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TEST REPORT

Report Number	231200110SEL-EMC1
Applicant Name/Address	Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-Gu, Suwon-si, Gyeonggi-Do, 16677, Korea
Test Sample Description	
- Product ..... :	Micro SD
- Model and/or Brand name ..... :	MB-MC1T0S*, MBMCGGVKOB**-7****
- Manufacturer Name / Address . :	Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-Gu, Suwon-si, Gyeonggi-Do, 16677, Korea
- Rating(s) ..... :	DC (2.7-3.6) V
- Variant model name .....:	MB-ME1T0S*, MBMEGGVKOB**-7****
Receipt of sample(s)	12 Dec. 2023
Date of Test	18 Dec. 2023 ~ 20 Dec. 2023
Test Method(s)	EN 55032:2015(Class B) EN 55032:2015/A11:2020+A1:2020(Class B) EN 55035:2017, EN 55035:2017/A11:2020
Test Results & Uncertainty	See EMC Results Conclusion
Issue date	28 Dec. 2023

Note 1. The results shown in this test report refer only to the sample(s) tested.
Note 2: This report shall not be reproduced except in full, without the written approval of Intertek.
Note 3: Intertek is applied the Simple Acceptance without considering the measurement uncertainty according to ILAC G8-09/2019.
Note 4: This test report is not related to "KOLAS accreditation".

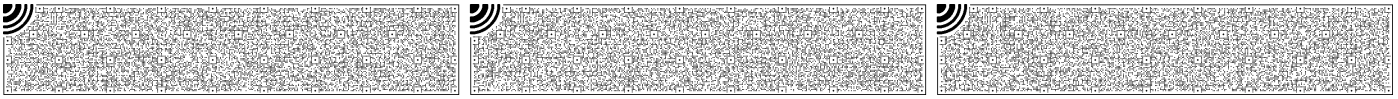
Tested by

Name : John Seo
Engineer

Approved by

Name : Shinyeong Lee
Technical Manager

Intertek ETL SEMKO Korea Ltd.



※ You can verify the forgery and authenticity by the barcode at the end of this document.

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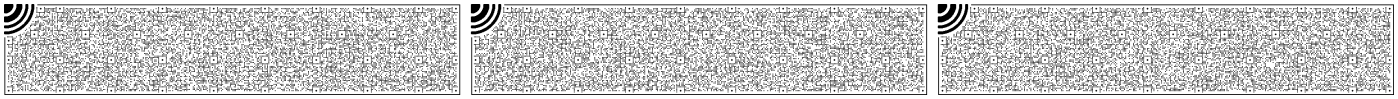
SECTION 2 EMC RESULTS CONCLUSION (WITH JUSTIFICATION)

We tested the Micro SD, Model: MB-MC1T0S*, MBMCGGVKOB**-7****, to determine if it was in compliance with the relevant EN standards as marked on the test report.
We found that the unit met the requirement of EN 55032, EN 55035 standards when tested as received.

Test Items	Test Method	Results			
		Comply	Not Comply	N/A	See Note
I. Emission					
Conducted Emission	EN 55032	☒	☐	☐	☐
Radiated Emission (Below 1 GHz)	EN 55032	☒	☐	☐	☐
Radiated Emission (Above 1 GHz)	EN 55032	☒	☐	☐	☐
Conducted Differential Voltage	EN 55032	☐	☐	☒	☐
Harmonics	EN IEC 61000-3-2	☐	☐	☒	☐
Voltage Fluctuations and Flicker	EN 61000-3-3	☐	☐	☒	☐
II. Immunity					
Electrostatic Discharge	EN 55035 EN 61000-4-2	☒	☐	☐	☐
Radiated Immunity	EN 55035 EN 61000-4-3	☒	☐	☐	☐
Fast Transient	EN 55035 EN 61000-4-4	☒	☐	☐	☐
Surge Immunity	EN 55035 EN 61000-4-5	☒	☐	☐	☐
Conducted Immunity	EN 55035 EN 61000-4-6	☒	☐	☐	☐
Voltage Dips and Interruptions	EN 55035 EN 61000-4-11	☒	☐	☐	☐
-					

SECTION 3 EUT INFORMATION

Equipment Under Test (EUT):	Micro SD
Model:	MB-MC1T0S*, MBMCGGVKOB**-7****
Variant Model:	MB-ME1T0S*, MBMEGGVKOB**-7****
Variant model information:	The model MB-ME1T0S*, MBMEGGVKOB**-7**** is dualization model depending on Color difference. Basic model: White, Variant Model: Green
Capacity:	1 TB
Serial No.:	-
Rated Voltage:	DC (2.7-3.6) V
Maximum clock frequency:	208 MHz



SECTION 4 TEST Configuration, Operation mode and SET-UP

Ancillary Equipment List

Equipment	Model No.	Serial No.	Manufacturer	ETC.
Micro SD	MB-MC1T0S*, MBMCGGVKOB** -7****	-	Samsung Electronics Co., Ltd.	EUT
Notebook PC	P73G	-	DELL INC.	AE
AC Adapter	LA65NM130	-	Liteon Technology Corporation ,Lite-On Technology (Changzhou) Co.,Ltd.	AE

Interface Cable

Start		END		CABLE		
Name	I/O Port	Name	I/O Port	Length (m)	Shield	With Ferrite
EUT	TF Slot type	Notebook PC	TF Card slot	-	-	-
Notebook PC	DC IN	AC Adapter	DC OUT	1.8	Unshielded	-
AC Adapter	AC IN	AC Power	AC OUT	1.0	Unshielded	-

- Test the enclosure and AC power ports using the Notebook PC's power source.

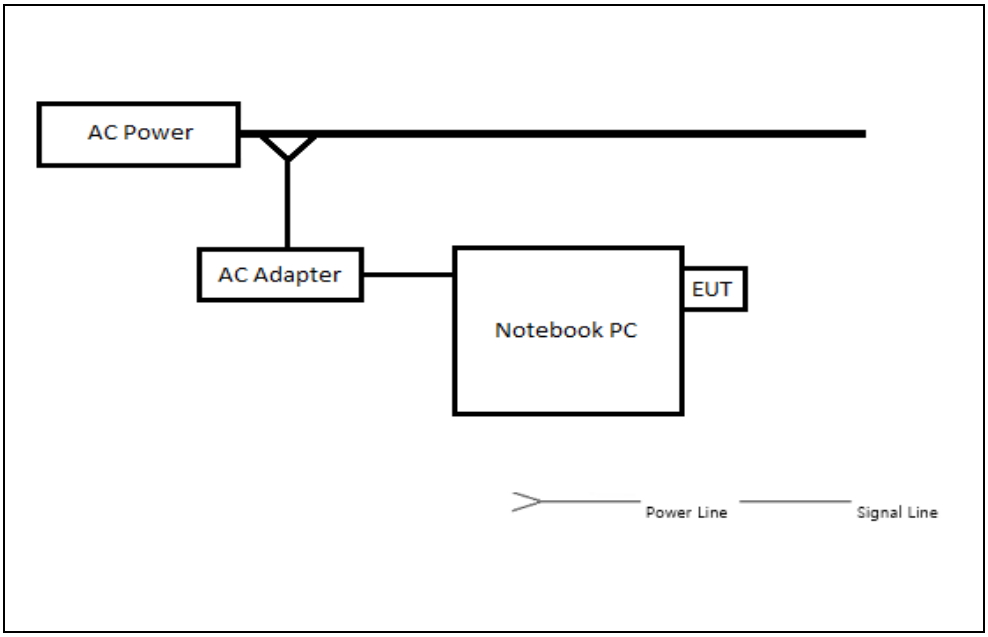
Test Operation Mode

- Operating mode: After configuring the EUT as in the layout diagram, it is tested in the read, written and erased repeat state using the "EMC Exerciser" application program on the Notebook PC.

