



CE EMC TEST REPORT

Equipment : CC2340R5 Launchpad™ Development Kit
Brand Name : Texas Instruments
Model Name : LP-EM-CC2340R5
Marketing Name : LP-EM-CC2340R5
Applicant : Texas Instruments Incorporated
12500 TI BLVD., Dallas, Texas, 75243
Manufacturer : Texas Instruments Incorporated
12500 TI BLVD., Dallas, Texas, 75243
Standard : ETSI EN 301489-1 V2.2.3, ETSI EN 301 489-17 V3.2.4 (2020-09)

The product was received on Mar. 16, 2023, and testing was performed from Mar. 29, 2023 to Apr. 13, 2023. 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 ETSI EN 301 489-17 V3.2.4 (2020-09); 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

Sporton International Inc. EMC & Wireless Communications Laboratory

No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issue Date
EW331602	01	Initial issue of report	Apr. 21, 2023



Summary of Test Result

ETSI EN 301 489-17 V3.2.4 (2020-09)						
Report Clause	Ref 301 489-1 V2.2.3 Std. Clause	301 489-1 V2.2.3 Test Standard	Standard for Customer Requirement	Test Items	Result (PASS/FAIL)	Remark
A1	8.2	EN 55032:2015 Class B	EN 55032:2015+A11:2020 Class B	Radiated Emission	PASS	10.65 dB under the limit at 369.300 MHz
-	8.3/8.4/8.7	EN 55032:2015 Class B	EN 55032:2015+A11:2020 Class B	Conducted Emission	Not Required	-
-	8.5	EN 61000-3-2:2014 Class A	EN 61000-3-2:2014 Class A	Harmonic Current Emissions	Not Required	-
-	8.6	EN 61000-3-3:2013	EN 61000-3-3:2013	Voltage Fluctuations and Flicker	Not Required	-
A5	9.2	EN 61000-4-3: 2006+A1:2008+A2:2010	EN 61000-4-3: 2006+A1:2008+A2:2010	RF Electromagnetic Field	PASS	-
A6	9.3	EN 61000-4-2:2009	EN 61000-4-2:2009	Electrostatic Discharge	PASS	-
-	9.4	EN 61000-4-4:2012	EN 61000-4-4:2012	Fast Transients, Common Mode	Not Required	-
-	9.5	EN 61000-4-6:2014	EN 61000-4-6:2014	Radio frequency, Common Mode	Not Required	-
-	9.6	ISO 7637-2:2004	ISO 7637-2:2004	Transients and Surges in the vehicular environment	Not Required	-
-	9.7	EN 61000-4-11:2004	EN 61000-4-11:2004	Voltage Dips and Interruptions	Not Required	-
-	9.8	EN 61000-4-5: 2014+A1:2017	EN 61000-4-5: 2014+A1:2017	Surges	Not Required	-
Note: Not required means after assessing, test items are not necessary to carry out.						

Conformity Assessment Condition:

1. 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.
2. There is no additional test requirement for EN 55032:2015+A11:2020 on top of EN 55032:2015.

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: Danny Lee

Report Producer: Michelle Chen

1. General Description

1.1 Product Feature of Equipment Under Test

Product Feature
General Specs Bluetooth LE (125 kbps, 500 kbps, 1Mbps, 2Mbps)
Antenna Type Bluetooth LE: Inverted F PCB 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

- ETSI EN 301489-1 V2.2.3, ETSI EN 301 489-17 V3.2.4 (2020-09)

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, accessory, 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) Accessory: 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 2.5, required performance criteria of EUT per EN301489 series standards
Integrated required performance criteria of EN301489 series standards, they are used for all immunity test of this report.

