CE EMC TEST REPORT

Equipment	:	**Blues Wireless for Arduino Opta**
Brand Name	:	**Blues**
Model Name	:	**Blues Wireless for Arduino Opta – Cellular Edition (LTE Cat 1 EMEA)**
Applicant	:	**Blues Wireless Inc.** **50 Harbor Street, Manchester by the Sea, MA 01944, United States**
Manufacturer	:	**Blues Wireless Inc.** **50 Harbor Street, Manchester by the Sea, MA 01944, United States**
Standard	:	**EN 55032 : 2015 + A11:2020 Class B** **EN 55032 : 2015 + A1:2020 Class B** **EN 55035 : 2017** **EN 55035 : 2017 + A11:2020** **EN 55032 : 2015 + A11:2020 Class B**

The product was received on Sep. 18, 2024, and testing was performed from Nov. 17, 2024 to Nov. 29, 2024. We, Sporton International Inc. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in EN 55032 : 2015 + A11:2020 Class B, EN 55032 : 2015 + A1:2020 Class B, EN 55035 : 2017, EN 55035 : 2017, EN 55035 : 2017 + A11:2020; and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

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History of this test report

Report No.	Version	Description	Issue Date
EC491806	01	Initial issue of report	Feb. 19, 2025
EC491806	02	Revise Appendix A This report is an updated version, replacing the report issued on Feb. 19, 2025.	Mar. 14, 2025

Summary of Test Result

Report Clause	Ref Std. Clause	Test Standard	Standard for Customer Requirement	Test Items	Result (PASS/FAIL)	Remark
A1	EN 55032	EN 55032:2015+A11: 2020 Class A	EN 55032:2015+A1: 2020 Class A	Radiated Emission	PASS	1.09 dB under the limit at 575.10 MHz for Quasi-Peak
-	EN 55032	EN 55032:2015+A11: 2020 Class A	EN 55032:2015+A1: 2020 Class A	Conducted Emission	Not Required	-
-	EN 55032	EN 55032:2015+A11: 2020 Class A	EN 55032:2015+A1: 2020 Class A	Conducted Differential Voltage Emissions for Class B Equipment	Not Required	-
-	-	EN 61000-3-2 : 2014 Class D	EN IEC 61000-3-2 : 2019 + A2:2024 Class A	Harmonic Current Emission	Not Required	-
-	-	EN 61000-3-3 : 2013	EN 61000-3-3 : 2013 + A2 : 2021 + AC: 2022-01	Voltage Fluctuations and Flicker	Not Required	-
A6	EN 55035 4.2.1	IEC 61000-4-2:2008	IEC 61000-4-2:2008	Electrostatic Discharge	PASS	-
-	EN 55035 4.2.4	IEC 61000-4-4:2012	IEC 61000-4-4:2012	Electrical Fast Transients	Not Required	-
A5	EN 55035 4.2.2.2	IEC 61000-4-3: 2006+A1:2007+A2:2010	IEC 61000-4-3: 2020	Continuous RF electromagnetic field disturbances	PASS	-
-	EN 55035 4.2.2.3	IEC 61000-4-6:2008	IEC 61000-4-6:2023	Continuous Conducted Disturbances	Not Required	-
A11	EN 55035 4.2.3	IEC 61000-4-8:2009	IEC 61000-4-8:2009	Power-Frequency Magnetic Fields	PASS	-
-	EN 55035 4.2.5	IEC 61000-4-5:2005	IEC 61000-4-5:2014 + AMD1:2017	Surges	Not Required	-
-	EN 55035 4.2.6	IEC 61000-4-11:2004	IEC 61000-4-11:2020	Voltage Dips and Interruptions	Not Required	-
-	EN 55035 4.2.7	IEC 61000-4-6:2008	IEC 61000-4-6:2023	Broadband impulsive conducted disturbances Test	Not Required	-

Note: Not required means after assessing, test items are not necessary to carry out.

Conformity Assessment Condition:

The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. Please refer to each test results in Appendix A for measurement uncertainty.

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Jin Peng
Report Producer: Ming Chen

1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature
General Specs GSM/WCDMA/LTE and Wi-Fi 2.4GHz 802.11b/g/n. **Antenna Type** WWAN: Omni-directional Antenna WLAN: Omni-directional Antenna

Remark: The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.

1.2 Modification of EUT

No modifications made to the EUT during the testing.

1.3 Applied Standards

According to the specifications of the manufacturer, the EUT must complies with the requirements of

- **EN 55032 : 2015 + A11:2020 Class B**
- **EN 55032 : 2015 + A1:2020 Class B**
- **EN 55035 : 2017**
- **EN 55035 : 2017 + A11:2020**

2. Assess Test for Equipment under Test (EUT)

2.1 Requirements of Limit and EUT Performance Criteria for all Immunity Test Items

Test limit including test level, test frequency range, pulse type, test duration…etc. requirements.
This section is intended to integrate requirements of limit, and required performance criteria for all immunity test Items.

In subsection 2.1.1, includes two parts:

1. Subsection 2.1.1: Support ports list of EUT, accessary, and cable record, where EUT intended to use in. These information will be used for decide test items and test limit
   (1) Supported ports list of EUT: Because test limit are based on supported ports of EUT, this is necessary information.
   (2) Accessary: include adapter type and remark EUT has battery or not.
   (3) Cable Record: includes cable type, cable length, indoor/outdoor. These parameters will decide tests shall be carrying out or not.
2. In subsection 2.3, required performance criteria of EUT per EN55035 series standards
   Integrated required performance criteria of EN55035 series standards, they are used for all immunity test of this report.

2.1.1 Information of Supported Ports of EUT, Accessary and Cable Record

1. Supported ports of EUT are listed as below (symbol ■ means supported port):

■	Enclosure Port
□	Input AC power port
■	Input DC power port
□	Telecommunication port

2. Accessory (symbol ☒ means have used with EUT during test)

■	□ AC Adapter ■ DC Adapter □ Car charger □ PoE adapter	Pins : □ 2pins □ 3pins Cable Length : □ >3m ■ <3m
■	Battery	

2.1.2 Detailed Test Modes of EUT

Assess test modes of EUT according to recorded information of section 2.1.
The detailed test modes of each test items are shown in Appendix A.

2.2 EUT Operation Test Setup

The EUT was set in below conditions during EMI and EMS testing.

WLAN

1. Enable WLAN function of the EUT.
2. The EUT links with supported units
3. Playing WiFi streaming video.
4. Execute “PING IP” function under the “ cmd “ of Window system to transfer packet bi-directionally between the EUT and supported units.
5. Monitor the packet loss and WLAN radio performance.

LTE Link

1. The LTE (LTE: QPSK, Full RB, Max. BW) radio function is linked with system simulator, and set all up bits for maximum output power, and the DTX is disabled.

LTE Idle

1. For Idle mode, the connection between EUT and LTE system simulator is established.

WLAN Idle

1. For Idle mode, the connection between EUT and companion device is established and monitored the signal by spectrum analyzer, unintentional transmission shall not occur during the test.

Monitor the WLAN (2.4GHz) function

2.3 Required Performance Criteria of EUT per EN55035

Criteria	Performance criteria
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. ♦ The EUT shall operate as its intended operating condition during and after the test. ♦ Network Where relevant, during the application of the test the network function shall, as a minimum, operate ensuring that: • established connections shall be maintained throughout the application of the test; • no change of operational state or corruption of stored data occurs; • no increase in error rate above the figure defined by the manufacturer occurs. The manufacturer should select the most appropriate performance measurement criteria for the product or system, for example bit error rate, block error rate; • no request for retry above the figure defined by the manufacturer; • the data transmission rate does not reduce below the figure defined by the manufacturer; • no protocol failure occurs; • The audio noise level at a two-wire analogue interface (supporting telephony) shall satisfy the requirements of limit.
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. ♦ Network Established connections shall be maintained throughout the test, or shall self-recover in a way and timescale that is imperceptible to the user. The error rate, request for retry and data transmission rates may be degraded during the application of the test. Degradation of the performance as described in criterion A is permitted, provided that the normal operation of the EUT is self-recoverable to the condition established prior to the application of the test.
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. ♦ Network Degradation of performance as described in criteria A and B is permitted provided that the normal operation of the EUT is self-recoverable to the condition immediately before the application of the test, or can be restored after the test by the operator.

Appendix A. Test Requirements and Test Results

Test requirements and rest results include

- Information of testing environment : temperature, humidity, test site, test engineer, test date, measurement uncertainty, test software.
- Summary : worst mode, EUT operated voltage during test, test parameter, EUT performance criteria and test result
- Detailed test modes of EUT
- Test setup
- Test procedures
- Connection diagram of test system
- Supported unit used in test configuration and system
- List of measuring equipment
- Setup photograph
- Test raw data

Above contents have been corresponded to each test items.

A1. Test Results of Radiated Emission Test

Information of Testing Environment			
Temperature	23~26 ℃	**Humidity**	43~47 %
Test Site (30MHz ~ 6GHz)	03CH06-HY	**Test Engineer**	Bor-Shiang,Huang
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)		
Test Date	Nov. 17, 2024		
Measurement Uncertainty Level of Confidence of 95% (U=2Uc(y))	30 MHz ~ 1000 MHz : 5.8 dB 1000 MHz ~ 6000 MHz : 4.8 dB		
Test Software and its version	Test Software: e3 , Version: 6.2009-8-24(k5)(sporton)		

A1.1. Summary

Worst Mode	Mode 1		
EUT Operated Voltage During Test	DC12V		
Frequency	575.10 MHz	**Detector**	Quasi-Peak
Level	45.91 dBμV	**Margin**	Under 1.09 dB
Result	PASS		

A1.2. Details of EUT Test Modes

Details of Test line Items
Radiated Emission
Mode 1: LTE Band 3 Link + DC power
Mode 2: LTE Band 7 Link + DC power
Mode 3: WLAN (2.4GHz) Link + DC power
Mode 4: WLAN (2.4GHz) Idle + DC power
Mode 5: LTE Band 3 Idle + DC power

A1.3. Test Limit

<Class B limit>

<30MHz ~ 1000MHz>

Frequency Range (MHz)	Measurement		Class B limits dB (μV/m)
	Distance (m)	Detector Type/ Bandwidth	OATS/SAC
30 ~ 230	10	Quasi Peak / 120 kHz	30
230 ~ 1000			37
30 ~ 230	3		40
230 ~ 1000			47

<1000MHz ~ 6000MHz>

<EN 55032 : 2015 + A11:2020>

Frequency Range (MHz)	Measurement		Class B limits dB(μV/m)
	Distance (m)	Detector Type/ Bandwidth	FSOATS
1000 ~ 3000	3	Average / 1 MHz	50
3000 ~ 6000			54
1000 ~ 3000		Peak / 1 MHz	70
3000 ~ 6000			74