Reference of monitoring

- Check the data reading, writing, and erasing status with Display of Notebook PC.

Test Setup



SECTION 5 EMISSION

Conducted Emission

Test Method

Test standard : EN 55032

Used Test Equipment

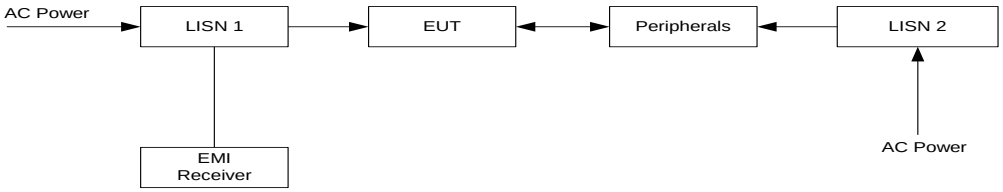
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC004	EMI Test Receiver	R & S	ESR7	101560	2024.01.03	1Y
EMC007	Two-Line V-Network	R & S	ENV216	101982	2024.04.10	1Y

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
Shielded Room 2	12-19	20.8 ± 1.0	38.3 ± 1.0	-

Test Setup and Procedure



The EUT along with its peripherals were placed on a 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 m space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 characteristic coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

Limits

Conducted disturbance at mains ports

Frequency range (MHz)	Quasi-peak (dBµV) Class A	Average (dBµV) Class A
0.15 to 0.50	79	66
0.50 to 30	73	60

Note 1) The lower limit shall apply at the transition frequencies.
Note 2) The limit decreases linearly with the logarithm of the frequency in the range (0.15 ~ 0.5) MHz.
Note 3) Result (dBµV) = Reading (dBµV) + Corr. (Insertion Loss (dB) + Cable Loss (dB))
where. Result: Final value (QuasiPeak, Average),
Reading: Receiver reading value,
Corr.: Correction Factor (Margin = Limit – Result)

Frequency range (MHz)	Quasi-peak (dBµV) Class B	Average (dBµV) Class B
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Note 1) The lower limit shall apply at the transition frequencies.
Note 2) The limit decreases linearly with the logarithm of the frequency in the range (0.15 ~ 0.5) MHz.
Note 3) Result (dBµV) = Reading (dBµV) + Corr. (Insertion Loss (dB) + Cable Loss (dB))
where. Result: Final value (QuasiPeak, Average),
Reading: Receiver reading value,
Corr.: Correction Factor (Margin = Limit – Result)

Conducted disturbance at telecommunication ports

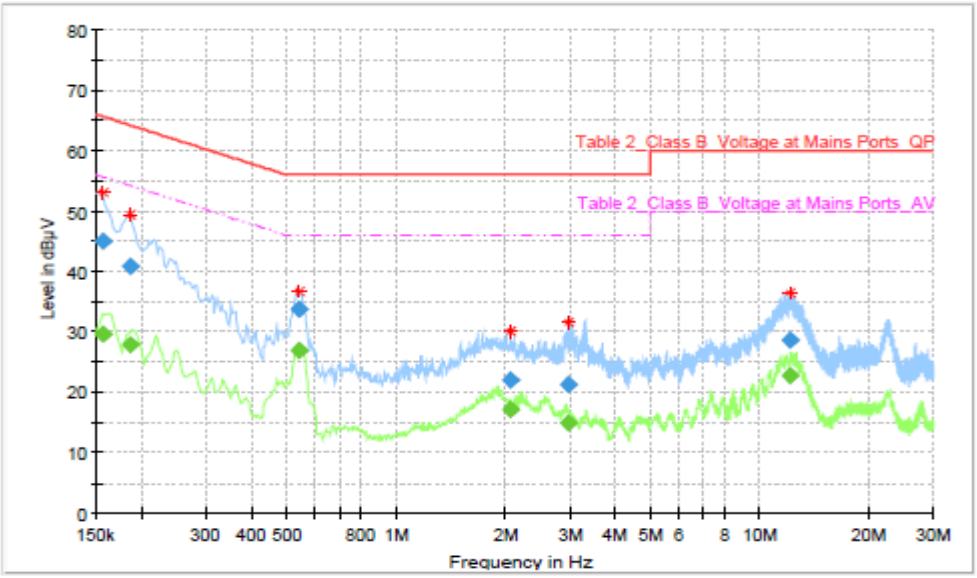
Frequency range (MHz)	Quasi-peak (dBµV) Class A	Average (dBµV) Class A
0.15 to 0.50	97 to 87	84 to 74
0.5 to 30	87	74

Note 1) The lower limit shall apply at the transition frequencies.
Note 2) The limit decreases linearly with the logarithm of the frequency in the range (0.15 ~ 0.5) MHz.
Note 3) Result (dBµV) = Reading (dBµV) + Corr. (Insertion Loss (dB) + Cable Loss (dB))
where. Result: Final value (QuasiPeak, Average),
Reading: Receiver reading value,
Corr.: Correction Factor (Margin = Limit – Result)

Frequency range (MHz)	Quasi-peak (dBµV) Class B	Average (dBµV) Class B
0.15 to 0.50	84 to 74	74 to 64
0.5 to 30	74	64

Note 1) The lower limit shall apply at the transition frequencies.
Note 2) The limit decreases linearly with the logarithm of the frequency in the range (0.15 ~ 0.5) MHz.
Note 3) Result (dBµV) = Reading (dBµV) + Corr. (Insertion Loss (dB) + Cable Loss (dB))
where. Result: Final value (QuasiPeak, Average),
Reading: Receiver reading value,
Corr.: Correction Factor (Margin = Limit – Result)

Test Data



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.155970	—	29.53	55.68	26.14	N	ON	9.8
0.155970	44.91	—	65.68	20.76	N	ON	9.8
0.185820	40.97	—	64.22	23.25	N	ON	10.0
0.185820	—	27.88	54.22	26.34	N	ON	10.0
0.541035	—	26.93	46.00	19.07	N	ON	9.9
0.541035	33.78	—	56.00	22.22	N	ON	9.9
2.066370	22.08	—	56.00	33.92	L1	ON	9.7
2.066370	—	17.22	46.00	28.78	L1	ON	9.7
2.994705	—	14.87	46.00	31.13	N	ON	9.7
2.994705	21.28	—	56.00	34.72	N	ON	9.7
12.146715	—	22.70	50.00	27.30	N	ON	9.9
12.146715	28.54	—	60.00	31.46	N	ON	9.9

