.0	9.000	Single Line	19.8
0.450000	61.37	---	87.88	26.51	1000.0	9.000	Single Line	19.8
0.895000	---	62.60	74.00	11.40	1000.0	9.000	Single Line	20.1
0.895000	64.38	---	87.00	22.62	1000.0	9.000	Single Line	20.1
0.900000	---	64.49	74.00	9.51	1000.0	9.000	Single Line	20.1
0.900000	65.24	---	87.00	21.76	1000.0	9.000	Single Line	20.1
10.310000	---	41.09	74.00	32.91	1000.0	9.000	Single Line	19.7
10.310000	46.57	---	87.00	40.43	1000.0	9.000	Single Line	19.7
10.520000	---	40.64	74.00	33.36	1000.0	9.000	Single Line	19.7
10.520000	46.01	---	87.00	40.99	1000.0	9.000	Single Line	19.7

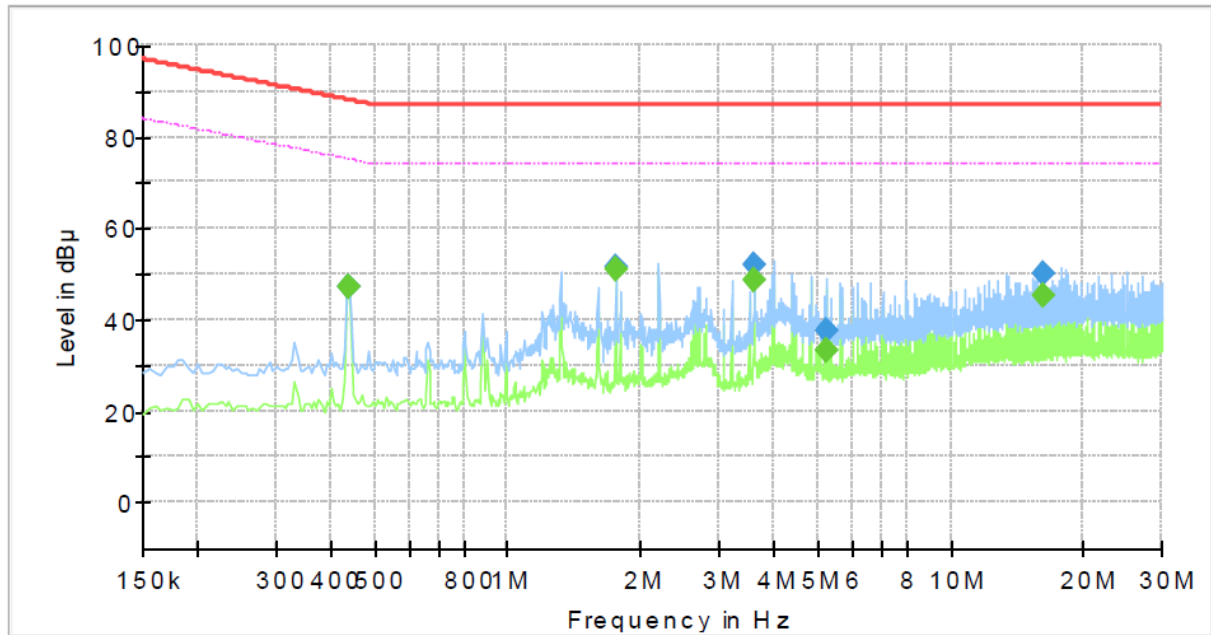
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PoE Mode
[1 000 Mbps]
Common Information

Test Description:	Telecommunication Emission
Model No.:	SPA-M1000
Mode :	PoE
Speed :	1 000 Mbps
Operator Name:	KES


Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.440000	---	47.02	75.06	28.04	1000.0	9.000	Single Line	19.8
0.440000	47.29	---	88.06	40.77	1000.0	9.000	Single Line	19.8
1.755000	---	51.13	74.00	22.87	1000.0	9.000	Single Line	20.2
1.755000	51.41	---	87.00	35.59	1000.0	9.000	Single Line	20.2
3.605000	---	48.54	74.00	25.46	1000.0	9.000	Single Line	19.8
3.605000	51.94	---	87.00	35.06	1000.0	9.000	Single Line	19.8
5.265000	---	33.10	74.00	40.90	1000.0	9.000	Single Line	19.4
5.265000	37.49	---	87.00	49.51	1000.0	9.000	Single Line	19.4
16.230000	---	45.09	74.00	28.91	1000.0	9.000	Single Line	19.7
16.230000	49.93	---	87.00	37.07	1000.0	9.000	Single Line	19.7

◆ Calculation

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

QuasiPeak / CAverage : The Final Value

Reading Value : Not shown in the table.

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

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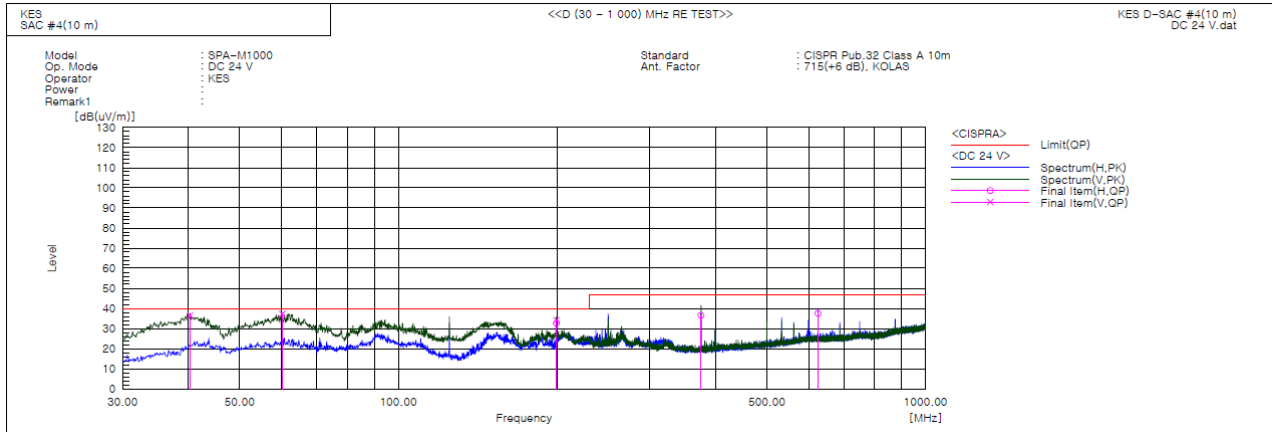
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KES-EM-21T1240-R2
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Radiated Electric Field Emissions(Below 1 GHz)