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

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

<input checked="" type="checkbox"/>	Enclosure Port
<input type="checkbox"/>	Input AC power port
<input type="checkbox"/>	Input DC power port
<input type="checkbox"/>	Telecommunication port

2.1.2 Detailed Test Modes of EUT

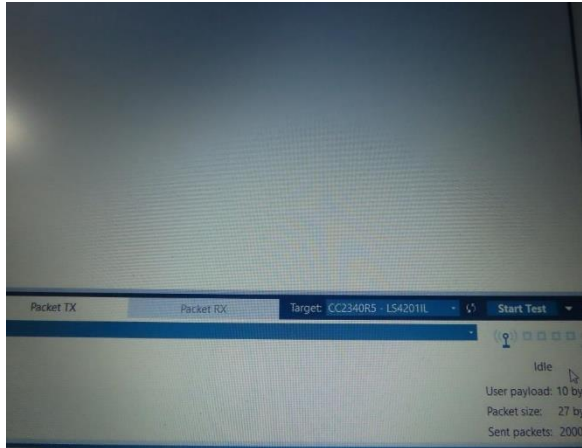
Assess test modes of EUT according to recorded information of section 2.1.

The detailed test modes of each test items are shown in Appendix A.

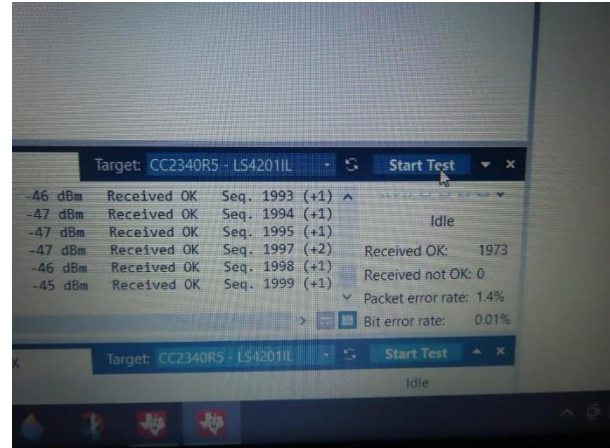
2.2 EUT Operation Test Setup

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

Connect the EUT to a Notebook and run the program "SmartRF Studio" to configure the Packet TX or Packet RX mode.



Bluetooth - LE Packet TX function



Bluetooth - LE Packet RX(PER) function

2.3 Test Conditions of 301 489 Series Standards

2.3.1 Special Conditions of Applied Standards for EUT

Below each section is special condition applied for each application of EUT.

2.3.2 Emission

EN301 489-17

No special conditions shall apply to UE in the scope of the present document.

2.3.3 Immunity

EN301 489-17

No special conditions are relevant for products covered in the present document.

2.4 RF Exclusion Band of Radio Equipment

• EN 301 489-1

Exclusion band for transmitters or the transmitter part of transceivers

a. General

Exclusion bands shall not be applied when measuring transmitters in standby mode.

b. Channelised Equipment

For channelised equipment the exclusion band shall extend 250% of the channel width either side of the transmitter centre frequency.

NOTE: Exclusion band of 250 % is based on the ITU Radio Regulations, as the boundary between OOB and Spurious Domain.

c. Non-Channelised Equipment

For non-channelised equipment the exclusion band shall extend 250% of the occupied bandwidth either side of the transmitter centre frequency.

NOTE: Exclusion band of 250 % is based on the ITU Radio Regulations, as the boundary between OOB and Spurious Domain.

Exclusion band for receivers or the receiver part of transceivers

a. Applicability

Exclusion bands are not applied when testing emissions of receivers or receiver part of transceivers.

b. Channelised Equipment

For channelised equipment the exclusion band shall be calculated by using the following formulae:

For the lower edge for the exclusion band:-

$$\text{EXband(lower)} = \text{BandRX(lower)} - n\text{ChWRX}$$

and for the upper edge of the exclusion band:-

$$\text{EXband(upper)} = \text{BandRX(upper)} + n\text{ChWRX}$$

Where n = number of channel widths required for exclusion band

For equipment that support multiple channel widths the Channel Width used should be the widest support by the EUT.

Where the present document is being used in a stand-alone basis (i.e. with no reference to other relevant radio technology parts of ETSI EN 301 489 series), the value of n shall be 1.

c. Non-Channelised Equipment

For non-channelized equipment the exclusion band shall be calculated by using the following formula:

For the lower edge for the exclusion band:-

$$\text{EXband(lower)} = \text{BandRX(lower)} - n\text{BWRX}$$

and for the upper edge of the exclusion band:-

$$\text{EXband(upper)} = \text{BandRX(upper)} + n\text{BWRX}$$

Where n = multiple of whole bandwidths required to define exclusion band

Bandwidth of Receiver is the occupied bandwidth of the corresponding transmitter signal.