Radiated Emission

Test Method and Summary

Test standard : EN 55032

Used Test Equipment

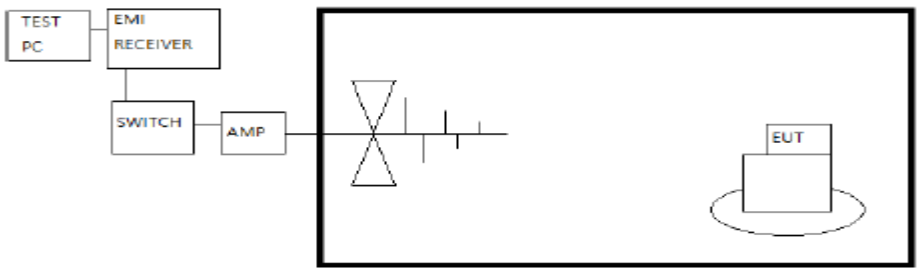
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC001	EMI Test Receiver	R & S	ESU40	100478	2024.01.03	1Y
EMC002	EMI Test Receiver	R & S	ESU26	100590	2024.01.03	1Y
EMC025	Biconilog (Type7)	ETS-Lindgren	3142E	00203547	2025.04.05	2Y
EMC029	DRG Horn (Medium)	ETS-Lindgren	3117	00203763	2024.04.12	1Y
EMC074	AMP	R & S	SCU-01D	1904843	2024.06.26	1Y
EMC215	Preamplifier	Agilent	HP 8449B	3008A01832	2024.03.13	1Y
-	CONTROLLER	Innco systems GmbH	CO3000	CO3000/887 /36540815/L	-	-
-	TURN TABLE	Innco systems GmbH	DT3000-2T	-	-	-
-	ANTENNA MASTER	Innco systems GmbH	MA4000-XP-ET	-	-	-

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
10 m Chamber (Below 1 GHz)	12-18	20.5 ± 1.0	38.6 ± 1.0	-
10 m Chamber (Above 1 GHz)	12-18	20.9 ± 1.0	38.3 ± 1.0	-

Test Setup and Procedure



The EUT along with its peripherals were placed on a non-conducted table with a height of 0.8 m in height table above the reference ground plane.
Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 m to 4 m above the reference ground plane continuously to determine associated with higher emission levels and record them.
The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.
For measurements above 1 GHz,
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at

each frequency of significant emissions, with polarization oriented for maximum response.
The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal.
The final measurement antenna elevation shall be that which maximizes the emissions.

Limits

- The test frequency range of Radiated Disturbance measurements are listed below.

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 to 500	2 000
500 to 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 6 GHz, whichever is lower

(1) Radiated Disturbance below 1 000 MHz at a measuring distance of 10 m

Frequency range (MHz)	Quasi-peak limits (dBµV/m)	
	Class A	Class B
30 to 230	40.0	30.0
230 to 1 000	47.0	37.0

Note 1) The lower limit shall apply at the transition frequency.
Note 2) Additional provisions may be required for cases where interference occurs.
Note 3) Result (dBµV/m) = Reading (dBµV) + c.f. (Ant. Factor (dB/m) + Cable Loss (dB) –Amp Gain (dB))
When, Result: Final value, Reading: Receiver reading value, c.f.: Correction Factor
Margin = Limit – Result

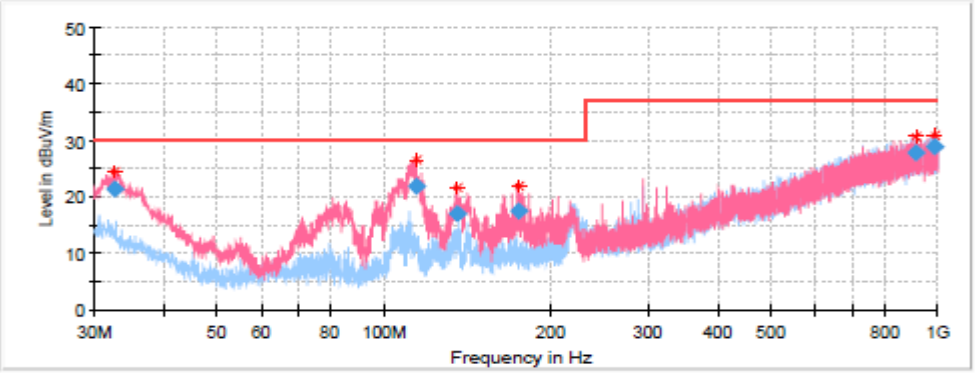
(2) Limits for Radiated Emission above 1 000 MHz at a measuring distance of 3 m

Frequency (GHz)	Peak limits (dBµV/m)		Average limits (dBµV/m)	
	Class A	Class B	Class A	Class B
1 to 3	76	70	56	50
3 to 6	80	74	60	54

Note 1) Result (dBµV/m) = Reading (dBµV) + c.f. (Ant. Factor (dB/m) + Cable Loss (dB) - Amp Gain (dB))
when, Result: Final value, Reading: Receiver reading value, c.f. : Correction Factor
Margin = Limit - Result
Note 2) If measured at a distance other than 3 m, apply the following formula to compensate the measured value.
Em = Edm + 20log(d/3) (d: Measured distance)
Em: Result of measured distance correction, Edm: Measured value

Test Data

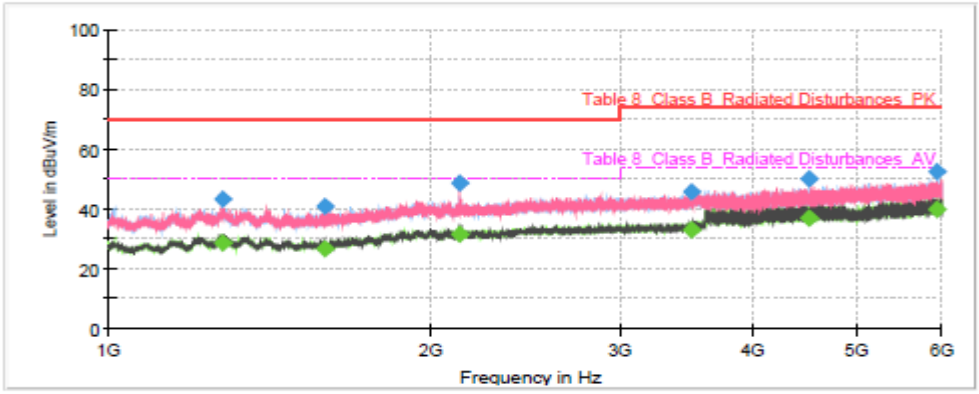
[30 MHz ~ 1 GHz]



Final_Result

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
32.77	21.38	30.00	8.62	105.0	V	291.00	-8.55
114.13	22.03	30.00	7.97	126.0	V	69.00	-14.42
135.68	17.12	30.00	12.88	110.0	V	97.00	-13.88
175.29	17.45	30.00	12.55	210.0	V	145.00	-11.05
908.87	27.90	37.00	9.10	296.0	V	238.00	7.63
988.85	28.76	37.00	8.24	385.0	H	321.00	8.20

[1 GHz ~ 6 GHz]