<EN 55032 : 2015 + A1:2020>

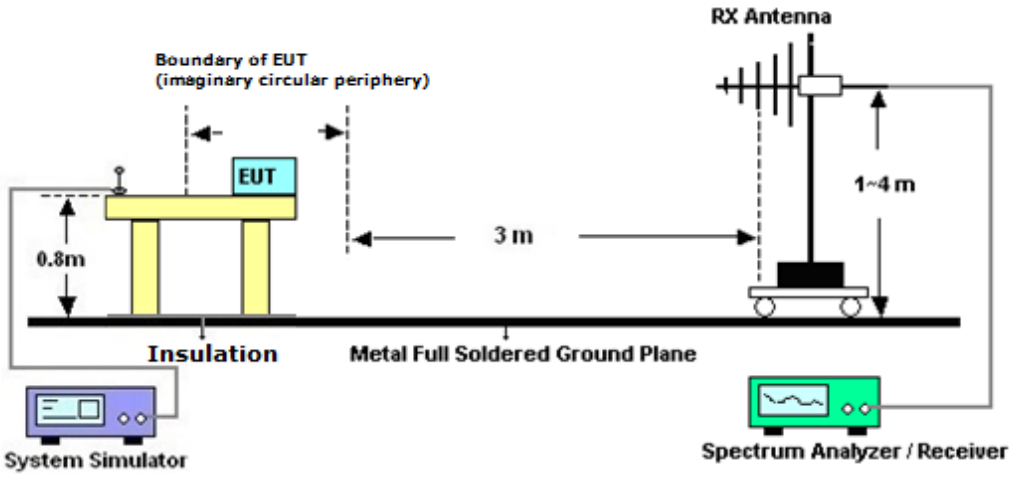
Frequency Range (MHz)	Measurement		Class B limits dB(μV/m)
	Distance (m)	Detector Type/ Bandwidth	FSOATS
1000 ~ 6000	3	Average / 1 MHz	54
1000 ~ 6000		Peak / 1 MHz	74

Conditional testing frequency:

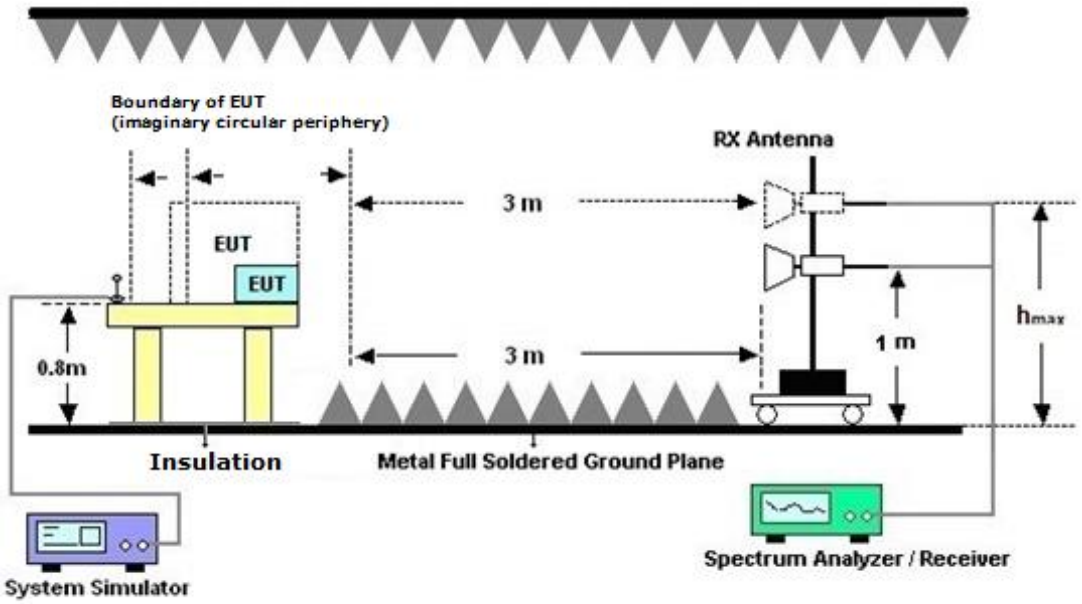
Highest measured frequency	Highest measured frequency
Fx ≤ 108 MHz	1 GHz
108 MHz < Fx ≤ 500 MHz	2 GHz
500 MHz < Fx ≤ 1 GHz	5 GHz
Fx > 1 GHz	5 x Fx up to a maximum of 6 GHz
NOTE: For FM and TV broadcast receivers, Fx is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	

A1.4. Test Setup

<Radiated Emissions Frequency: 30 MHz to 1000 MHz>

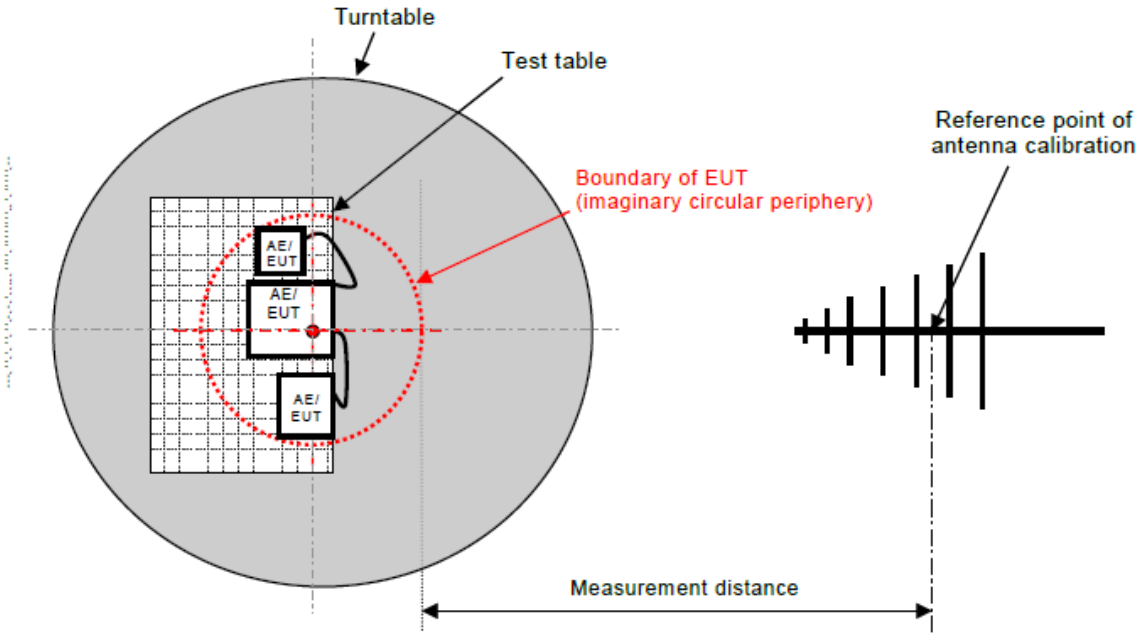


<Radiated Emissions Frequency: 1000 MHz to 6000 MHz>



Remark: When EUT's height is over 172cm, h_{max} = top of EUT

<Radiated Emissions Setup Configuration>



A1.5. Test Procedures

a. The EUT shall be placed upon a non-conductive table 0.8 m above the horizontal ground reference plane of the test site.

b. The boundary of EUT was set 3 meters from the receiving antenna which was mounted on the top of a variable height antenna tower. Cables connecting to outside area is directly dropped to, but with an insulation holder less than 150mm height, the reference ground plane.

c. The table was rotated 360 degrees to determine the position of the highest radiation.

d. The height of the antenna is varied between 1 m and 4 m above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.

e. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading values.

f. Ideally, the central point of the arrangement shall be positioned at the centre of the turntable and the rear of the arrangement shall be flush with the back of the supporting tabletop unless that would not be possible or typical of normal use.

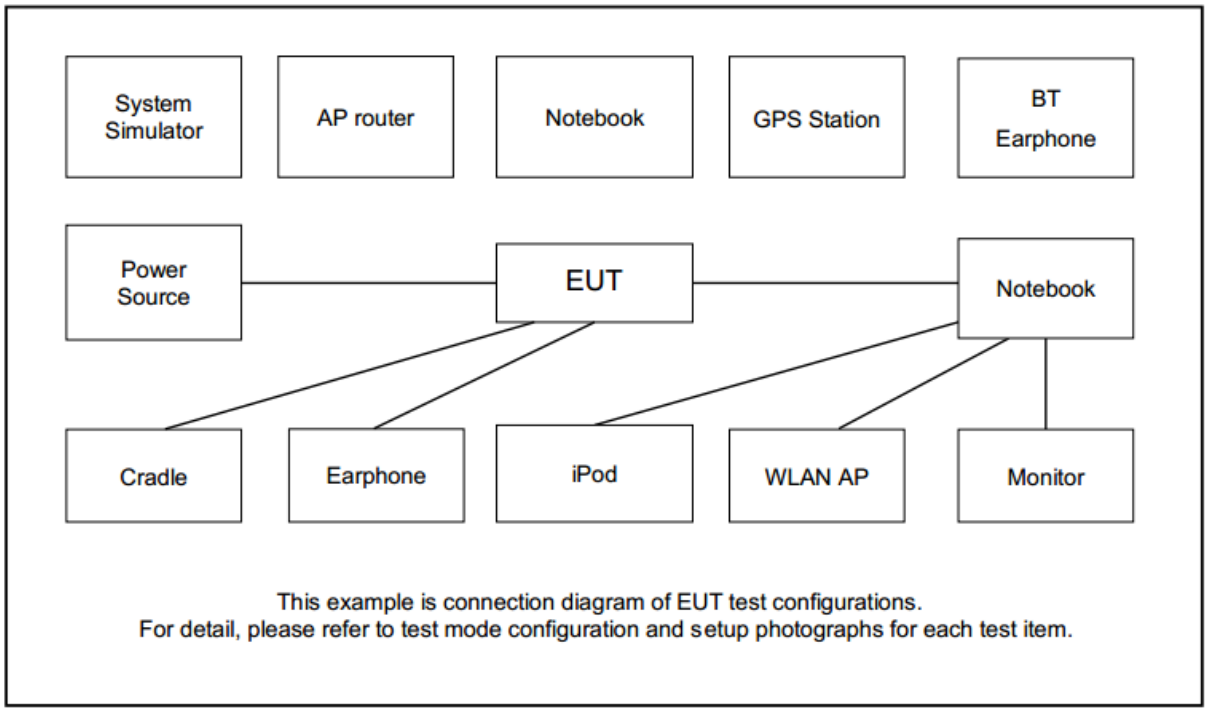
g. All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0.1 m separation is achieved between the neighboring units.

h. Where the mains cable supplied by the manufacturer is longer than 1 m, the excess should be folded at the centre into a bundle no longer than 0.4 m, so that its length is shortened to 1 m.

i. For frequencies below 1GHz, the Quasi-peak detector is employed as the limit. If the emission level of the Equipment Under Test (EUT) in peak mode is 3 dB lower than the specified limit, the peak values of the EUT will be reported. In cases where the emission level exceeds this threshold, the measurement will be repeated using the quasi-peak method, and the results will be reported for the frequency range below 1GHz.

j. If emission level of the EUT in Peak measurement mode is lower than average limit line (that means the emission level in Peak measurement mode complies with both Peak and Average limit lines), then only Peak measurement result is reported. Otherwise, emissions in Average measurement mode shall be measured, and reported.