■ DC 24 V Mode



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	40.306	V	59.0	-22.3	36.7	40.0	3.3	107.0	265.0	
2	60.191	V	59.1	-21.9	37.2	40.0	2.8	108.0	212.0	
3	199.265	V	55.0	-20.8	34.2	40.0	5.8	100.0	41.0	
4	199.508	H	53.4	-20.8	32.6	40.0	7.4	400.0	336.0	
5	374.956	H	51.1	-14.6	36.5	47.0	10.5	399.0	76.0	
6	625.095	H	45.8	-8.2	37.6	47.0	9.4	397.0	139.0	

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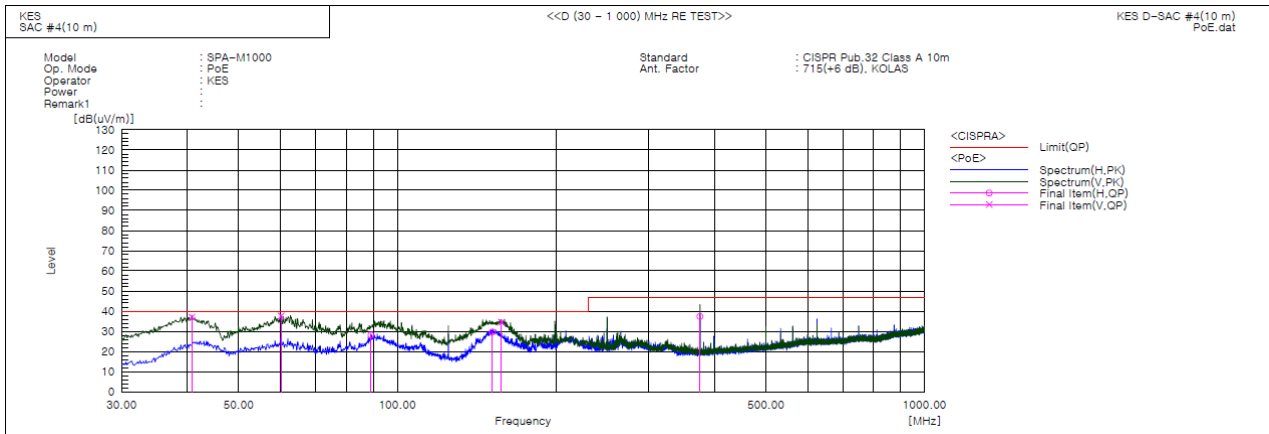
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PoE Mode



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	40.791	V	59.2	-22.1	37.1	40.0	2.9	100.0	246.0	
2	60.191	V	59.6	-21.9	37.7	40.0	2.3	108.0	76.0	
3	89.170	H	52.4	-24.3	28.1	40.0	11.9	393.0	213.0	
4	151.493	H	54.8	-25.1	29.7	40.0	10.3	398.0	243.0	
5	157.555	V	59.3	-24.7	34.6	40.0	5.4	105.0	205.0	
6	374.956	H	52.0	-14.6	37.4	47.0	9.6	400.0	329.0	

◆ Calculation – SEMI ANECHOIC CHAMBER #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 - Preamp Factor), Margin: Margin value

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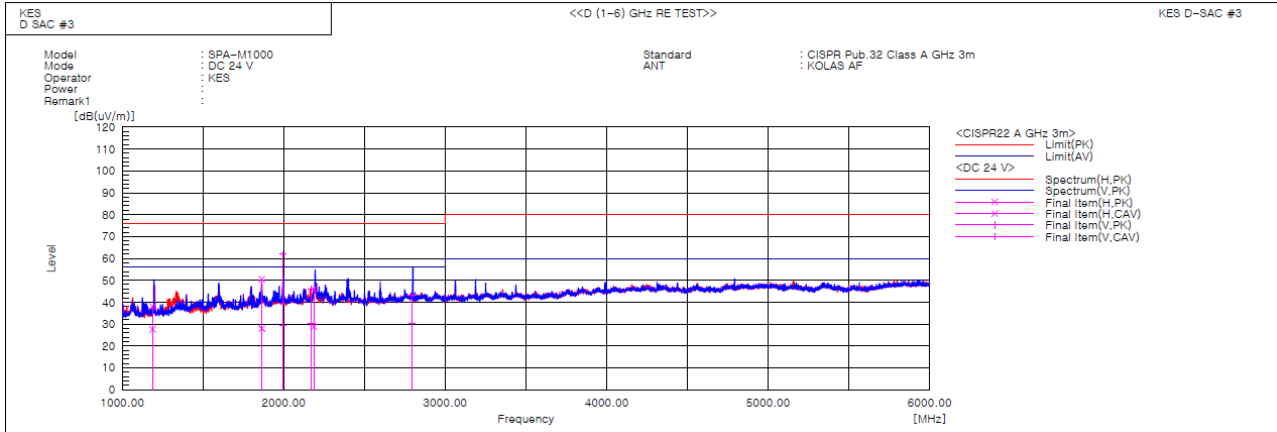
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Radiated Electric Field Emissions(Above 1 GHz)

■ DC 24 V Mode



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	1186.783	H	46.7	36.2	-8.6	38.1	27.6	76.0	56.0	37.9	28.4	100.0	109.8	
2	1863.960	H	52.8	30.3	-2.3	50.5	28.0	76.0	56.0	25.5	28.0	100.0	165.4	
3	1994.880	V	62.9	30.4	-1.0	61.9	29.4	76.0	56.0	14.1	26.6	100.0	357.3	
4	2172.584	V	46.7	30.6	-0.5	46.2	30.1	76.0	56.0	29.8	25.9	100.0	174.3	
5	2185.962	H	46.5	29.3	-0.5	46.0	28.8	76.0	56.0	30.0	27.2	100.0	29.5	
6	2796.645	V	41.6	28.4	1.7	43.3	30.1	76.0	56.0	32.7	25.9	100.0	236.8	