Final_Result

Frequency (MHz)	MaxPeak (dBuV/m)	CAverage (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1278.00	43.65	---	70.00	26.35	115.0	V	323.00	-1.32
1278.00	---	28.88	50.00	21.12	115.0	V	323.00	-1.32
1592.83	---	26.78	50.00	23.22	108.0	V	297.00	-1.50
1592.83	40.79	---	70.00	29.22	108.0	V	297.00	-1.50
2125.67	---	31.90	50.00	18.10	100.0	V	73.00	3.20
2125.67	48.97	---	70.00	21.03	100.0	V	73.00	3.20
3507.17	46.08	---	74.00	27.92	105.0	V	214.00	7.04
3507.17	---	33.05	54.00	20.95	105.0	V	214.00	7.04
4510.17	---	37.13	54.00	16.87	210.0	H	231.00	9.47
4510.17	50.48	---	74.00	23.52	210.0	H	231.00	9.47
5925.33	---	39.80	54.00	14.21	186.0	H	195.00	12.52
5925.33	52.83	---	74.00	21.17	186.0	H	195.00	12.52

Conducted Differntial Voltage

Test Method and Summary

Test standard : EN 55032

Used Test Equipment

Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
-	-	-	-	-	-	-

Operating Environment

Test Voltage: -

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
-	-	-	-	-

Test Setup and Procedure

The antenna terminals of the EUT and the auxiliary signal generator are connected to the Measuring set by means of coaxial cables and a resistive combining network having a minimum Attenuation of 6 dB. The EUT tuned to the wanted signal.

The measuring set is tuned to the relevant radiated frequency and the disturbance level is Measured taking into account the attenuation between the receiver antenna terminal and the Measuring set input.

Limits

Equipment type	Source	Frequency MHz	Limit values dB(μV) 75 Ohm Quasi-peak
Television receivers, video recorders and PC tuner cards working in channels between 30 MHz and 1 GHz	Local oscillator	30 to 950	Fundamental 46
		950 to 2 150	Fundamental 54
	Other	30 to 950	Harmonics 46
		950 to 2 150	Harmonics 54
		30 to 2 150	46
Frequency modulation sound receivers and PC tuner cards	Local oscillator	≤1000	Fundamental 54
		30 to 300	Harmonics 50
	Other	300 to 1 000	Harmonics 52
		30 to 1 000	46

Note 1) At frequencies above 1 GHz the peak detector is used.

Test Data

N/A

Harmonics

Test Method

Test standard : EN IEC 61000-3-2

Used Test Equipment

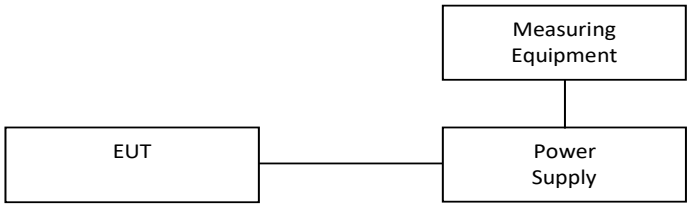
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
-	-	-	-	-	-	-

Operating Environment

Test Voltage: -

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
-	-	-	-	-

Test Setup and Procedure



The limits of harmonic components of the input current which may be produced by equipment having an input current up to and including 16 A per phase, and which is intended to be connected to public low-voltage distribution system had been checked.

Class A:
– balanced three-phase equipment;
– household appliances, excluding those specified as belonging to Class B, C or D;
– vacuum cleaners;
– high pressure cleaners;
– tools, excluding portable tools;
– independent phase control dimmers;
– audio equipment;
– professional luminaires for stage lighting and studios

Class B:
- portable tools
- arc welding equipment which is not professional equipment

Class C:
- lighting equipment

Class D:
Equipment having a specified power less than or equal to 600 W according to 6.3.2 of the following types
– personal computers and personal computer monitors;
– television receivers;
– refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).

Note 1) According to EN 61000-3-2 the manufacturer shall specify the power of the apparatus. This value shall be used for establishing limits; the specified power shall be within ±10 % of the measured power.

Note 2) Limit are not specified for
- Equipment with a rated power of 75 W or less (other than lighting equipment)
- Professional equipment with a total rated power greater than 1 kW
- Symmetrically controlled heating elements with a rated power less than or equal to 200 W
- Independent dimmers for incandescent lamps with a rated power less than or equal to 1

Limit

Class A equipment

Harmonic order (n) Odd harmonics	Maximum permissible Harmonic current (A)	Harmonic order (n) Even harmonics	Maximum permissible Harmonic current (A)
3	2.30	2	1.08
5	1.14	4	0.43
7	0.77	5	0.3
9	0.40	8 ≤ n ≤ 40	0.23 8/n
11	0.33		
13	0.21		
15 ≤ n ≤ 39	0.15 15/n		

Class B equipment

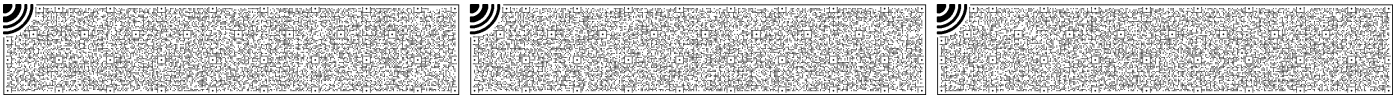
It shall not exceed the value give in Class A multiplied by a factor of 1.5.

Class C equipment

Harmonic order (n)	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	30·λ(λ is the circuit power factor)
5	10
7	7
9	5
11 ≤ n ≤ 39 (odd harmonics only)	3

Class D equipment

Harmonic order (n)	Maximum permissible Harmonic current per watt (mA/W)	Maximum permissible Harmonic current (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13 ≤ n ≤ 39 (odd harmonics only)	3.85/n	See Class A



Test Data

N/A

Voltage fluctuations and flicker

Test Method

Test standard : EN 61000-3-3

Used Test Equipment

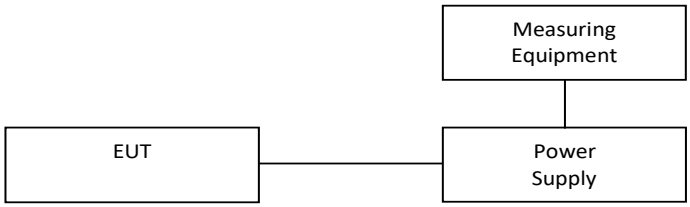
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
-	-	-	-	-	-	-

Operating Environment

Test Voltage: -

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
-	-	-	-	-

Test Setup and Procedure



The limits of voltage changes which may be produced by an equipment tested under specified conditions and which is intended to be connected to public low-voltage distribution system had been checked.

Limits

- the short-term flicker indicator, Pst, shall not be greater than 1.0
- the long-term flicker indicator, Plt, shall not be greater than 0.65
- the relative steady-state voltage change, dc shall not exceed 3.3 %
- the voltage change with time, d(t), during a voltage change shall not exceed 3.3 % for more than 500 ms
- the maximum relative voltage change, dmax, shall not exceed

a) 4 % without additional conditions
b) 6 % for equipment which is switched manually, if any
c) 7 % for equipment which is attended whilst in use, if any

Test Data

N/A

SECTION 6 IMMUNITY

Performance Criteria for Immunity test

The performance criteria was based on the following guidelines:

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.