A1.6. Connection Diagram of Test System



A1.7. Supported Unit Used in Test Configuration and System

Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8m
System Simulator	R&S	CMW 500	N/A	N/A	Unshielded, 1.8m
DC Power Supply	GW Instek	GEU810960	FCC DoC	N/A	N/A

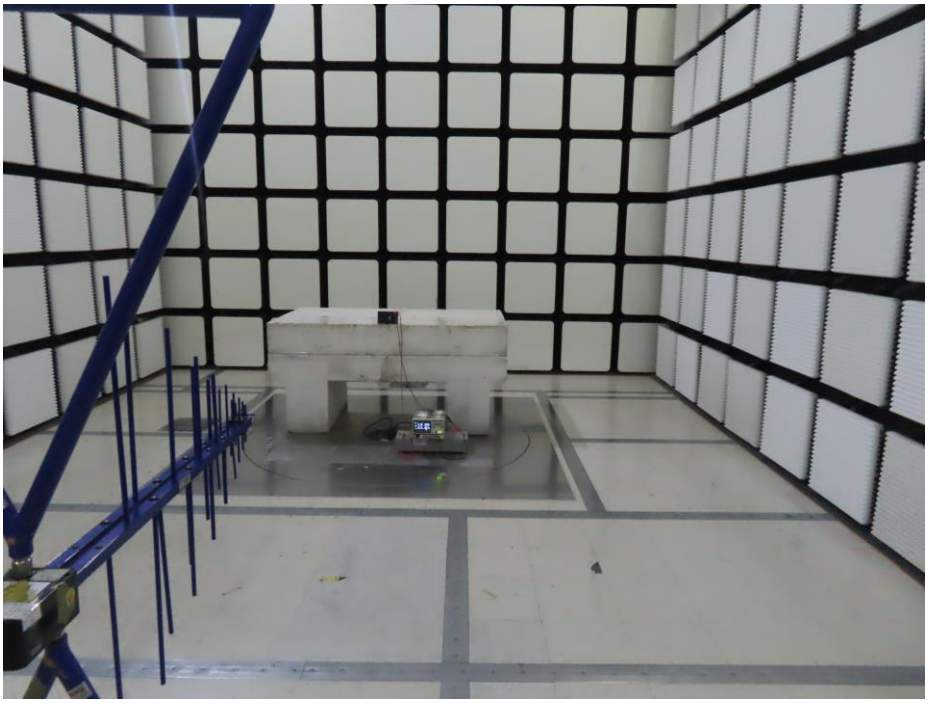
A1.8. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	186713	9kHz~1GHz	Apr. 16, 2024	Nov. 17, 2024	Apr. 15, 2025	Radiation (03CH06-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 05, 2024	Nov. 17, 2024	Oct. 04, 2025	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Feb. 01, 2024	Nov. 17, 2024	Jan. 31, 2025	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02037	1GHz~18GHz	Dec. 28, 2023	Nov. 17, 2024	Dec. 27, 2024	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz~26.5GHz	Jan. 31, 2024	Nov. 17, 2024	Jan. 30, 2025	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SF102_2000mm SF102_3000mm SF102_7000mm	532421/2 532422/2 532299/2	30MHz to 40GHz	Jul. 02, 2024	Nov. 17, 2024	Jul. 01, 2025	Radiation (03CH06-HY)
Hygrometer	TECPEL	DTM-303B	TP210018	N/A	Oct. 14, 2024	Nov. 17, 2024	Oct. 13, 2025	Radiation (03CH06-HY)
Controller	INN-CO	EM1000	060782	Control Turn table & Ant Mast	N/A	Nov. 17, 2024	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Nov. 17, 2024	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Nov. 17, 2024	N/A	Radiation (03CH06-HY)
Software	Audix	E3 6.2009-8-24(k5)	N/A	N/A	N/A	Nov. 17, 2024	N/A	Radiation (03CH06-HY)

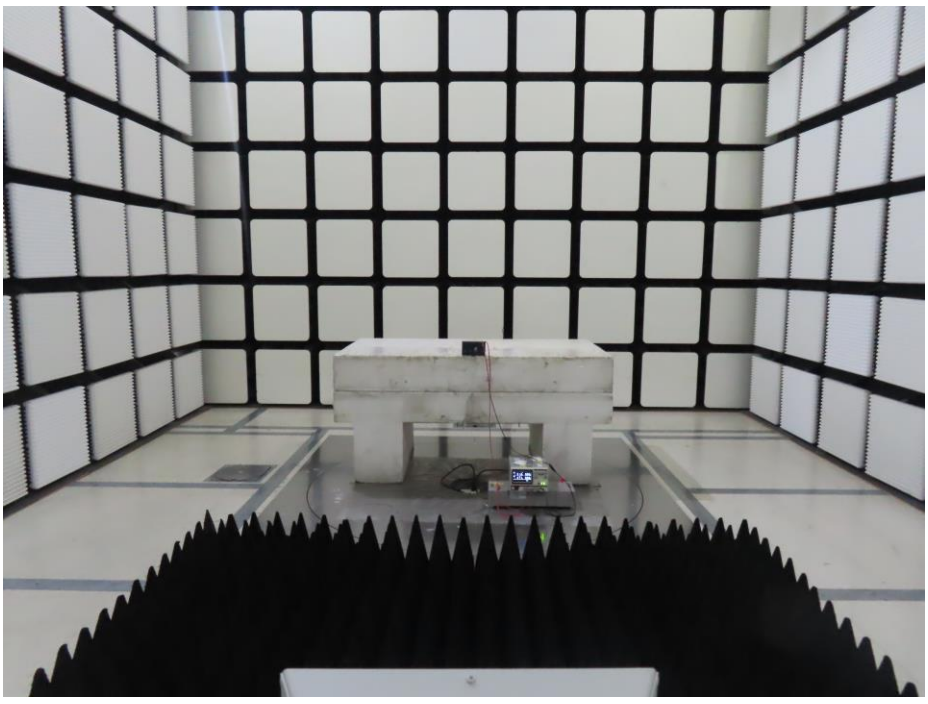
A1.9. Setup Photograph

Mode 1

Frequency: 30 MHz to 1000 MHz



Frequency: 1000 MHz to 6000 MHz

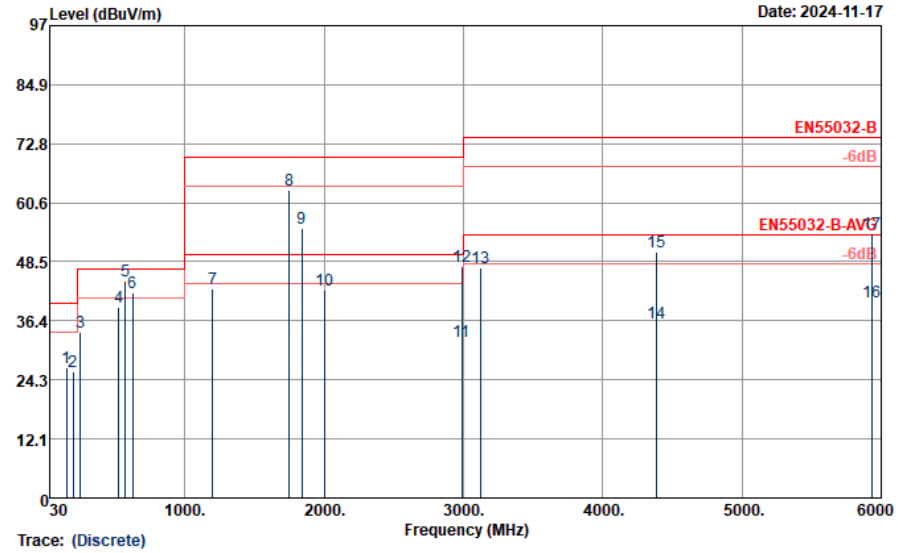


A1.10.Test Raw Data

<EN 55032 : 2015 + A11: 2020>

Test Mode :	Mode 1
Remark :	#8 is mobile station signal which can be ignored. #9 is system simulator signal which can be ignored.

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)
■ Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
■ Corrected Reading: Factor(dB) + Read Level = Level

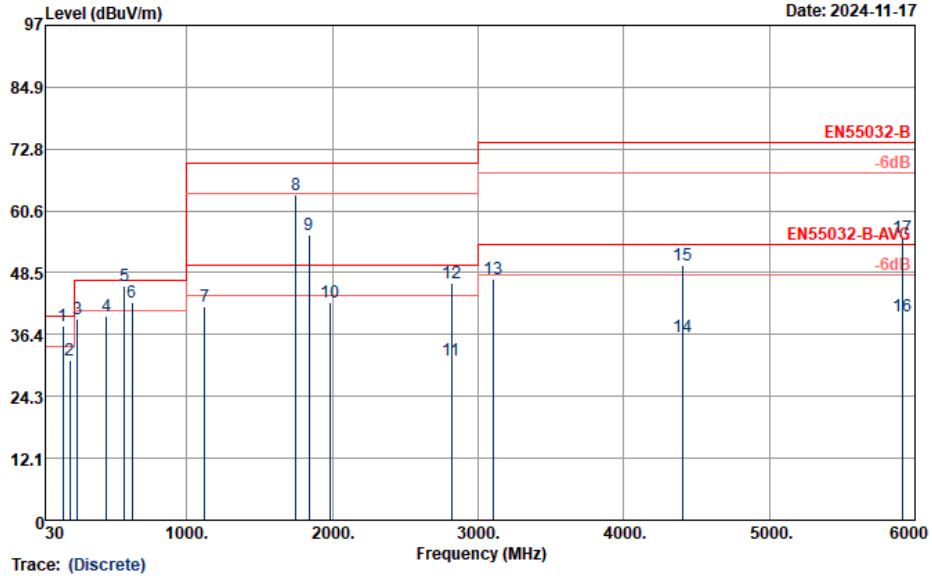


Site : 03CH06-HY
Condition : EN55032-B 3m 9120D_02037 HORIZONTAL
Project : 491806
Power : DC 12V/2A
Memo : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1		149.88	26.83	-13.17	40.00	39.25	-12.42	---	---	Peak
2		200.10	25.89	-14.11	40.00	40.12	-14.23	---	---	Peak
3		250.05	33.97	-13.03	47.00	44.51	-10.54	---	---	Peak
4		524.70	39.31	-7.69	47.00	43.16	-3.85	---	---	Peak
5	!	575.10	44.50	-2.50	47.00	45.98	-1.48	100	110	QP
6	!	624.80	42.10	-4.90	47.00	43.36	-1.26	150	230	QP
7		1200.00	42.86	-27.14	70.00	46.14	-3.28	---	---	Peak
8		1748.00	63.33	-6.67	70.00	65.80	-2.47	---	---	Peak
9		1842.00	55.32	-14.68	70.00	57.40	-2.08	---	---	Peak
10		2002.00	42.76	-27.24	70.00	42.89	-0.13	---	---	Peak
11		2988.00	32.19	-17.81	50.00	27.90	4.29	100	78	Average
12		2988.00	47.58	-22.42	70.00	43.29	4.29	100	78	Peak
13		3120.00	47.35	-26.65	74.00	42.36	4.99	---	---	Peak
14		4386.00	35.98	-18.02	54.00	26.60	9.38	100	142	Average
15		4386.00	50.51	-23.49	74.00	41.13	9.38	100	142	Peak
16		5937.00	40.27	-13.73	54.00	26.19	14.08	100	87	Average
17		5937.00	54.30	-19.70	74.00	40.22	14.08	100	87	Peak

Test Mode :	Mode 1
Remark :	#8 is mobile station signal which can be ignored. #9 is system simulator signal which can be ignored.