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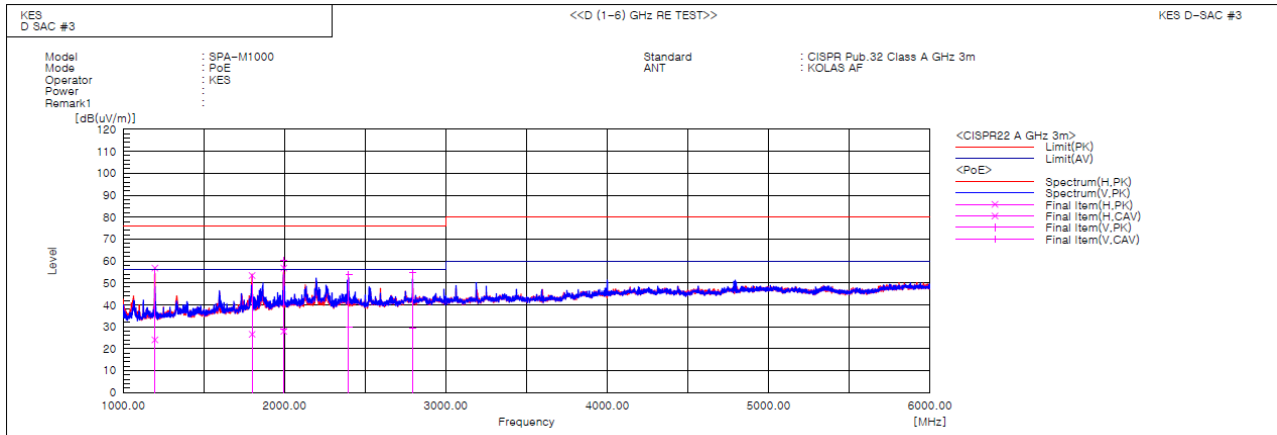
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■ PoE Mode



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	1196.732	H	65.3	32.5	-8.5	56.8	24.0	76.0	56.0	19.2	32.0	100.0	126.6	
2	1799.294	H	56.5	29.7	-3.1	53.4	26.6	76.0	56.0	22.6	29.4	100.0	2.1	
3	1994.795	V	61.1	29.7	-1.0	60.1	28.7	76.0	56.0	15.9	27.3	100.0	86.0	
4	1995.248	H	57.8	28.9	-1.0	56.8	27.9	76.0	56.0	19.2	28.1	100.0	118.6	
5	2398.064	V	53.4	29.5	0.2	53.6	29.7	76.0	56.0	22.4	26.3	100.0	183.8	
6	2793.705	V	53.0	27.8	1.7	54.7	29.5	76.0	56.0	21.3	26.5	100.0	240.3	

◆ Calculation

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

Margin(PK/CAV)[dB] = Limit[dB(μ V/m)] - Result(PK/CAV) [dB(μ V/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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Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC 24 V Mode

Average harmonic current results

Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.043			
2	0.004	0.408	1.080	n/a
3	0.035	1.511	2.300	PASS
4	0.003	0.709	0.430	n/a
5	0.034	2.978	1.140	PASS
6	0.005	1.676	0.300	PASS
7	0.033	4.326	0.770	PASS
8	0.004	1.576	0.230	n/a
9	0.033	8.249	0.400	PASS
10	0.003	1.547	0.184	n/a
11	0.032	9.743	0.330	PASS
12	0.003	2.024	0.153	n/a
13	0.031	14.688	0.210	PASS
14	0.003	2.508	0.131	n/a
15	0.029	19.574	0.150	PASS
16	0.003	2.869	0.115	n/a
17	0.028	21.118	0.132	PASS
18	0.003	3.195	0.102	n/a
19	0.027	22.399	0.118	PASS
20	0.003	3.148	0.092	n/a
21	0.025	15.298	0.161	PASS
22	0.003	3.479	0.084	n/a
23	0.023	15.759	0.147	PASS
24	0.003	3.594	0.077	n/a
25	0.021	15.897	0.135	PASS
26	0.002	3.400	0.071	n/a
27	0.020	15.721	0.125	PASS
28	0.002	3.707	0.066	n/a
29	0.018	15.591	0.116	PASS
30	0.002	3.314	0.061	n/a
31	0.016	14.870	0.109	PASS
32	0.002	3.157	0.058	n/a
33	0.014	14.141	0.102	PASS
34	0.002	3.280	0.054	n/a
35	0.013	13.491	0.096	PASS
36	0.001	2.562	0.051	n/a
37	0.011	12.194	0.091	PASS
38	0.001	2.723	0.048	n/a
39	0.010	11.262	0.087	PASS
40	0.001	2.326	0.046	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

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Test Data - Harmonics (continued)

Maximum harmonic current results				
Hn	I _{eff} [A]	% of Limit	Limit [A]	Result
1	0.044			
2	0.005	0.302	1.620	n/a
3	0.035	1.019	3.450	PASS
4	0.003	0.531	0.645	n/a
5	0.034	2.015	1.710	PASS
6	0.005	1.207	0.450	PASS
7	0.034	2.939	1.155	PASS
8	0.004	1.171	0.345	n/a
9	0.033	5.562	0.600	PASS
10	0.003	1.164	0.276	n/a
11	0.032	6.562	0.495	PASS
12	0.003	1.503	0.230	n/a
13	0.031	9.892	0.315	PASS
14	0.004	1.840	0.197	n/a
15	0.030	13.193	0.225	PASS
16	0.004	2.100	0.173	n/a
17	0.028	14.319	0.199	PASS
18	0.004	2.323	0.153	n/a
19	0.027	15.092	0.178	PASS
20	0.003	2.322	0.138	n/a
21	0.025	15.519	0.161	PASS
22	0.003	2.556	0.125	n/a
23	0.023	15.995	0.147	PASS
24	0.003	2.711	0.115	n/a
25	0.022	16.063	0.135	PASS
26	0.003	2.483	0.106	n/a
27	0.020	15.858	0.125	PASS
28	0.003	2.716	0.099	n/a
29	0.018	15.756	0.116	PASS
30	0.002	2.457	0.092	n/a
31	0.016	15.006	0.109	PASS
32	0.002	2.333	0.086	n/a
33	0.015	14.260	0.102	PASS
34	0.002	2.458	0.081	n/a
35	0.013	13.615	0.096	PASS
36	0.002	1.958	0.077	n/a
37	0.011	12.328	0.091	PASS
38	0.002	2.072	0.073	n/a
39	0.010	11.363	0.087	PASS
40	0.001	1.831	0.069	n/a

Note: Harmonic currents less than 0.6 % of the input current measured under the test conditions, or less than 5 mA, whichever is greater, are disregarded.

* Application of limits for average is 100% except for odd harmonics from 21 to 39, where 150% applies.