Electrostatic Discharge

Test Method and Summary

Test standard : EN 61000-4-2

Used Test Equipment

Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC065	FLAGSHIP ESD SIMULATOR	TESEQ	NSG 438	197	2024.01.10	1Y
-	CARBON BRUSH	Noiseken	CARBON BRUSH	-	-	-

Operating Environment

Test Voltage: AC 230 V, 50 Hz

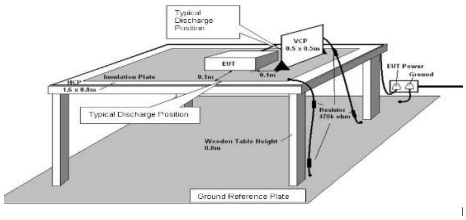
Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
Shielded Room 1	12-18	20.5 ± 1.0	38.7 ± 1.0	102.5

The EUT shall be operated within its intended climatic conditions

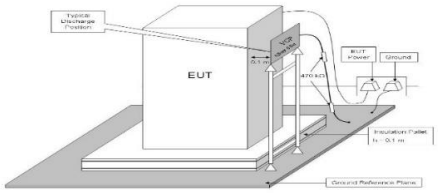
In the case of air discharge testing, the climatic conditions shall be within the following ranges	
Ambient temperature	15 °C to 35 °C
Relative humidity	30 % R.H. to 60 % R.H.
Atmospheric pressure	86 kPa (860 mbar) to 106 kPa (1 060 mbar)

Test Setup and Procedure

The typical table-top test setup is as follow:



The typical Floor-standing test setup is as follow:



A ground reference plane was located on the floor, and connected to earth via a low impedance connection. The return cable of the ESD generator was connected to the reference plane

Test Summary

Basic Standard		EN 61000-4-2
Level:		± 2.0 / 4.0 / 8.0 kV (Air Discharge)
		± 4.0 kV (Contact Discharge)
		± 4.0 kV (Indirect Contact Discharge)
Required Performance Criterion:		B
No. of Discharge		≥ 10
Time Between Each Discharge:		1 s
Test Mode:		Operating Mode
Test Point:	Air Discharge:	All accessible insulated enclosure and seams All accessible points where contact discharge cannot be applied
	Contact:	All conductive surfaces of the EUT
	HCP:	All sides of the EUT (Floor-stand product excluded)
	VCP:	Four faces of the EUT

Test Result

Location of Position	Kind of Discharge	Applied Voltage	Polarity	Result
HCP	Contact	4.0 kV	Positive	A
			Negative	A
VCP			Positive	A
			Negative	A
Non-Metal Enclosure	Air	(2.0 / 4.0 / 8.0) kV	Positive	A
			Negative	A

- A: The EUT normally operate during and after the test.

ESD Photo of selected test points

Contact discharge
Air discharge

Photo 1

Photo 2

Radiated Susceptibility

Test Method

Test standard : EN 61000-4-3

Used Test Equipment

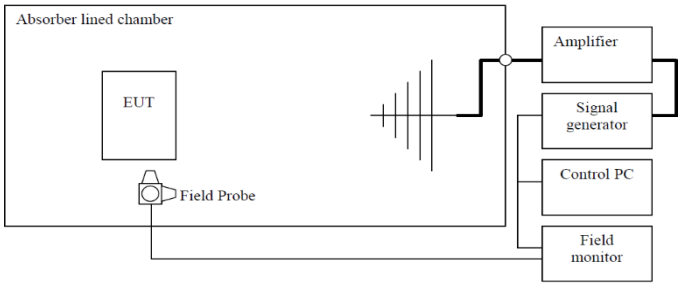
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC016	RF and Microwave Signal Generator	R & S	SMB100A	110626	2024.01.03	1Y
EMC017	Power Meter	R & S	NRP2	104732	2024.01.03	1Y
EMC018	Average Power Sensor	R & S	NRP-Z91	103199	2024.01.03	1Y
EMC019	Average Power Sensor	R & S	NRP-Z91	103202	2024.09.27	1Y
EMC033	RF Amplifier	AR	1000W1000EM1	0344864	2024.01.04	1Y
EMC034	RF Amplifier	Amplifier Research	100S1G6M1	0344927	2024.01.04	1Y
EMC022	High Gain Log-Periodic	R & S	HL046Z1	100278	-	-
EMC036	Stacked Log Periodic Antenna	Schwarzbeck	STLP 9149	#345	-	-
-	CONTROLLER	Innco systems GmbH	CO3000	CO3000/888/36540815/L	-	-
-	TURN TABLE	Innco systems GmbH	DS1500-S	-	-	-
-	ANTENNA MASTER	R & S	STATIV VERFAHRBAR TRIPOD MOBLE	-	-	-
-	ANTENNA MASTER	Innco systems GmbH	MA2500-EP-HS	-	-	-

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
RI Chamber	12-20	20.4 ± 1.0	38.2 ± 1.0	101.9

Test Setup and Procedure



The antenna has been orientated for both horizontal and vertical polarization.
The distance between antennas the equipment under testing was at least 3 m.
The tests have been performed with the antenna facing each of the four side of the EUT.

Test Summary

Basic Standard	EN 61000-4-3
Required Performance Criterion:	A
Test frequency:	80 MHz ~ 1 GHz
Spot frequency	1.8 GHz, 2.6 GHz, 3.5 GHz, 5 GHz
Level:	3 V/m
Modulation:	1 kHz, 80 % Amplitude Modulation
Frequency Step:	1 %
Dwell time:	1 s
Test Mode:	Operating Mode

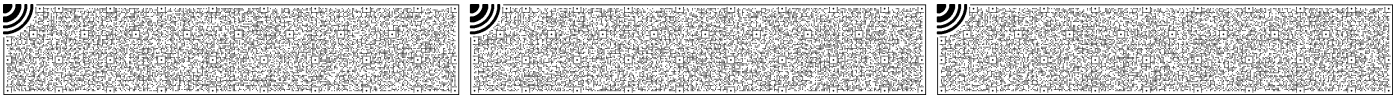
Test Result

Test Side	Polarization	Result
Front	Horizontal	A
	Vertical	A
Rear	Horizontal	A
	Vertical	A
Left	Horizontal	A
	Vertical	A
Right	Horizontal	A
	Vertical	A

Audio output function (☐ Acoustic / ☐ Electrical)

Test Side	Audio Reference Level	Polarization	Result
Front	-	Horizontal	-
		Vertical	-
Rear		Horizontal	-
		Vertical	-
Left		Horizontal	-
		Vertical	-
Right		Horizontal	-
		Vertical	-

- A: The EUT normally operate during and after the test.