Where the present document is being used in a stand-alone basis (i.e. with no reference to other relevant radio technology parts of ETSI EN 301 489 series), the value of n shall be 1.

• EN 301 489-17

The frequencies on which the transmitter part of the EUT is intended to operate shall be excluded from radiated emission measurements when performed in transmit mode of operation.

There shall be no frequency exclusion band applied to emission measurements of the receiver part of transceivers or the stand alone receiver under test, and/or associated ancillary equipment.

For EUT that operate above 6 GHz there is no exclusion band specified as test ranges stop at 6 GHz.

The exclusion band for immunity testing of equipment operating in the 2.4GHz band shall be:

- lower limit of exclusion band = lowest allocated band edge frequency -120MHz, i.e. 2 280MHz;
- upper limit of exclusion band = highest allocated band edge frequency +120MHz, i.e. 2 603.5MHz.

Note: This is based upon a channel size of 40 MHz and a value of $n = 3$.

The exclusion band for immunity testing of equipment operating in the 5GHz WiFi band shall be:

- lower limit of exclusion band = lowest allocated band edge frequency -320MHz, i.e. 4 830MHz;
- As the immunity requirements have an upper frequency range of 6 GHz and any upper edge exclusion band would be greater than this for both the 5 470 MHz - 5 725 MHz and 5 725 MHz - 5 850 MHz bands. Therefore the test stops at the lower limit of exclusion band (i.e. 4 830 MHz).

Note: This is based upon a channel size of 80 MHz and a value of $n = 4$.

The exclusion band for immunity testing of equipment operating in the 5.8GHz band shall be:

- lower limit of exclusion band = lowest allocated band edge frequency -440MHz, i.e. 5 285MHz;
- As the immunity requirements have an upper frequency range of 6 GHz and any upper edge exclusion band would be greater than this for the 5,8 GHz band. Therefore the test stops at the lower limit of exclusion band (i.e. 5 285 MHz).

Note: This is based upon a channel size of 40 MHz and a value of $n = 11$

2.5 Required Performance Criteria of EUT per EN 301 489 series standards

Criteria	Performance criteria
CT/CR	<p>During and after the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer when the apparatus is used as intended.</p> <p>At the conclusion of the test, the EUT shall operate as intended with no loss of user control functions or stored data, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.</p> <p>The EUT shall operate as its intended operating condition during and after the test.</p>
TT/TR	<p>After the test, the apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a permissible performance level specified by the manufacturer, when the apparatus is used as intended.</p> <p>At the conclusion of each exposure the EUT shall operate with no user noticeable loss of the communication link. At the conclusion of the total test comprising the series of individual exposures, the EUT shall operate as intended with no loss of user control functions or stored data, as declared by the manufacturer, and the communication link shall have been maintained. In addition to confirming the above performance during a call, the test shall also be performed in idle mode, and the transmitter shall not unintentionally operate.</p>

Criteria	Performance criteria
Continuous Phenomena	<p>During the test, the equipment shall:</p> <ul style="list-style-type: none"> ♦ continue to operate as intended ♦ not unintentionally transmit ♦ not unintentionally change its operating state ♦ not unintentionally change critical stored data
Transient Phenomena	<p>For all ports and transient phenomena with the exception described below, the following applies:</p> <ul style="list-style-type: none"> ♦ The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data. ♦ After application of the transient phenomena, the equipment shall operate as intended. <p>For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:</p> <ul style="list-style-type: none"> ♦ For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost. ♦ For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

Performance requirements table of 301 489-17

CLAUSE 6.2 of EN 301 489-17		
Criteria	During test	After test
A	Shall operate as intended. (see note). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance. Shall be no loss of function. Shall be no loss of critical stored data.
B	May be loss of function.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no loss of critical stored data.
C	May be loss of function.	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no loss of critical stored data.
Note: Operate as intended during the test allows a level of degradation in accordance with clause 6.2.2.		

Minimum performance level:

For equipment that supports a PER or FER, the minimum performance level shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER, the minimum performance level shall be no loss of the wireless transmission function needed for the intended use of the equipment.