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Test Data - Voltage Fluctuations

■ DC 24 V Mode

Maximum Flicker results

Flicker Measurements					
	Plt	Max Pst	Max Dc	Max Dmax	Max Tmax
Line 1:	0.028	0.028	0	< 0.2	0
Limits:	0.65	1	3.3	4	0.5
Results:	PASS	PASS	PASS	PASS	PASS

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Test Setup Photos and Configuration

Conducted Emissions at Mains Power Ports

■ DC 24 V Mode



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Conducted Emissions at Telecommunication Ports

■ DC 24 V Mode



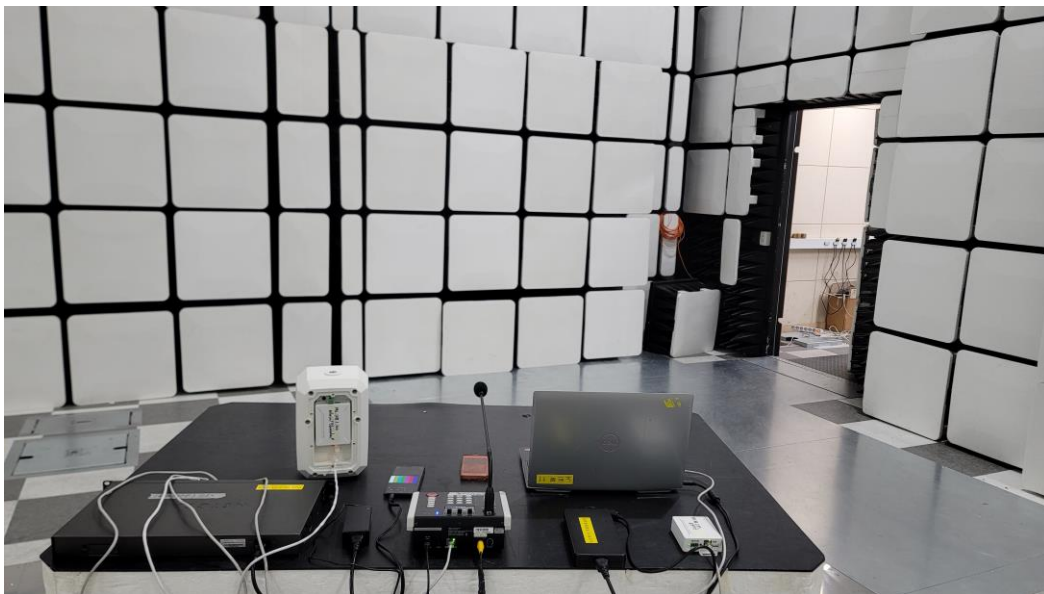
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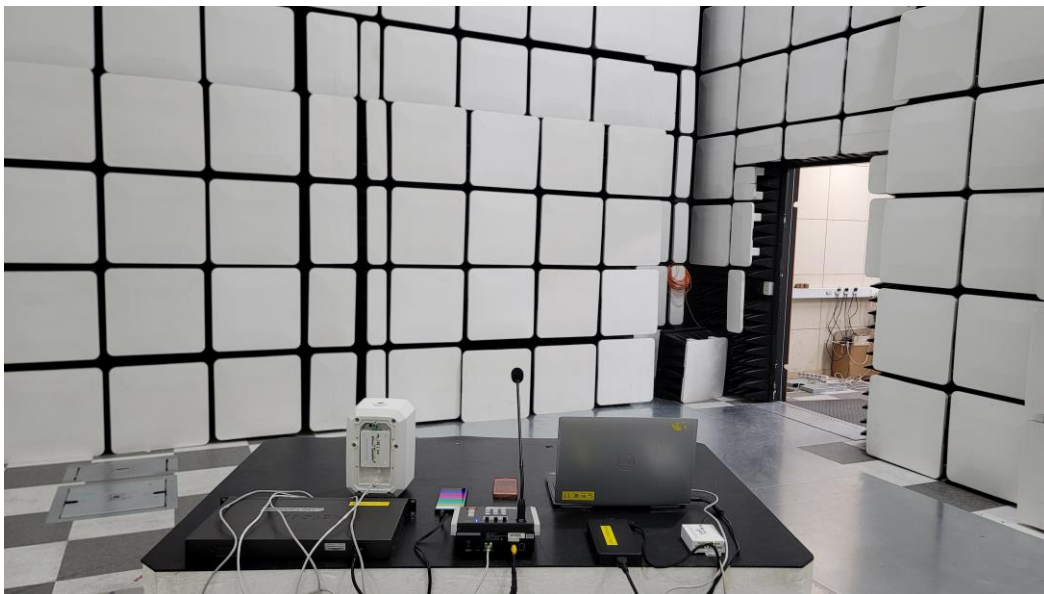


Radiated Electric Field Emissions(Below 1 GHz)