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)
■ Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
■ Corrected Reading: Factor(dB) + Read Level = Level



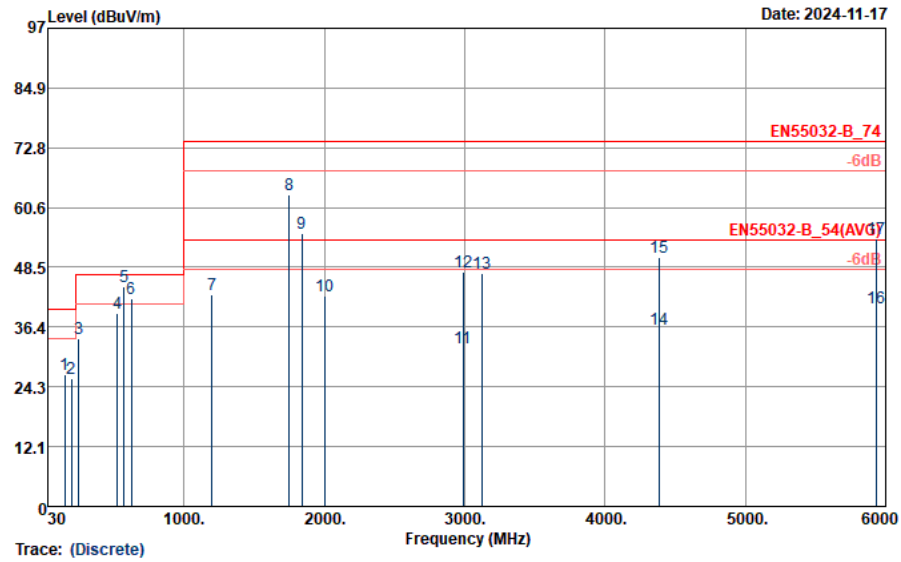
Site : 03CH06-HY
Condition : EN55032-B 3m 9120D_02037 VERTICAL
Project : 491806
Power : DC 12V/2A
Memo : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1 !	149.88	38.08	-1.92	40.00	50.50	-12.42	100	250	QP
2	200.10	31.39	-8.61	40.00	45.62	-14.23	---	---	Peak
3	250.05	39.34	-7.66	47.00	49.88	-10.54	---	---	Peak
4	449.80	39.88	-7.12	47.00	44.76	-4.88	---	---	Peak
5 !	575.10	45.91	-1.09	47.00	47.39	-1.48	100	35	QP
6 !	624.80	42.63	-4.37	47.00	43.89	-1.26	100	20	QP
7	1126.00	41.76	-28.24	70.00	45.34	-3.58	---	---	Peak
8	1748.00	63.74	-6.26	70.00	66.21	-2.47	---	---	Peak
9	1842.00	55.92	-14.08	70.00	58.00	-2.08	---	---	Peak
10	1982.00	42.59	-27.41	70.00	42.99	-0.40	---	---	Peak
11	2816.00	31.46	-18.54	50.00	28.00	3.46	100	286	Average
12	2816.00	46.50	-23.50	70.00	43.04	3.46	100	286	Peak
13	3105.00	47.26	-26.74	74.00	42.36	4.90	---	---	Peak
14	4410.00	35.81	-18.19	54.00	26.40	9.41	100	77	Average
15	4410.00	50.02	-23.98	74.00	40.61	9.41	100	77	Peak
16	5916.00	39.87	-14.13	54.00	26.00	13.87	100	181	Average
17	5916.00	55.26	-18.74	74.00	41.39	13.87	100	181	Peak

<EN 55032 : 2015 + A1:2020>

Test Mode :	Mode 1
Remark :	#8 is mobile station signal which can be ignored. #9 is system simulator signal which can be ignored.

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)
■ Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
■ Corrected Reading: Factor(dB) + Read Level = Level

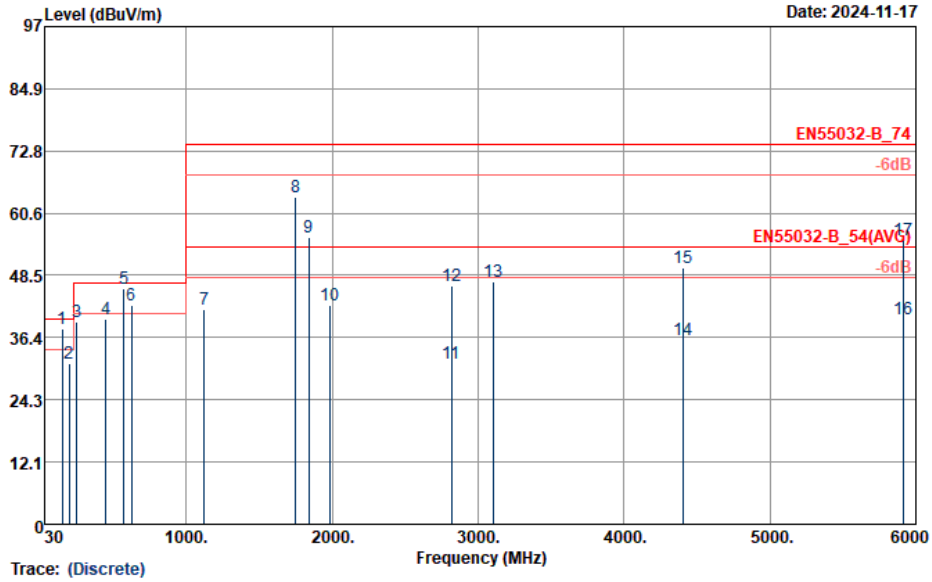


Site : 03CH06-HY
Condition : EN55032-B_74 3m 9120D_02037 HORIZONTAL
Project : 491806
Power : DC 12V/2A
Memo : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1		149.88	26.83	-13.17	40.00	39.25	-12.42	---	---	Peak
2		200.10	25.89	-14.11	40.00	40.12	-14.23	---	---	Peak
3		250.05	33.97	-13.03	47.00	44.51	-10.54	---	---	Peak
4		524.70	39.31	-7.69	47.00	43.16	-3.85	---	---	Peak
5	!	575.10	44.50	-2.50	47.00	45.98	-1.48	100	110	QP
6	!	624.80	42.10	-4.90	47.00	43.36	-1.26	150	230	QP
7		1200.00	42.86	-31.14	74.00	46.14	-3.28	---	---	Peak
8		1748.00	63.33	-10.67	74.00	65.80	-2.47	---	---	Peak
9		1842.00	55.32	-18.68	74.00	57.40	-2.08	---	---	Peak
10		2002.00	42.76	-31.24	74.00	42.89	-0.13	---	---	Peak
11		2988.00	32.19	-21.81	54.00	27.90	4.29	100	78	Average
12		2988.00	47.58	-26.42	74.00	43.29	4.29	100	78	Peak
13		3120.00	47.35	-26.65	74.00	42.36	4.99	---	---	Peak
14		4386.00	35.98	-18.02	54.00	26.60	9.38	100	142	Average
15		4386.00	50.51	-23.49	74.00	41.13	9.38	100	142	Peak
16		5937.00	40.27	-13.73	54.00	26.19	14.08	100	87	Average
17		5937.00	54.30	-19.70	74.00	40.22	14.08	100	87	Peak

Test Mode :	Mode 1
Remark :	#8 is mobile station signal which can be ignored. #9 is system simulator signal which can be ignored.

■ Emission level (dBμV/m) = 20 log Emission level (μV/m)
■ Factor(dB) = Antenna Factor + Cable Loss + Filter loss – Preamp Factor
■ Corrected Reading: Factor(dB) + Read Level = Level



Site : 03CH06-HY
Condition : EN55032-B_74 3m 9120D_02037 VERTICAL
Project : 491806
Power : DC 12V/2A
Memo : Mode 1

		Freq	Level	Over Limit	Limit Line	Read Level	Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1	!	149.88	38.08	-1.92	40.00	50.50	-12.42	100	250	QP
2		200.10	31.39	-8.61	40.00	45.62	-14.23	---	---	Peak
3		250.05	39.34	-7.66	47.00	49.88	-10.54	---	---	Peak
4		449.80	39.88	-7.12	47.00	44.76	-4.88	---	---	Peak
5	!	575.10	45.91	-1.09	47.00	47.39	-1.48	100	35	QP
6	!	624.80	42.63	-4.37	47.00	43.89	-1.26	100	20	QP
7		1126.00	41.76	-32.24	74.00	45.34	-3.58	---	---	Peak
8		1748.00	63.74	-10.26	74.00	66.21	-2.47	---	---	Peak
9		1842.00	55.92	-18.08	74.00	58.00	-2.08	---	---	Peak
10		1982.00	42.59	-31.41	74.00	42.99	-0.40	---	---	Peak
11		2816.00	31.46	-22.54	54.00	28.00	3.46	100	286	Average
12		2816.00	46.50	-27.50	74.00	43.04	3.46	100	286	Peak
13		3105.00	47.26	-26.74	74.00	42.36	4.90	---	---	Peak
14		4410.00	35.81	-18.19	54.00	26.40	9.41	100	77	Average
15		4410.00	50.02	-23.98	74.00	40.61	9.41	100	77	Peak
16		5916.00	39.87	-14.13	54.00	26.00	13.87	100	181	Average
17		5916.00	55.26	-18.74	74.00	41.39	13.87	100	181	Peak

A5. Test Results of RS Test

Information of Testing Environment			
Temperature	23.2~24.1 ℃	**Humidity**	40.1~50.7 %
Test Site	RS05-HY (TAF Code: 3786)	**Test Engineer**	Timothy Chung
Test Site Location	No.58 , Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,Taoyuan City 333010, Taiwan (R.O.C.)		
Test Date	Nov. 27, 2024		
Test Software and its Version	Test Software: EMC32 , version: 10.30.00		
Remark	The Radiated Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.		