Electrical Fast Transient/Burst

Test Method

Test standard : EN 61000-4-4

Used Test Equipment

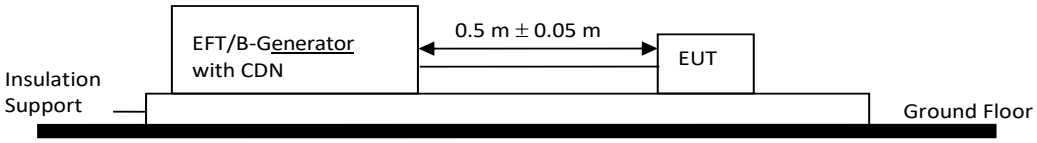
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC056	IMMUNITY TEST SYSTEM	HAEFELY HIPORONICS	AXOS8	182496	2024.02.10	1Y

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
Shielded Room 3	12-19	21.3 ± 1.0	38.5 ± 1.0	102.1

Test Setup and Procedure



The EUT has been placed on a wooden table 10 cm above the reference ground plane.

The reference ground plane exceeded the projected geometry of the EUT and the capacitive clamp by more than 20 cm. The clamp has placed directly on the reference ground plane.
The distance between the EUT and all other conductive structures except the ground plane beneath the EUT was more than 50 cm.

The distance between any coupling devices and the EUT shall be (0.5 – 0/+0.1) m or table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment, unless otherwise specified in product standards.

Test Summary

Basic Standard	EN 61000-4-4	
Port:	AC Power Ports	DC Power Ports, Signal Ports and Control Ports
Required Performance Criterion:	B	
Repetition frequency	5 kHz, Tr/Th = 5 / 50 ns	
Level:	± 1.0 kV	± 0.5 kV
Test Duration:	1 min	
Test Mode:	Operating Mode	

Test Result

Test Port	Test Point	Test Level	Polarity	Result
AC	L - N - PE	1.0 kV	Positive	A
			Negative	A
DC	-	0.5 kV	Positive	-
			Negative	-
Signal	-	0.5 kV	Positive	-
			Negative	-

- A: The EUT normally operate during and after the test.

Surge Transient

Test Method

Test standard : EN 61000-4-5

Used Test Equipment

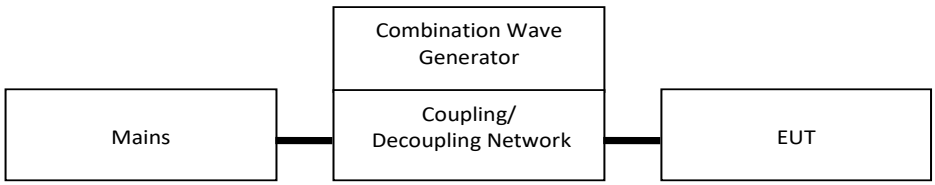
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC056	IMMUNITY TEST SYSTEM	HAEFELY HIPORONICS	AXOS8	182496	2024.02.09	1Y

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
Shielded Room 3	12-19	21.2 ± 1.0	38.6 ± 1.0	102.1

Test Setup and Procedure



The surge is to be applied to the EUT power supply terminal and the lines via the capacitive coupling network with decoupling networks. If not otherwise specified the power cord and interconnection line between the EUT and the coupling / decoupling networks should be 2 m in length (or shorter).

Five positive and five negative pulses shall be applied as far as applicable between phase and phase, phase and neutral, phase and protective earth, and between neutral and protective earth.

The surges have to be applied synchronized to the voltage phase at the zero-crossing and the peak value of the AC voltage wave (positive and negative).

Test Summary

Basic Standard	EN 61000-4-5		
Port	AC Power Ports		
Required Performance Criterion	B		
Surge pulse shape	Tr/Th = 1.2 / 50 μs		
Coupling Impedance	Line to Line	Line to ground	
	2 Ω (18 μF)	12 Ω (9 μF + 10 Ω)	
Angle	90°, 270°		
Number of Surge	5		
Level (kV)	L - N	N - PE	L - PE
	0.5 / 1	0.5 / 1 / 2	0.5 / 1 / 2
Interval time	1 min		
Test Mode	Operating Mode		

Test Result

Test Port	Test Point	Test Level (kV)	Polarity	Result
AC	L - N	0.5 / 1	Positive	A
			Negative	A
	L - PE	0.5 / 1 / 2	Positive	A
			Negative	A
	N - PE	0.5 / 1 / 2	Positive	A
			Negative	A

- A: The EUT normally operate during and after the test.

Conducted Susceptibility

Test Method and Summary

Test standard : EN 61000-4-6

Used Test Equipment

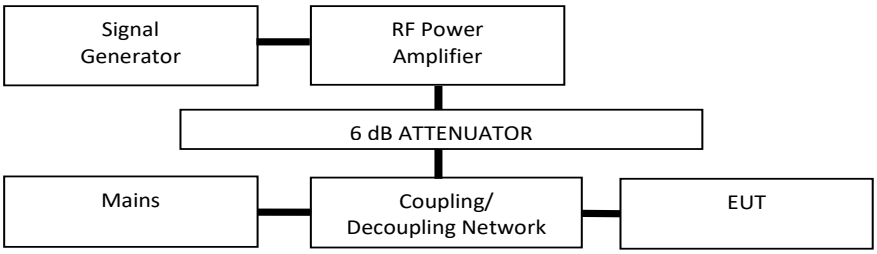
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC021	RF and Microwave Signal Generator	R & S	SMB100A	110626	2024.01.03	1Y
EMC023	Average Power Sensor	R & S	NRP-Z91	103200	2024.01.03	1Y
EMC038	RF Power Amplifier	AR	100A250AM1	0345211	2024.01.04	1Y
EMC039	Coupling Decoupling Networks	FCC	FCC-801-M2/M3-16A	161094	2024.06.28	1Y
EMC086	ATTENUATOR	Bird Technologies	150-A-FFN-06	1390416	2024.01.03	1Y

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
Shielded Room 1	12-18	20.3 ± 1.0	38.6 ± 1.0	102.5

Test Setup and Procedure



Test voltage should be applied on the signal line and control line, DC power ports or AC power ports alternately if applicable

Test Summary

Basic Standard:	EN 61000-4-6
Port:	AC/DC Power Ports, Digital/Analog/Data Ports
Required Performance Criterion:	A
Test frequency:	150 kHz ~ 80 MHz
Level:	150 kHz ~ 10 MHz (3 V) 10 MHz ~ 30 MHz (3 V ~ 1 V) 30 MHz ~ 80 MHz (1 V)
Modulation:	1 kHz, 80 % Amplitude Modulation
Frequency Step:	1 %
Dwell time:	1 s
Test Mode:	Operating Mode

Result

Test Port	Coupling method	Result
AC	CDN (M3)	A

Audio output function (☐ Acoustic / ☐ Electrical)

Test Port	Audio Reference Level	Result
-	-	-

- A: The EUT normally operate during and after the test.

Voltage Dips and Interruption

Test Method

Test standard : EN 61000-4-11

Used Test Equipment

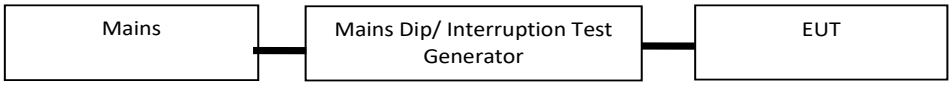
Control No.	Equipment	Manufacturer	Model No.	Serial No.	Next Cal.	Cal Int.
EMC056	IMMUNITY TEST SYSTEM	HAEFELY HIPORONICS	AXOS8	182496	2024.02.09	1Y
	Voltage Dips Transformer	HAEFELY HIPORONICS	DIP 116	182620	N/A	N/A

Operating Environment

Test Voltage: AC 230 V, 50 Hz

Test Site	Test date (MM-DD)	Temp (℃)	Humidity (% R.H.)	Pressure (kPa)
Shielded Room 3	12-18	21.3 ± 1.0	38.6 ± 1.0	102.1

Test Setup and Procedure



The EUT shall be tested for each selected combination of test level and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event for each mode.
Tests were conducted at zero crossings of the voltage.