■ DC 24 V Mode

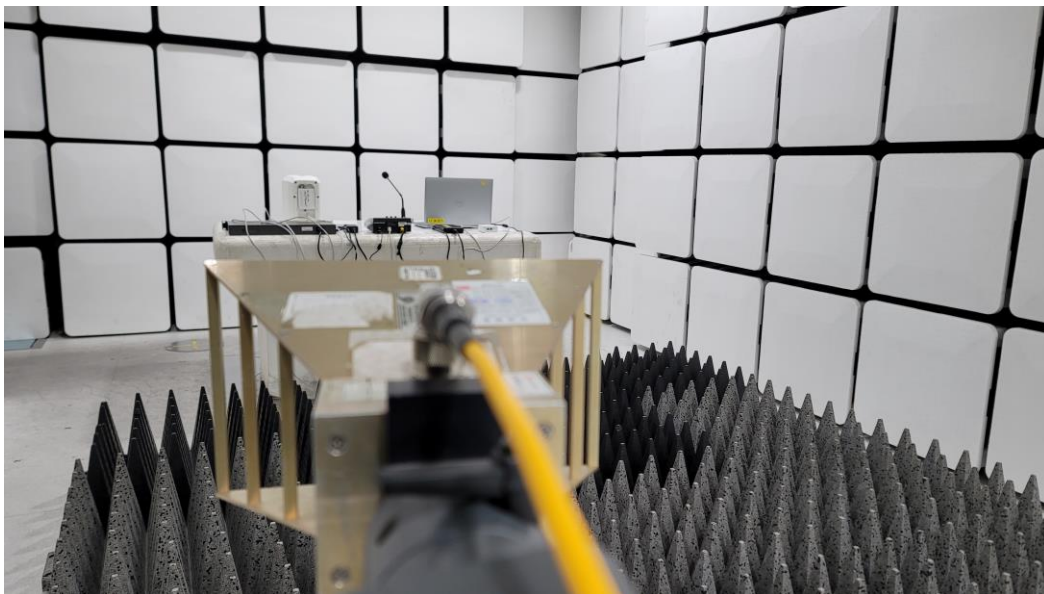


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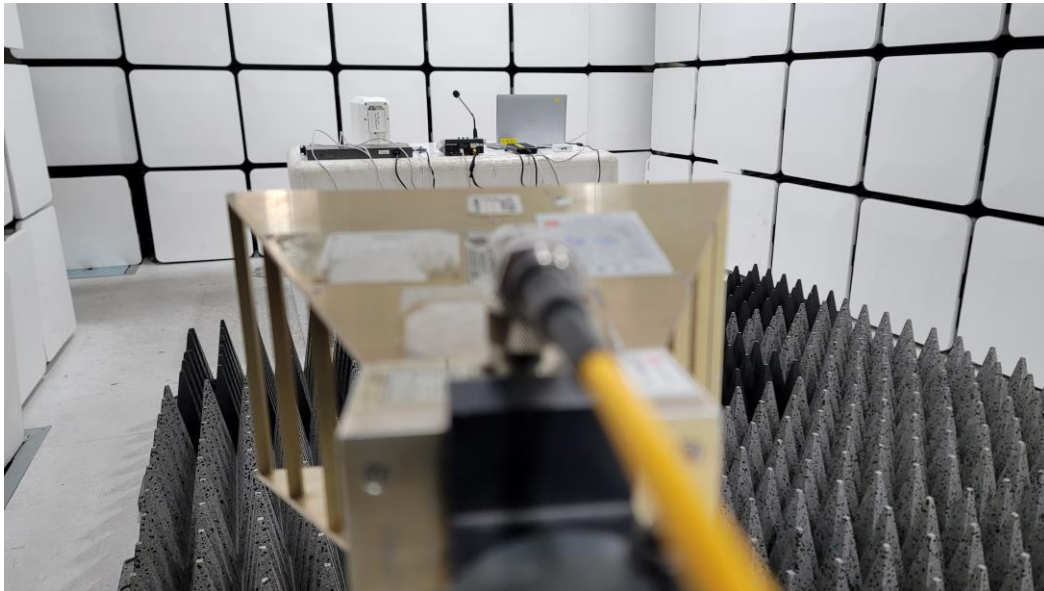
■ PoE Mode

Radiated Electric Field Emissions(Above 1 GHz)

■ DC 24 V Mode



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■ PoE Mode

Harmonic Current Emissions and Voltage Fluctuations and Flicker

■ DC 24 V Mode



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Electrostatic Discharge

■ DC 24 V Mode



- PoE Mode



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Radiated Electric Field Immunity

■ DC 24 V Mode



■ PoE Mode



Electrical Fast Transients/Bursts

■ DC 24 V Mode



■ PoE Mode



Surge Transients

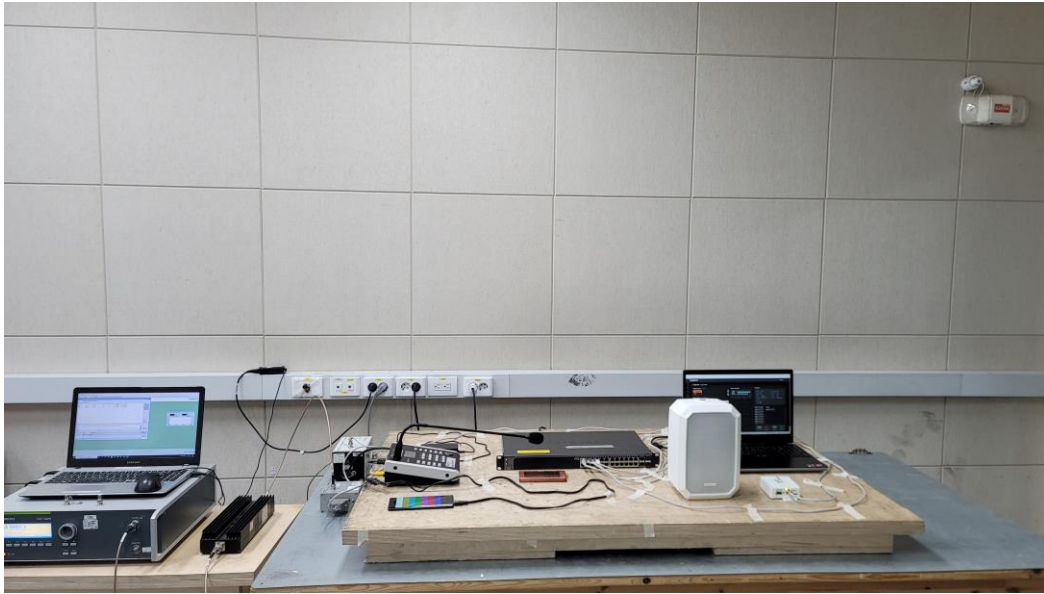
■ DC 24 V Mode



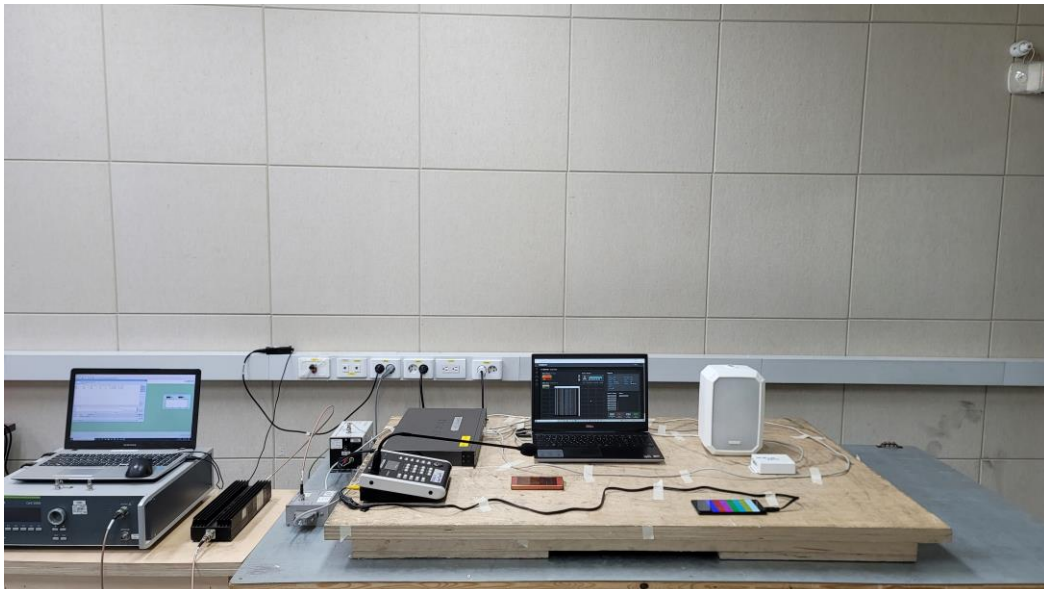
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Conducted Disturbance