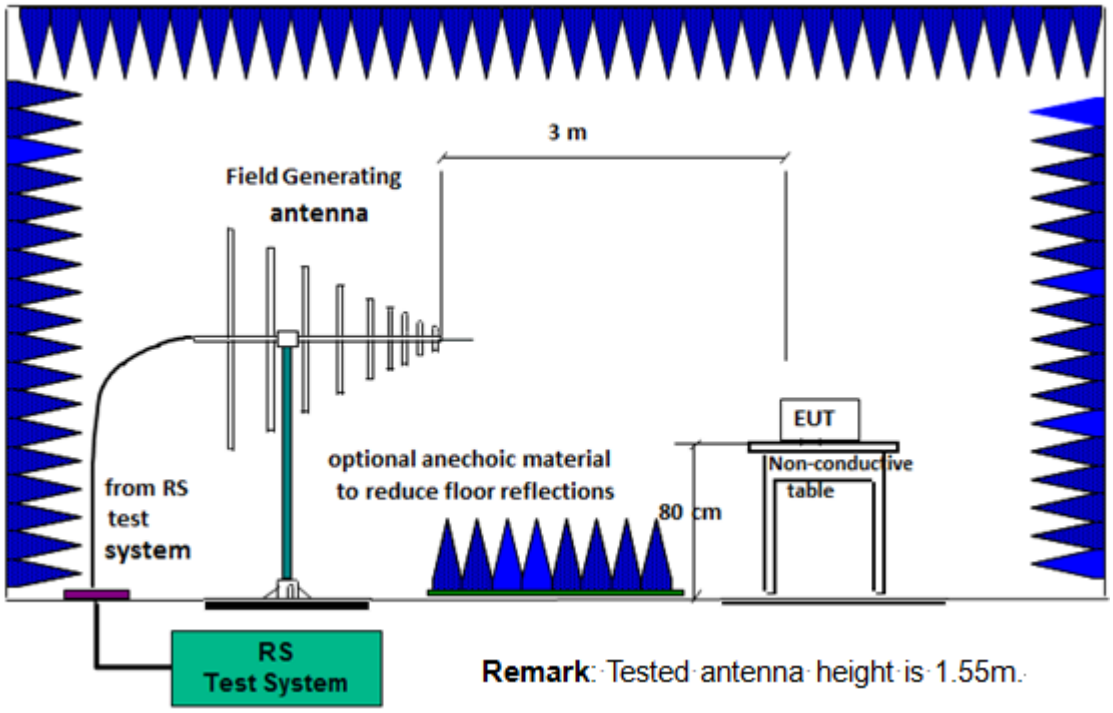
A5.1. Summary

Worst Mode	Mode 3
EUT Operated Voltage During Test	DC 12V
Frequency Range	80 MHz ~ 1000MHz
Spot frequency	1800/2600/3500/5000 MHz (±1 %)
Test Level	3 V/m
Frequency Step Size	1% increment
Modulation	80% AM (1kHz)
Dwell Time	3 seconds
Polarity	Horizontal and Vertical
Azimuth	0°, 180°
Performance Criteria(limit)	A
Result	A, PASS

A5.2. Details of EUT Test Modes

Details of Test line Items
Radio Frequency Electromagnetic Field
Mode 1: LTE Band 3 Link + DC 12V
Mode 2: LTE Band 7 Link + DC 12V
Mode 3: WLAN (2.4GHz) Link + DC 12V
Mode 4: LTE Band 7 Idle + WLAN (2.4GHz) Idle + DC 12V

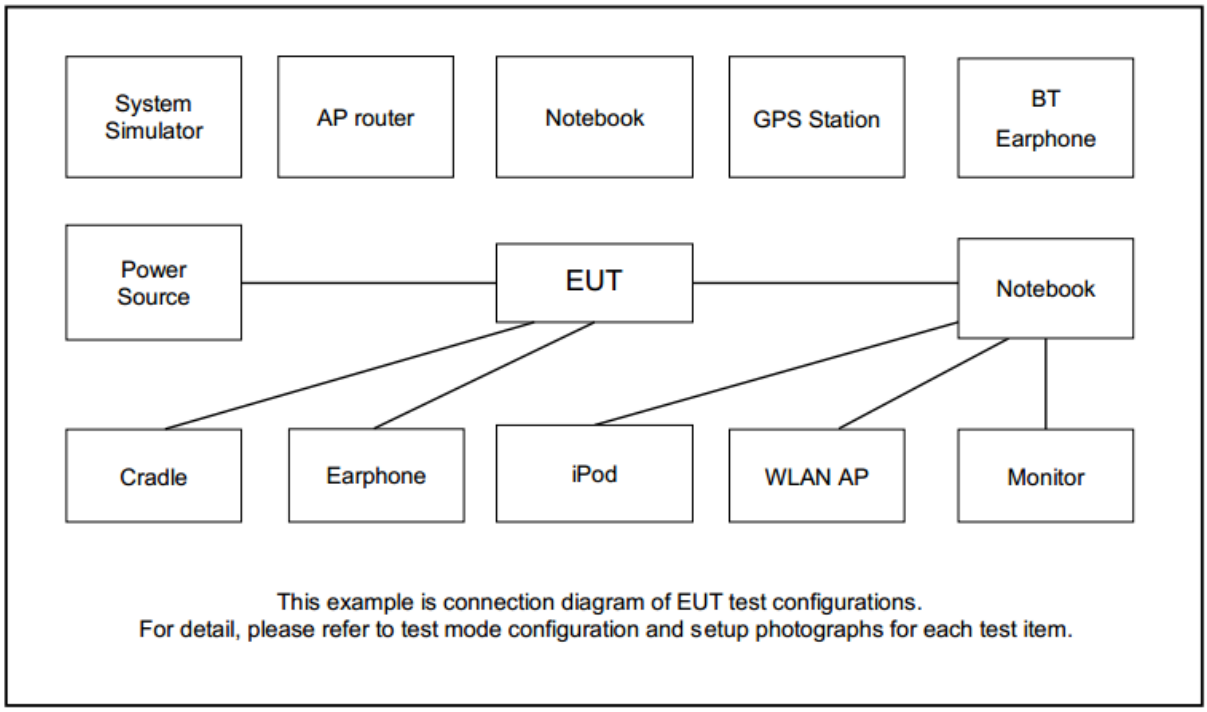
A5.3. Test Setup



A5.4. Test Procedures

The required field strength is pre-calibrated and complies with the uniform field area requirement lay down in the position which required in IEC/EN 61000-4-3.

A5.5. Connection Diagram of Test System



A5.6. Supported unit used in test configuration and system

Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
Notebook	Lenovo	81DE	FCC DoC	N/A	AC I/P： Unshielded, 1.2m DC O/P： Shielded, 1.8m
DC Power Supply	GWInstek	SPS-060	GEO835522	N/A	Unshielded, 1.8m

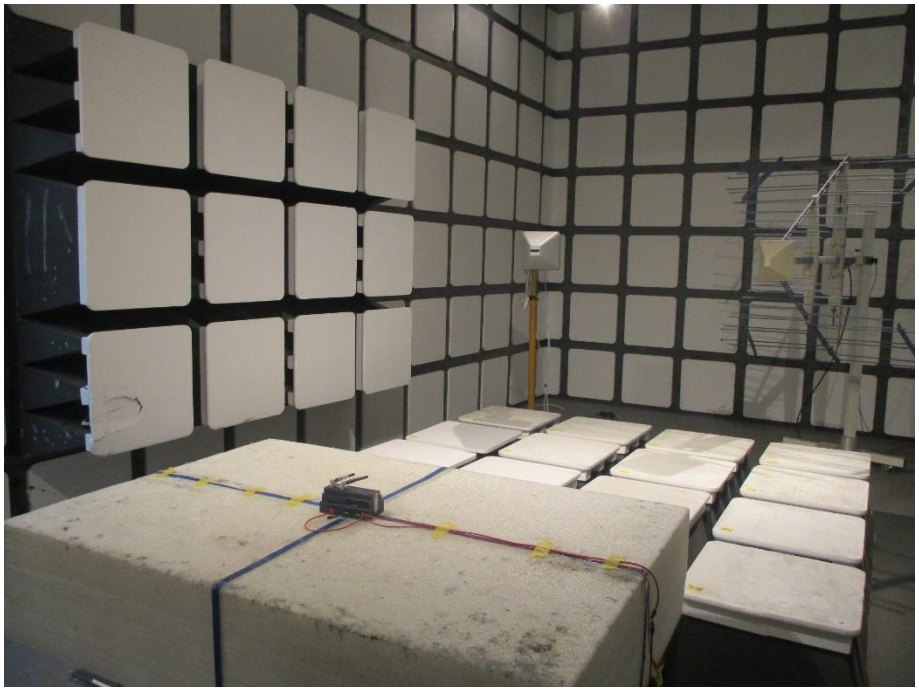
A5.7. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	Rohde & Schwarz	BBA100-B250 C125	101748-1	80MHz ~ 400MHz(250W)/250MHz ~ 1GHz(125W)	N/A	Nov. 27, 2024	N/A	RS (RS05-HY)
POWER AMPLIFIER	Rohde & Schwarz	BBA 150	105798	0.69GHz~3.2GHz(110W), 2.5GHz~6GHz(100W)	N/A	Nov. 27, 2024	N/A	RS (RS05-HY)
Antenna	SCHWARZBECK	STLP 9149	9149-274	0.7GHz-9GHz	N/A	Nov. 27, 2024	N/A	RS (RS05-HY)
Antenna	Rohde & Schwarz	HL046E	100167	80MHz ~ 3GHz	N/A	Nov. 27, 2024	N/A	RS (RS05-HY)
Field Sensor	A. R.	FL7006	0343231	100kHz~6GHz	Mar. 14, 2024	Nov. 27, 2024	Mar. 13, 2025	RS (RS05-HY)
Power Sensor	Rohde & Schwarz	NRP-Z91	102726	9kHz~6GHz	Aug. 21, 2024	Nov. 27, 2024	Aug. 20, 2025	RS (RS05-HY)
Power Sensor	Rohde & Schwarz	NRP-Z91	102727	9kHz~6GHz	Aug. 21, 2024	Nov. 27, 2024	Aug. 20, 2025	RS (RS05-HY)
Signal Generator	Rohde & Schwarz	SMB100A	108749	9kHz~6GHz	Oct. 23, 2024	Nov. 27, 2024	Oct. 22, 2025	RS (RS05-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Nov. 27, 2024	N/A	RS (RS05-HY)
Hygrometer	TECPEL	DTM-303A	TP182674	N/A	Oct. 08, 2024	Nov. 27, 2024	Oct. 07, 2025	RS (RS05-HY)
Intergrated Measurement Systum	Sporton	IMS	N/A	80MHz~6GHz 3V/m	Jul. 12, 2024	Nov. 27, 2024	Jul. 11, 2025	RS (RS05-HY)
CMW270 WIRELESS CONN. TESTER	Rohde & Schwarz	CMW270	102370	WiFi / Bluetooth	Sep. 06, 2024	Nov. 27, 2024	Sep. 05, 2025	RS (RS05-HY)
Base Station(Measure)	Rohde & Schwarz	CMW500	149637	GSM/GPRS/WCDMA/LTE(FDD/TDD 42~44) /IP TPUT/ Volte(Audio)	Sep. 13, 2024	Nov. 27, 2024	Sep. 12, 2025	RS (RS05-HY)