Test Summary

Basic Standard		EN 61000-4-11
Port:		AC INPUT
Required Performance Criterion:		B / C / C
Number of dips:		3
Phase:		0°
Test Levels:	Test level in % U_T	Period
	0	0.5
	70	25 / 30
	0	250 / 300
Test Mode:		Operating Mode

Result

Voltage dips % U_T	Test level % U_T	Periods (50 Hz) Cycle(s)	Result
100	0	0.5	A
30	70	25	A
100	0	250	A

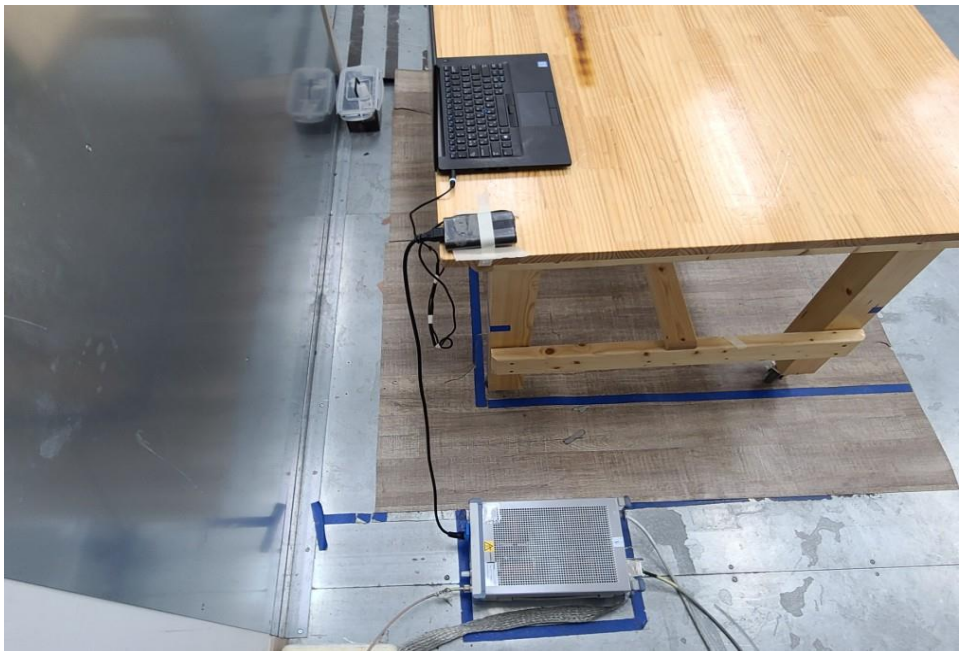
- A: The EUT normally operate during and after the test.