■ DC 24 V Mode



■ PoE Mode



Power Frequency Magnetic Field Immunity

■ DC 24 V Mode



■ DC 24 V Mode



Voltage Dips and Short Interruptions

■ DC 24 V Mode



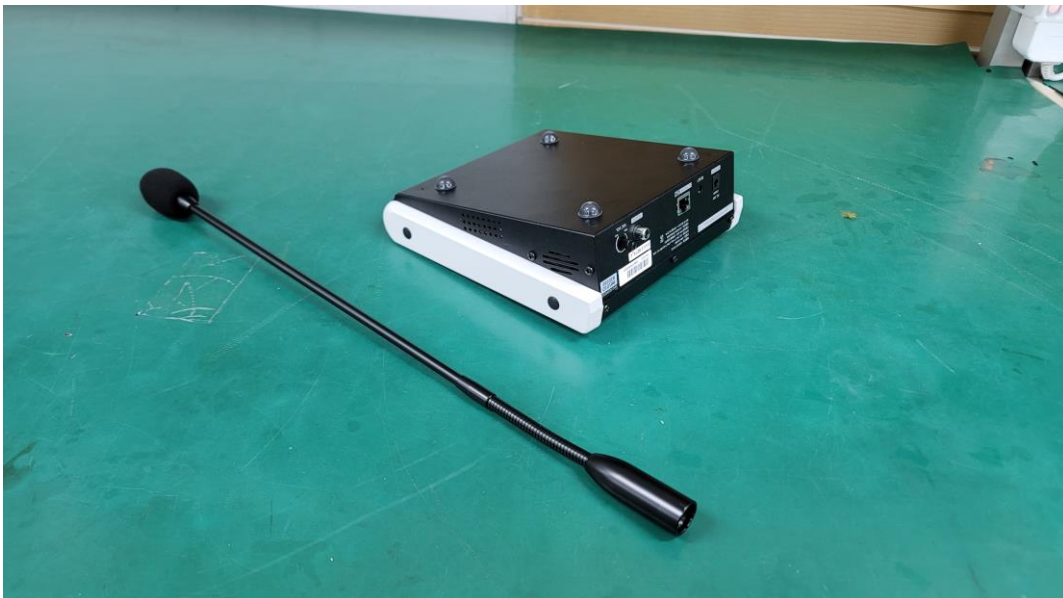
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EUT External Photographs

(Top)



(Bottom)



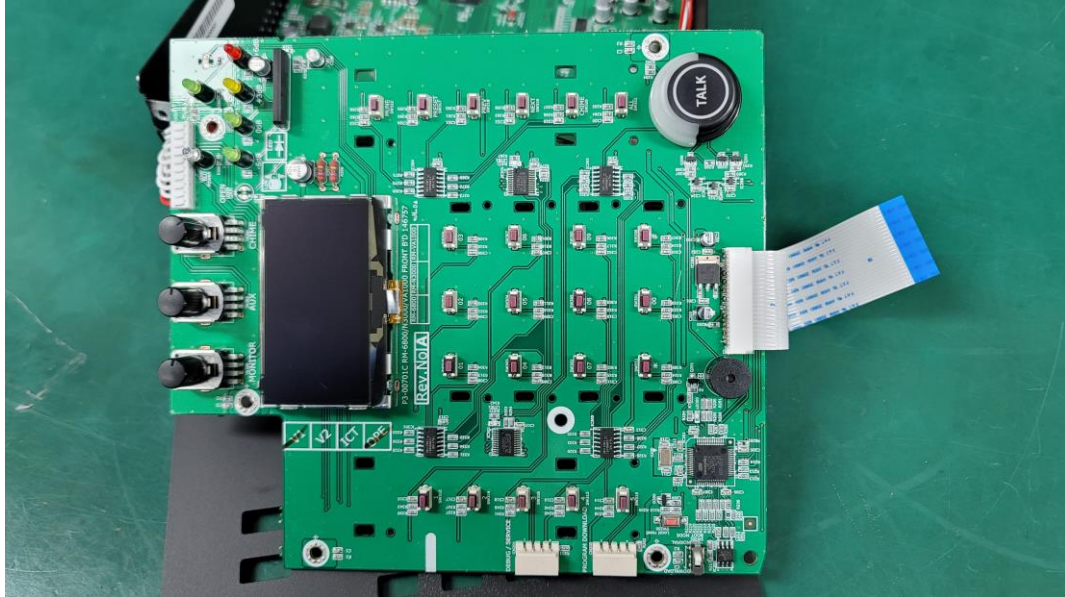
EUT Internal Photographs

(Internal View)

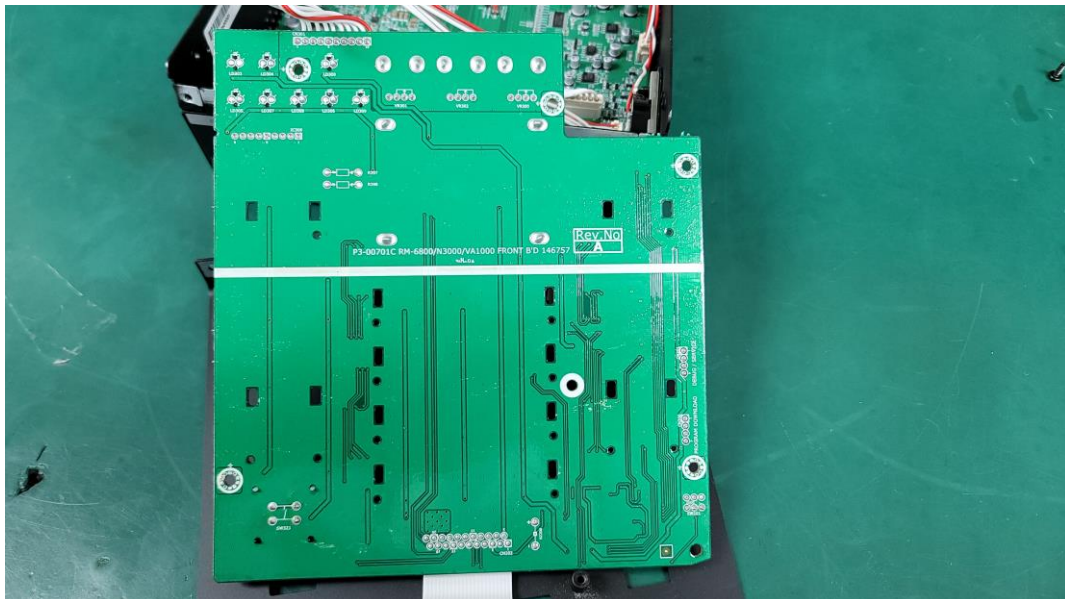


EUT Internal View – Board 1

(Top)