A5.8. Setup Photograph

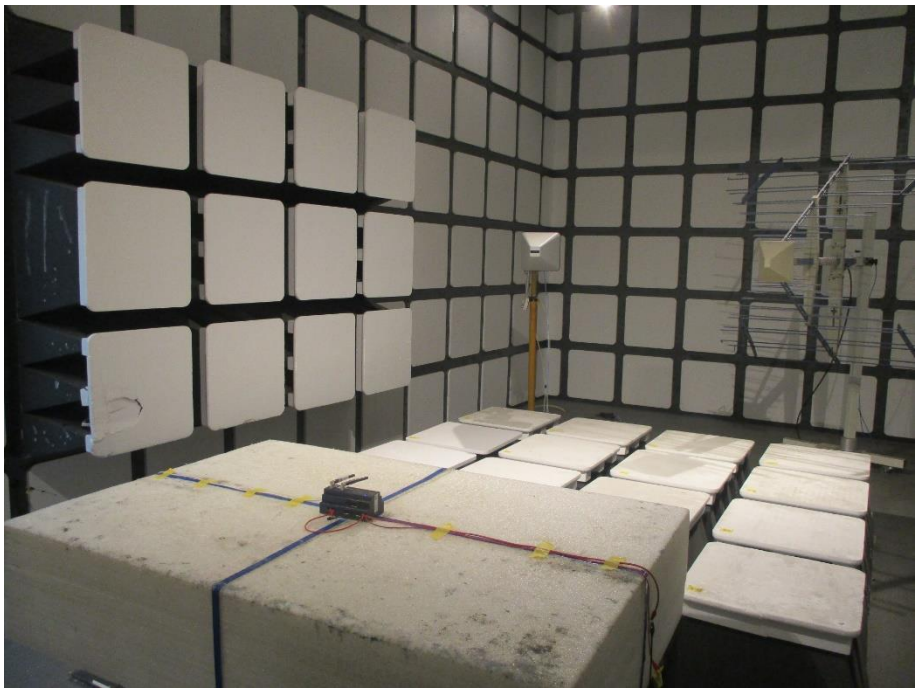
Mode 1

Position 0°
(Remote View)



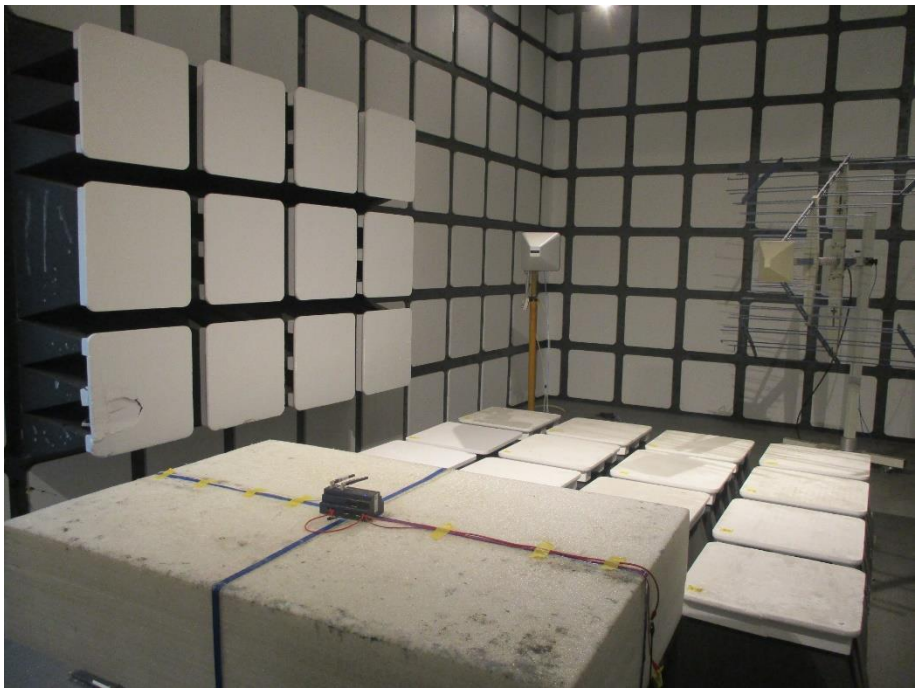
Mode 2

Position 0°
(Remote View)



Mode 3

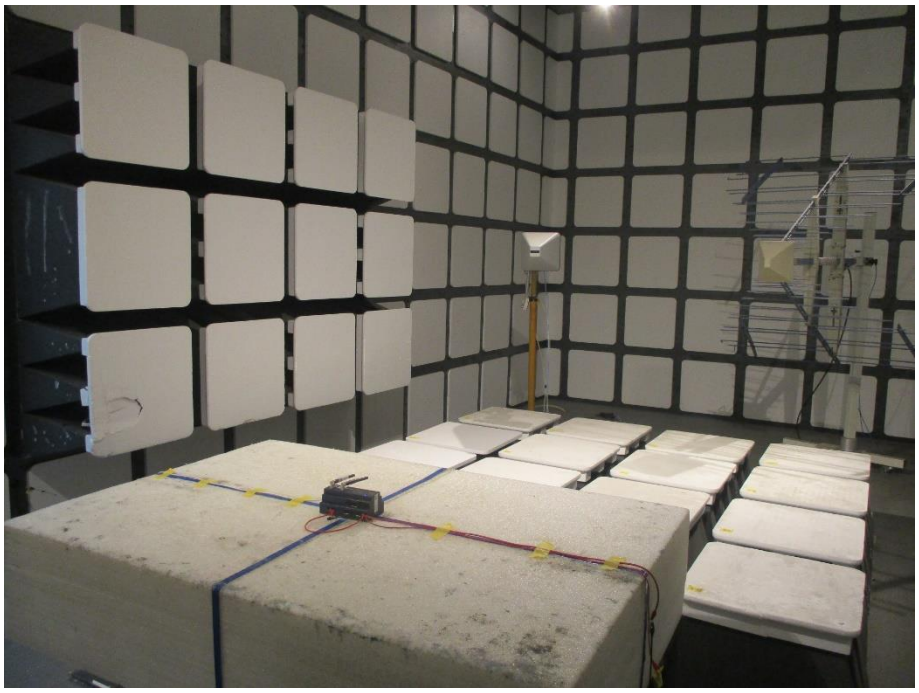
Position 0°
(Remote View)



Position 180°
(Remote View)

Mode 4

Position 0°
(Remote View)



A5.9. Test Raw Data

None

A6. Test Results of ESD Test

Information of Testing Environment			
Temperature	22.5 ~ 24.4 ℃	**Humidity**	45.3 ~ 55.9 %
Atmospheric Pressure	98kPa	**ESD Generator**	Noiseken
Test Site	ES05-HY	**Test Engineer**	HAO QUN LEE
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)		
Test Date	Nov. 28, 2024		

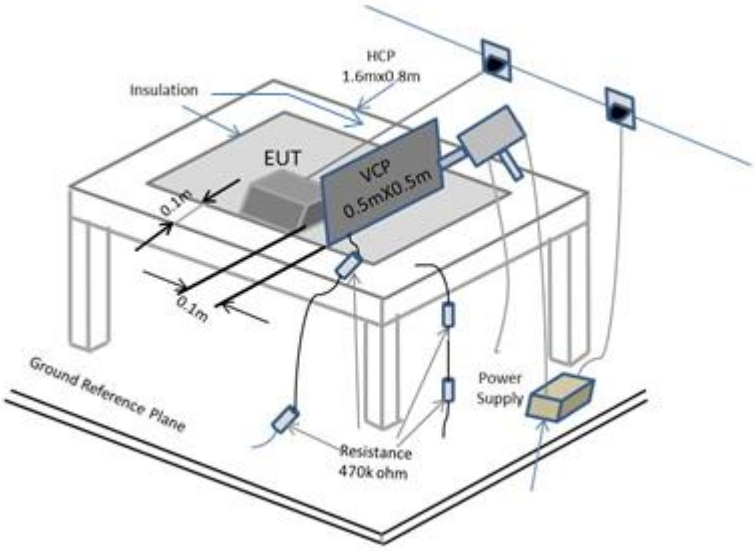
A6.1. Summary

Worst Mode	Mode 1
EUT Operated Voltage During Test	230Vac / 50Hz
Test Level	±2 / ±4 / ±8 kV for air discharge
	±2 / ±4 kV for contact discharge
Test Times of Each Test Point	Air discharge：10
	Contact discharge：10
Time Interval between Successive Single Discharges	1 s
Performance criteria (Limit)	B
Result	A, PASS

A6.2. Details of EUT Test Modes

Details of Test line Items
Electrostatic Discharge
Mode 1: LTE Band 3 Link + DC power
Mode 2: LTE Band 7 Link + DC power
Mode 3: WLAN (2.4GHz) Link + DC power
Mode 4: LTE Band 3 Link + WLAN (2.4GHz) Idle + DC power

A6.3. Test Setup



A distance of 1m minimum was provided between the EUT and the wall or any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not be less than 0.2m to other conductive parts in the test setup.

The coupling plane is placed parallel to, and positioned at a distance of 0.1 m from the EUT.

A6.4. Test Procedure

EUT and auxiliary instrument necessary to perform DIRECT and INDIRECT application of discharges to the EUT, in the following manner:

- CONTACT DISCHARGE to the conductive surfaces and to the coupling plane;
- AIR DISCHARGE at insulating surfaces.

a. Contact Discharges to the conductive surfaces and to coupling planes:

In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :

- If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
- Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
- The contact discharge test shall not be applied to such surfaces.

b. Air Discharge to apertures and insulation surfaces:

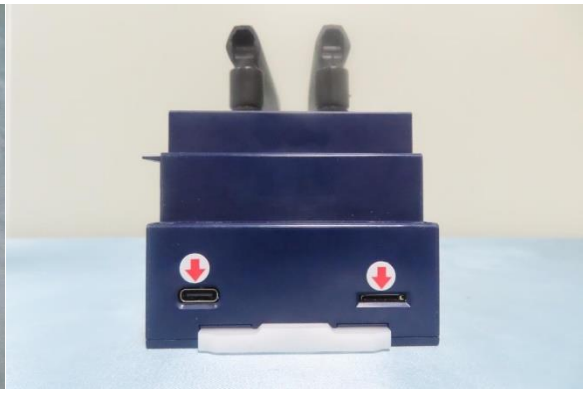
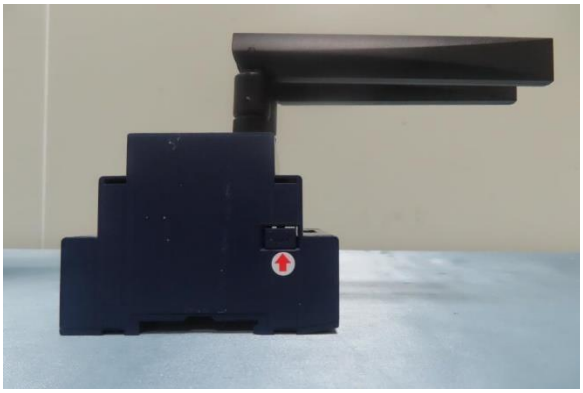
In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

c. Ensure that the applied charge on the EUT has been dis-charged before next ESD pulse.