SECTION 7 APPENDIX I

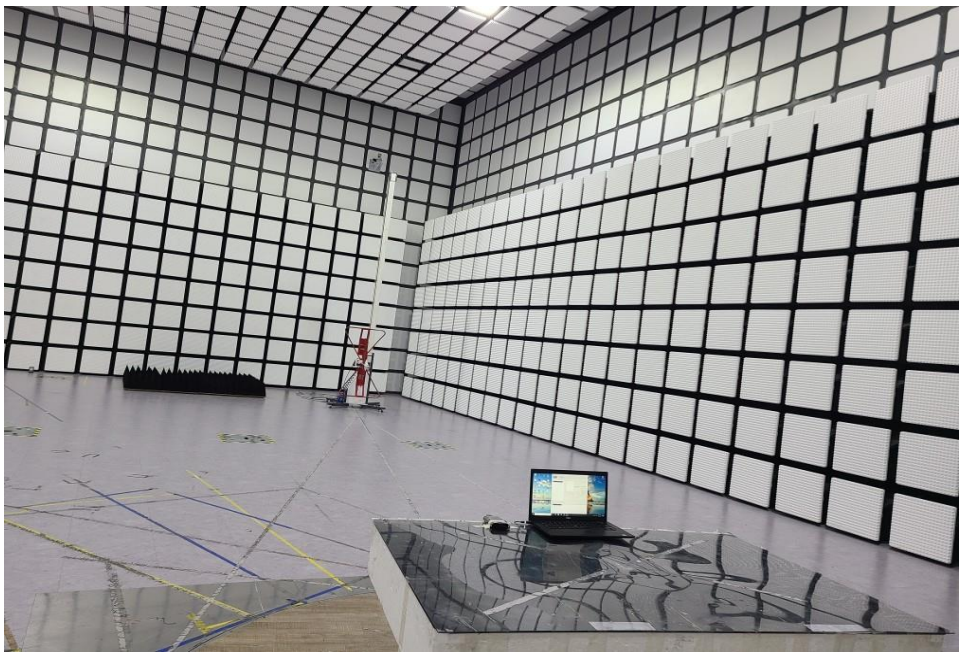
Emission

Photographs of Test Configurations

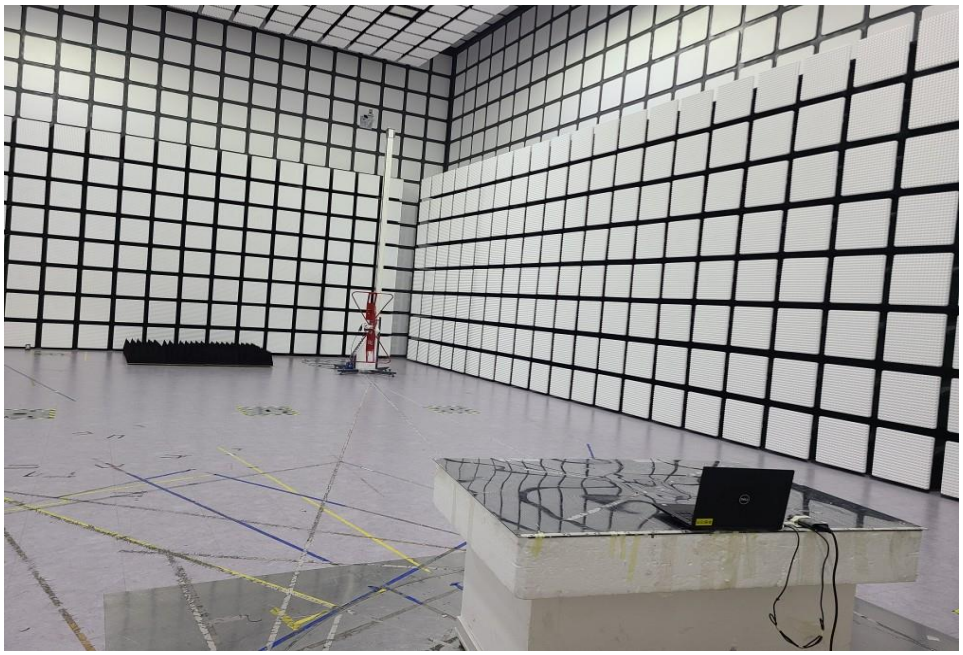
Conducted Emission



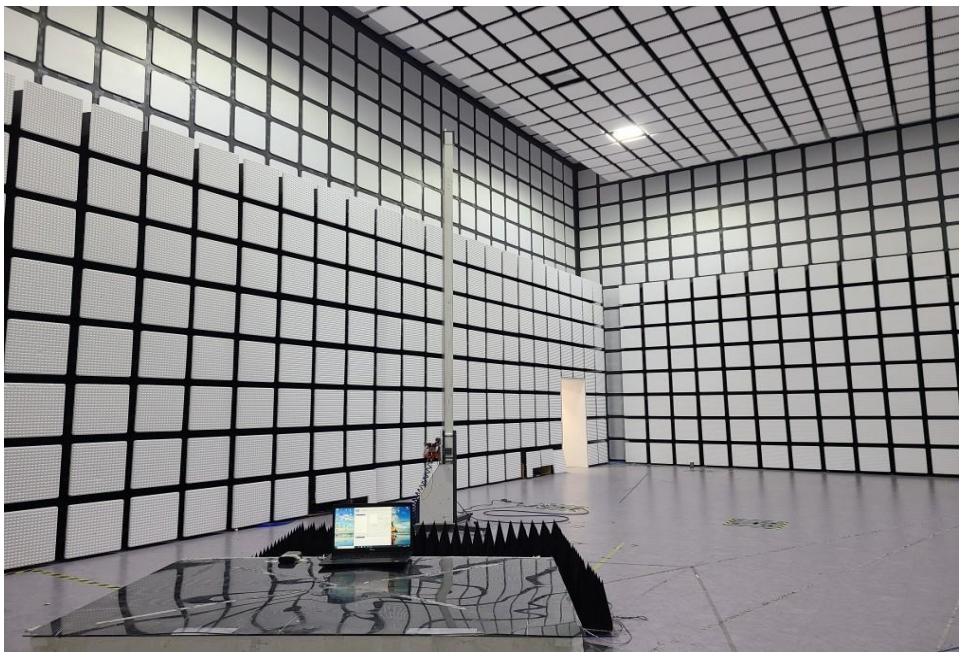
Conducted Emission



Radiated Emission below 1 GHz



Radiated Emission below 1 GHz



Radiated Emission above 1 GHz

Radiated Emission above 1 GHz

N/A

Conducted Differential Voltage

N/A

Conducted Differential Voltage

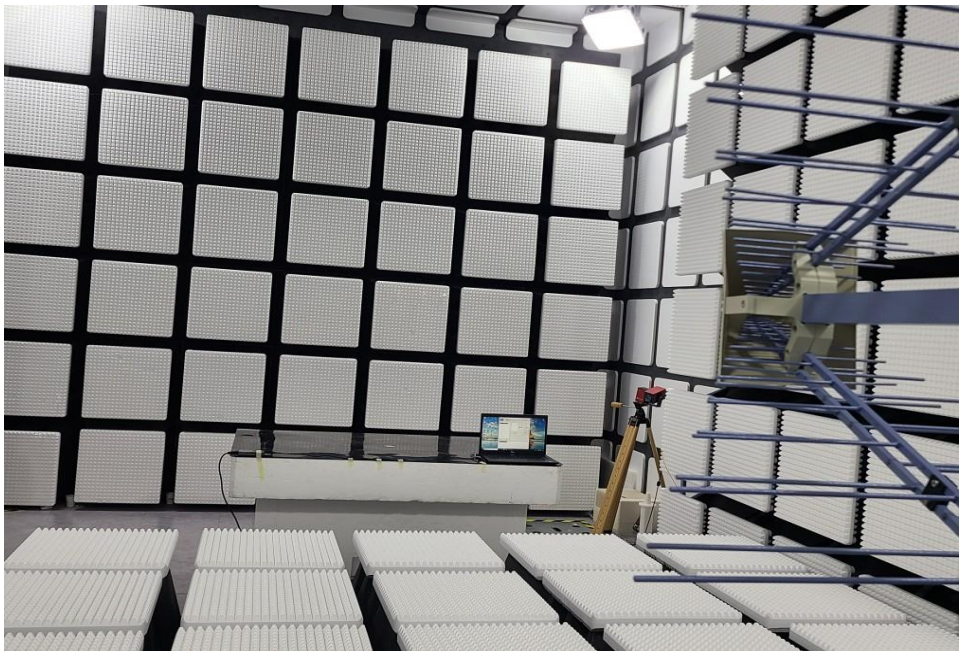
N/A

Harmonics

N/A

Voltage Fluctuations and Flicker

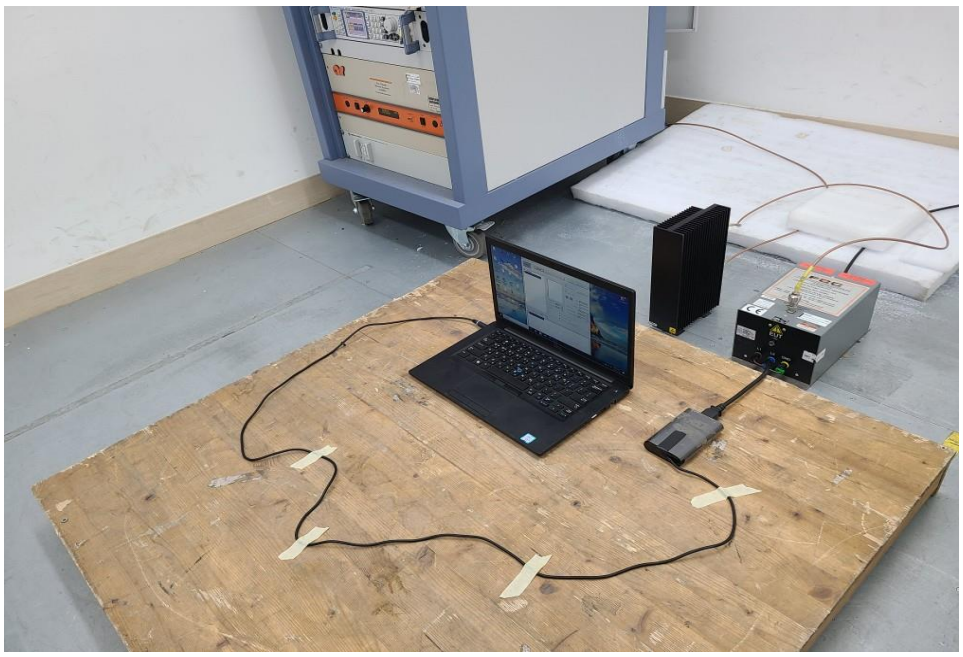
ESD



Radiated Susceptibility

Electric Fast Transient/Burst

Surge Transient



Conducted Susceptibility

Voltage Dips and Interruptions

SECTION 8 APPENDIX II

Photographs of EUT

Front

Rear

--- E N D ---