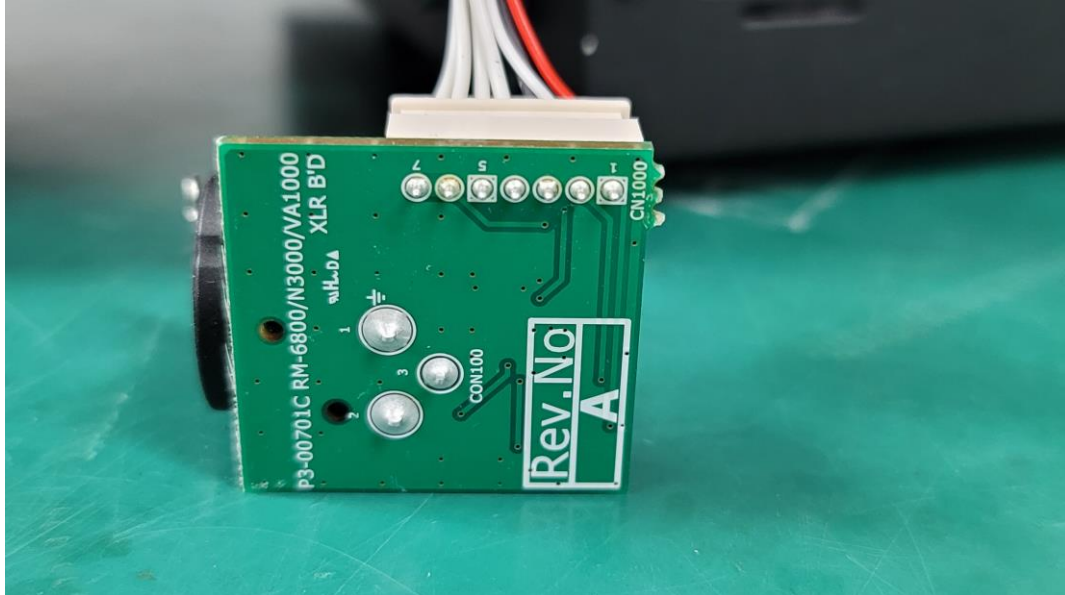
(Bottom)



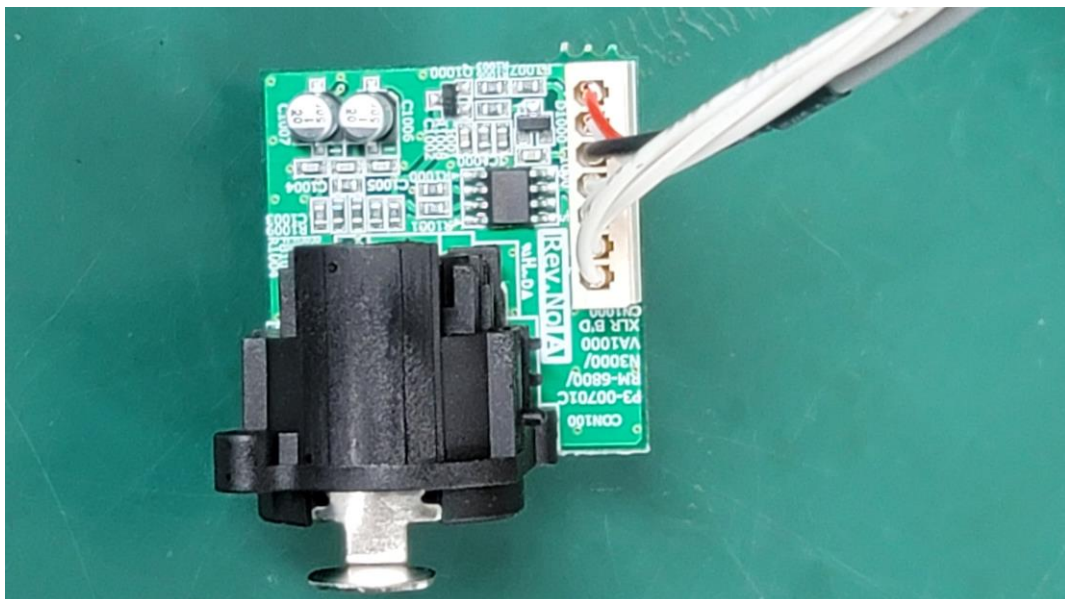
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The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
The authenticity of the test report, contact kes@kes.co.kr

EUT Internal View – Board 2

(Top)

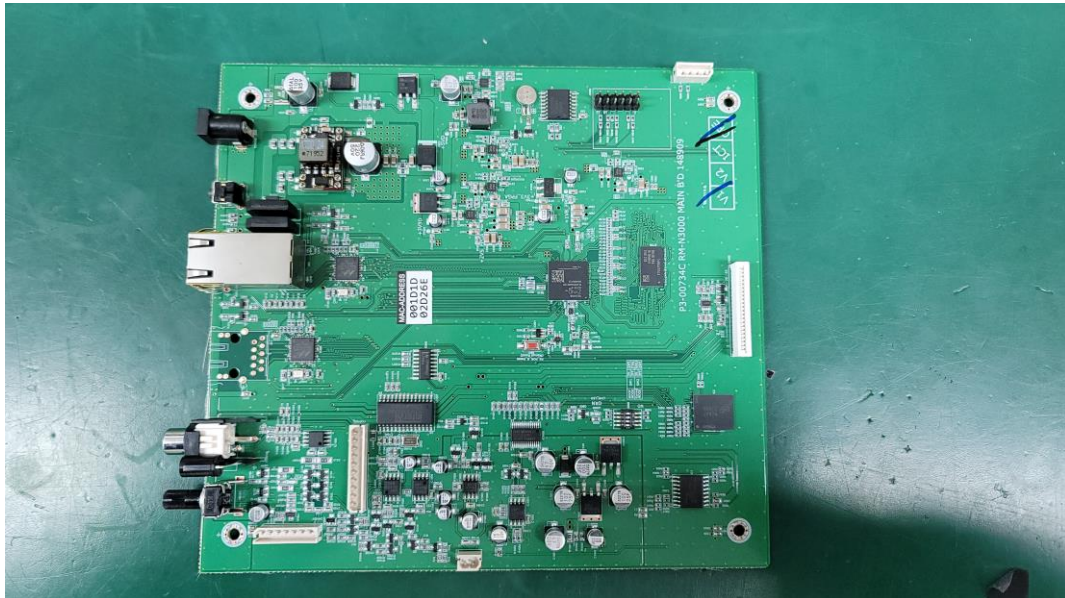


(Bottom)