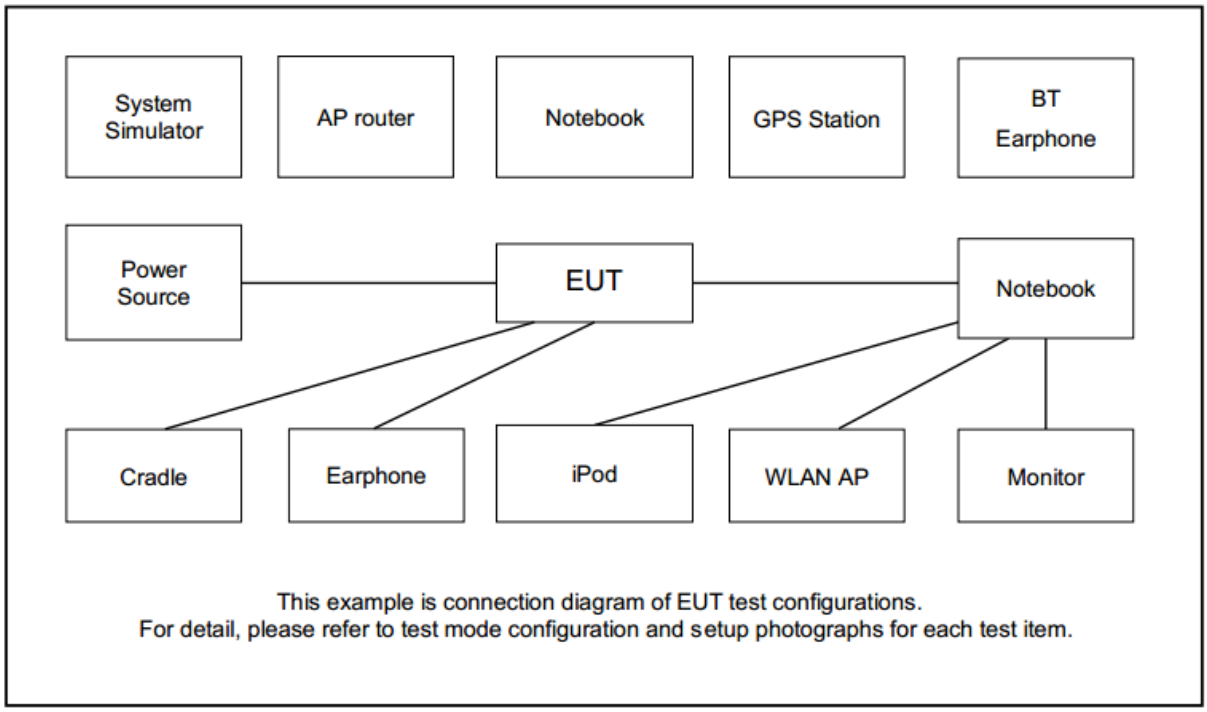
A6.5. Photos for Identification of ESD Test Points

Remark: Air Discharge refer to the red arrow on the photo, Contact Discharge refer to the blue arrow on the photo.

Mode 1~4

A6.6. Connection Diagram of Test System



A6.7. Supported Unit Used in Test Configuration and System

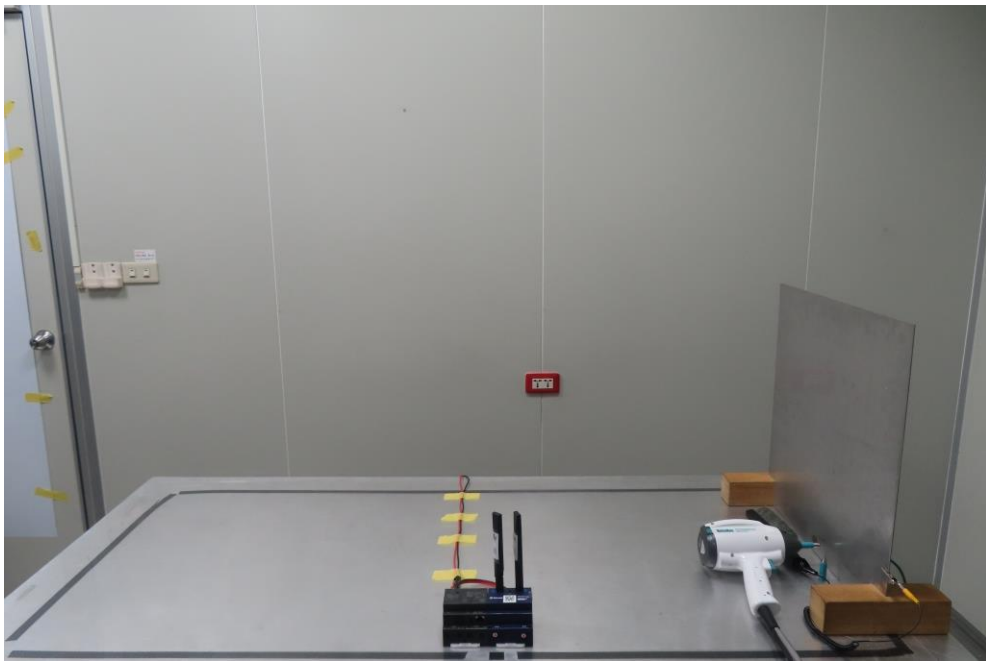
Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
Notebook	DELL	Latitude5480	FCC DoC	N/A	AC I/P：Unshielded, 1.2m DC O/P：Shielded, 1.8m
System Simulator	R&S	CMW 500	N/A	N/A	Unshielded, 1.8m
System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8m
DC Power supply	Chroma	62024P-100-50	N/A	N/A	Unshielded, 1.8m
EMI Test Receiver	R&S	ESCI 7	N/A	N/A	Unshielded, 1.8m

A6.8. List of Measuring Equipment

Instrument	Brand Name	Model Name	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
ESD Simulator	NoiseKen	ESS-B3011	ESS12X4459	±2 kV ~ ±30 kV	Dec. 19, 2023	Nov. 28, 2024	Dec. 18, 2024	ESD (ES05-HY)
Hygrometer	Testo	608-H1	34913904	N/A	Aug. 09, 2024	Nov. 28, 2024	Aug. 08, 2025	ESD (ES05-HY)
Anti-Static Dust Removal Brush	VORTEX	914	N/A	N/A	N/A	Nov. 28, 2024	N/A	ESD (ES05-HY)

A6.9. Setup Photograph

Mode 1~4



A11. Test Results of Power Frequency Magnetic Field Test

Information of Testing Environment			
Temperature	24.2 ~ 25.4 ℃	**Humidity**	48.6 ~ 65.2 %
Test Site	EX04-HY (TAF Code: 3786)	**Test Engineer**	Peter Lin
Test Site Location	No.58 , Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist.,Taoyuan City 333010, Taiwan (R.O.C.)		
Test Date	Nov. 29, 2024		
Test Software and its version	Test Software: iec.control , Version: 5.4.1		
Remark	The Power-Frequency Magnetic Fields test item subcontracted to Sporton International Inc. Wensan Laboratory.		

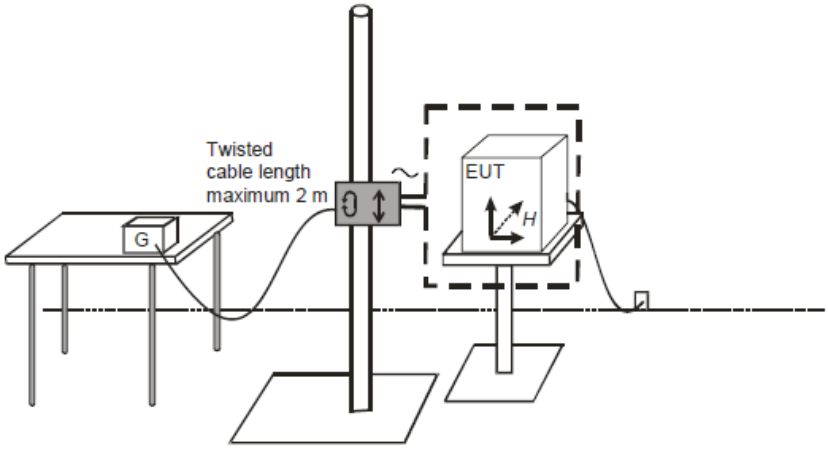
A11.1.Summary

Worst Mode	Mode 1
EUT Operated Voltage During Test	230Vac / 50Hz
Test Level	1A/m
Testing Duration	1 minute
Coil Orientation	X-axis, Y-axis, Z-axis
Performance Criteria(Limit)	A
Result	A, PASS

A11.2.Details of EUT Test Modes

Details of Test line Items
Power-Frequency Magnetic Fields
Mode 1: LTE Band 3 Link + DC power
Mode 2: LTE Band 7 Link + DC power
Mode 3: WLAN (2.4GHz) Link + DC power
Mode 4: LTE Band 3 Link + WLAN (2.4GHz) Idle + DC power

A11.3.Test Setup



A11.4.Test Procedures

a. The test procedure shall include:

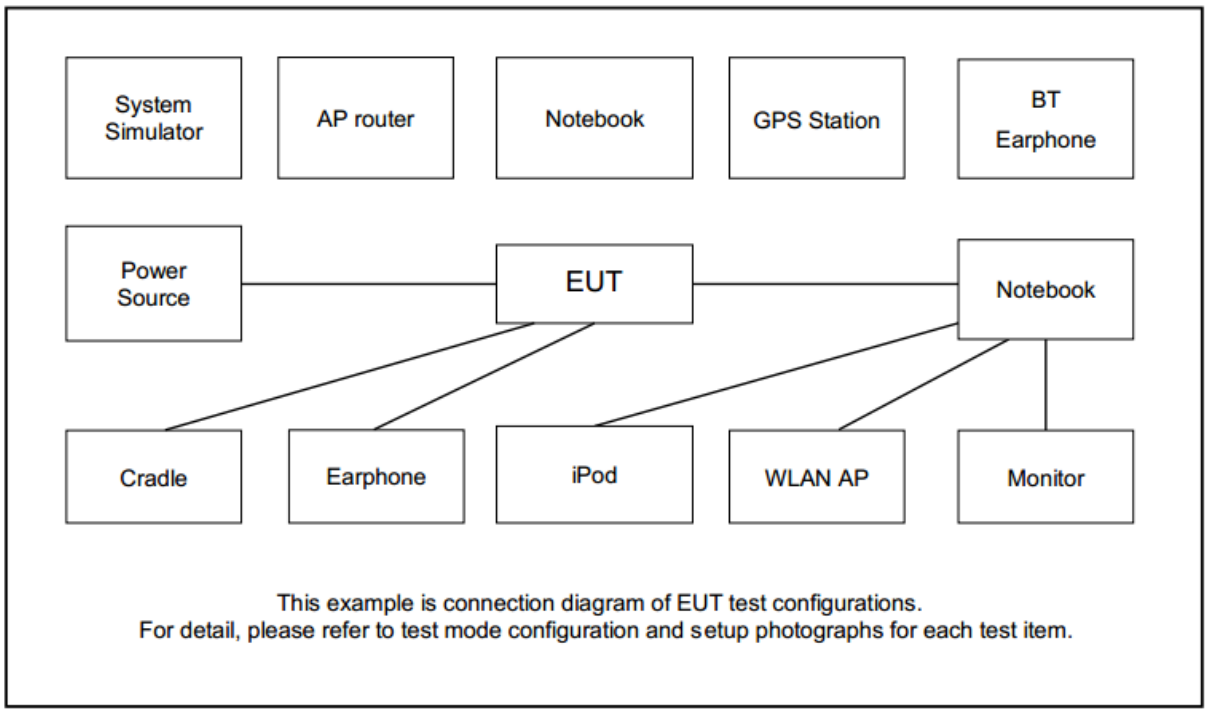
- the verification of the laboratory reference conditions;
- preliminary verification of the correct operation of the equipment;
- carrying out the test;
- evaluation of the test results.

b. The power frequency magnetic field value of the laboratory shall be at least 20 dB lower than the selected test level.

c. The equipment under test is placed in the center of the coil. For a single square coil, the distance from EUT to the coil is 0.2m (minimum).The equipment is then connected to power and signal leads according to pertinent installation instructions.

d. The plane of the inductive coil shall then be rotated by 90° in order to expose the EUT to the test field with different orientations.

A11.5.Connection Diagram of Test System



A11.6.Supported Unit Used in Test Configuration and System

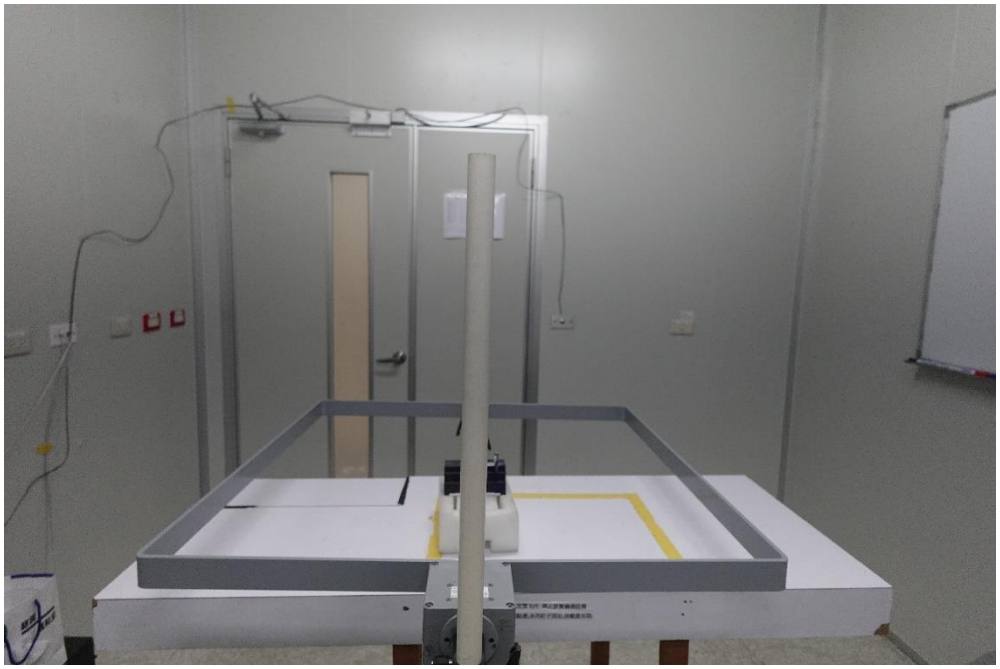
Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
System Simulator	R&S	CMW 500	N/A	N/A	Unshielded, 1.8m
WLAN AP	Asus	RT-AC58U	MSQ-RTACR66U	N/A	Unshielded, 1.8m
Power Supply	GW Instek	GPE2323	N/A	N/A	Unshielded, 1.8m

A11.7.List of Measuring Equipment

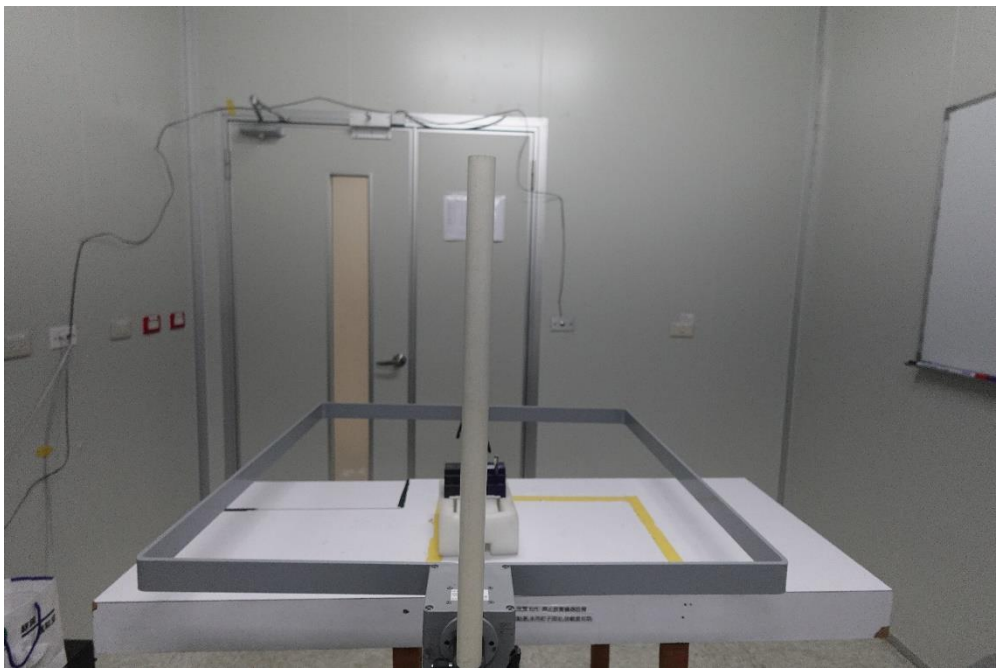
Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Ultra Compact Simulator	EM TEST	UCS 500N5T	V1139110844	MF 1A~30A	Nov. 19, 2024	Nov. 29, 2024	Nov. 18, 2025	MF (EX04-HY)
Motor Driven AC Source	EM TEST	MV2616S1	V1139110847	MF 1A~30A	Nov. 19, 2024	Nov. 29, 2024	Nov. 18, 2025	MF (EX04-HY)
Magnetic Field Immunity Loop	EM TEST	MS100N	0911-33	MF 1A~30A	Nov. 19, 2024	Nov. 29, 2024	Nov. 18, 2025	MF (EX04-HY)
Magnetic Generator	EM TEST	MC2630	0511-153	MF 1A~30A	Nov. 19, 2024	Nov. 29, 2024	Nov. 18, 2025	MF (EX04-HY)
Software	EM TEST	Iec.Control	N/A	Version 5.4.1	NCR	Nov. 29, 2024	NCR	MF (EX04-HY)
Hygrometer	TECPEL	DTM-303A	TP211545	N/A	Jun. 05, 2024	Nov. 29, 2024	Jun. 04, 2025	MF (EX04-HY)

A11.8.Setup Photograph

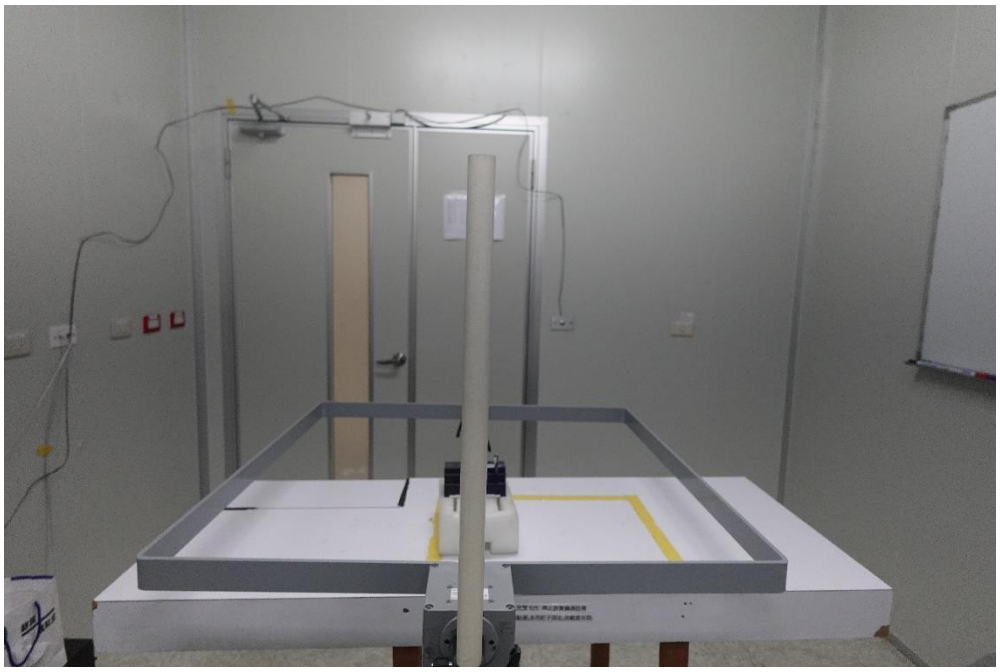
Mode 1



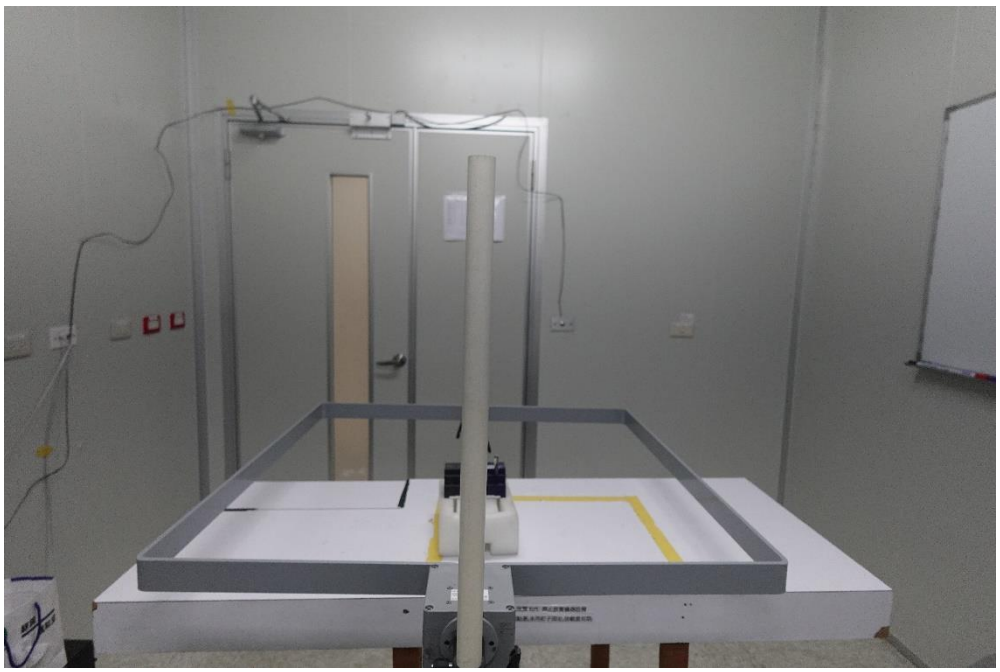
Mode 2



Mode 3



Mode 4



———THE END———