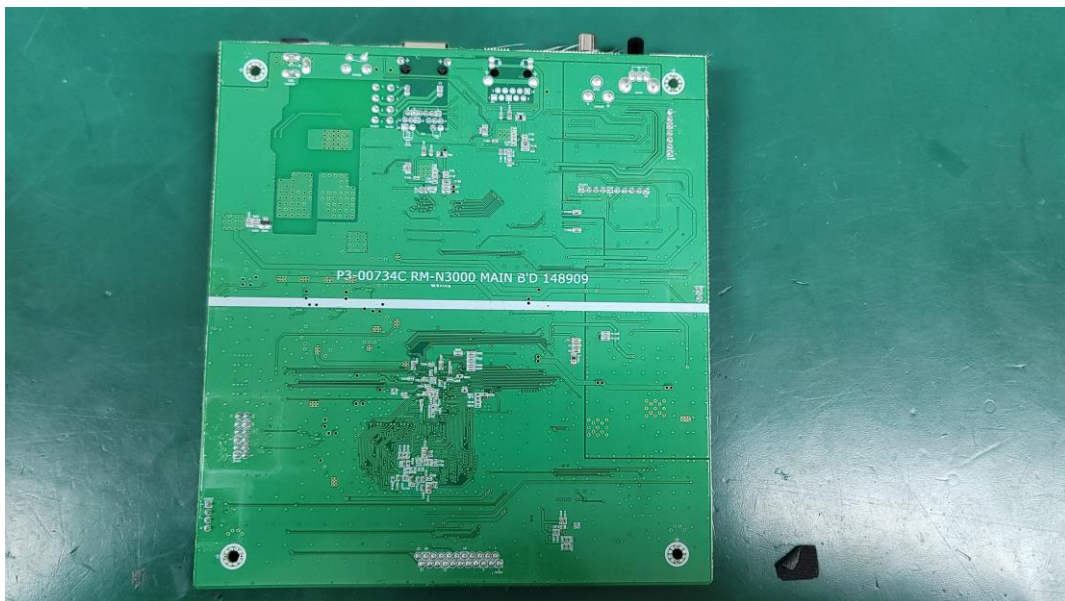


EUT Internal View – Board 3

(Top)

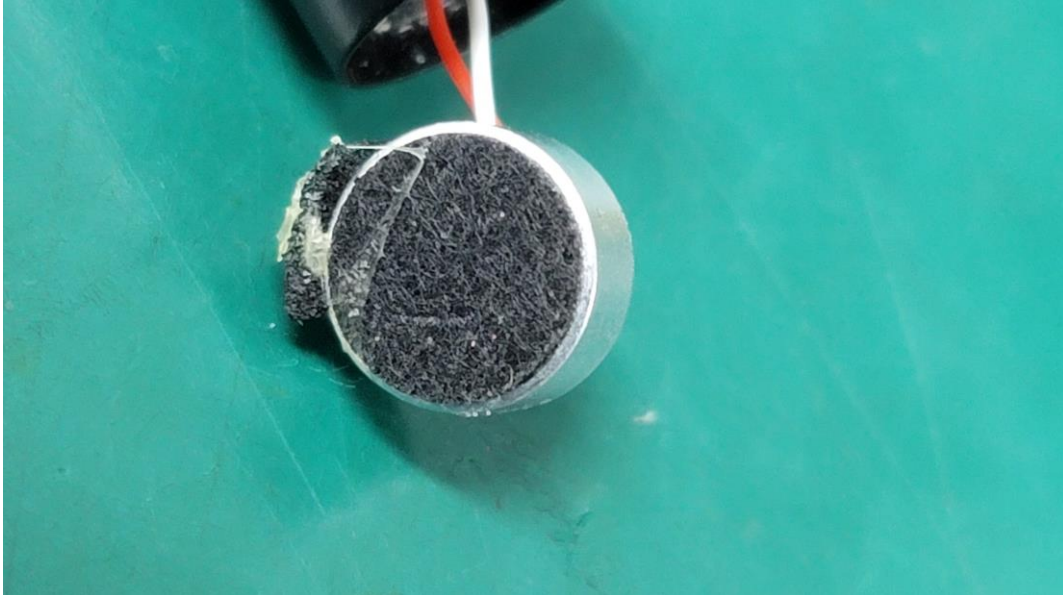


(Bottom)

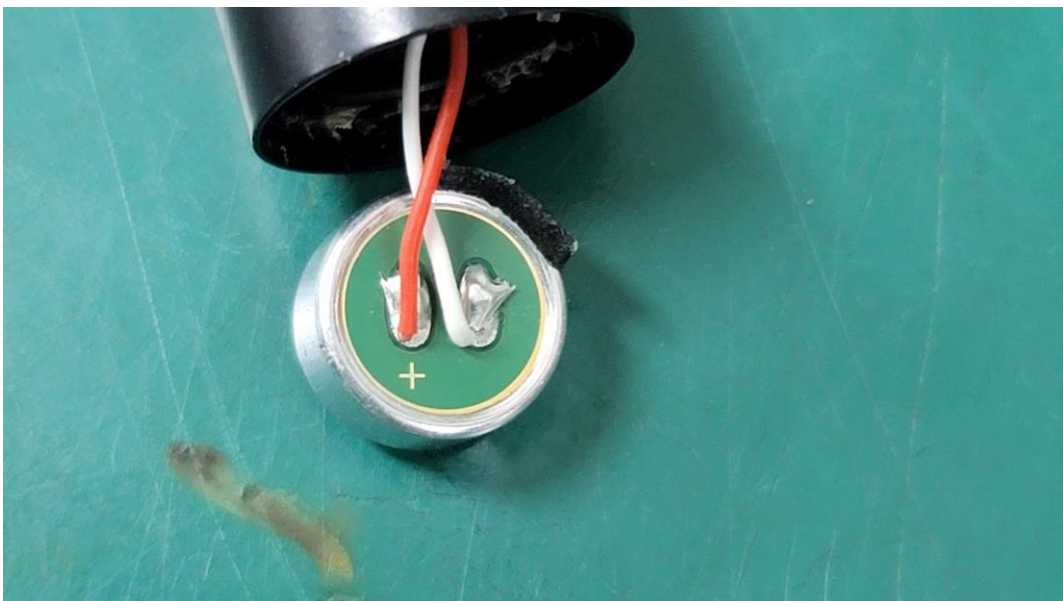


EUT Internal View – Board 4

(Top)



(Bottom)



Label and Location



NETWORK MICROPHONE

Model No : SPA-M1000

Manufacturer : Inter-M Corporation

Made in Korea