CLAUSE 6.3 to 6.4 of EN 301 489-17	
Criteria	Performance criteria
CP	The performance criteria A shall apply. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur during the test. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur during the test.
TP	The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Where the EUT is a transmitter in standby mode, unintentional transmission shall not occur as a result of the application of the test. Where the EUT is a transceiver in receive mode, unintentional transmission shall not occur as a result of the application of the test.

Appendix A. Test Requirements and Test Results

Test requirements and test 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. They are shown as below table "Contents of Appendix A."

After assessing, below test items which mark "■" are necessary to carry out.

Contents of Appendix A		
<input checked="" type="checkbox"/>	A1	Radiated Emission Test
<input type="checkbox"/>	A2	Conducted Emission Test
<input type="checkbox"/>	A3	Harmonics Current Emission Test
<input type="checkbox"/>	A4	Voltage Fluctuation and Flicker Test
<input checked="" type="checkbox"/>	A5	Radio Frequency Electromagnetic Field (RS) Test
<input checked="" type="checkbox"/>	A6	Electrostatic Discharge (ESD) Test
<input type="checkbox"/>	A7	Fast Transients, Common Mode (EFT/BURST) Test
<input type="checkbox"/>	A8	Radio Frequency, Common Mode (CS) Test
<input type="checkbox"/>	A9	Voltage Dips and Interruptions Test
<input type="checkbox"/>	A10	Surges Test
<input type="checkbox"/>	A11	Transients and Surges in the Vehicular Environment Test

Following pages are detailed testing contents of each test items.

A1. Test Results of Radiated Emission Test

Information of Testing Environment			
Temperature	22.4~23.5 °C	Humidity	59.2~61.8 %
Test Site (30MHz ~ 6GHz)	03CH10-HY (TAF Code: 3786)	Test Engineer	Donny Tang
Test Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)		
Test Date	Mar. 29, 2023		
Measurement Uncertainty Level of Confidence of 95% (U=2Uc(y))	30 MHz ~ 1000 MHz : 6.2 dB 1000 MHz ~ 6000 MHz : 4.6 dB		
Test Software and its version	Test Software: e3 , Version: 6.2009-8-24(K5)(sporton)		
Remark	The Radiated Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.		

A1.1. Summary

Worst Mode	Mode 1		
EUT Operated Voltage During Test	From System		
Frequency	369.300 MHz	Detector	Peak
Level	36.35 dBμV	Margin	Under 10.65 dB
Result	PASS		

A1.2. Details of EUT Test Modes

Details of Test line Items	
Radiated Emission	
Mode 1: Bluetooth - LE RX + USB Cable (Charging from Notebook)	

A1.3. Test Limit
<Class B limit>

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

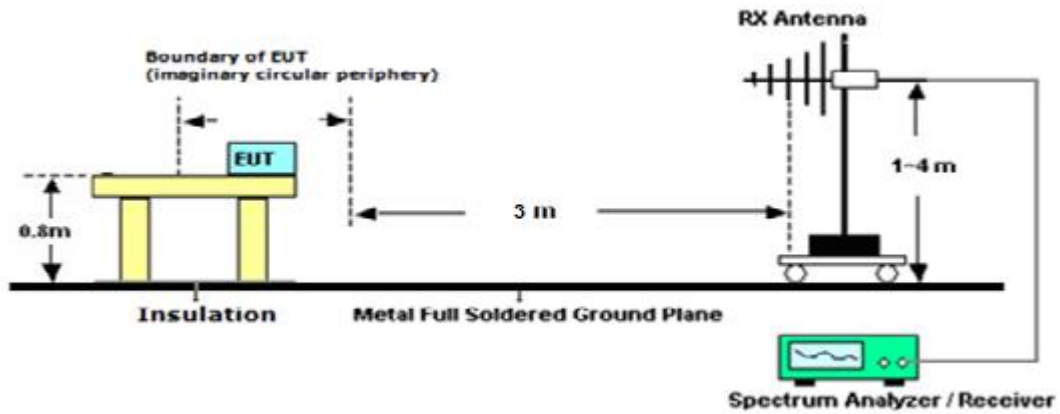
Frequency Range (MHz)	Measurement		Class B limits dB(μV/m)
	Distance (m)	Detector Type/ Bandwidth	FSOATS
1000 ~ 3000	3	Average / 1 MHz	50
3000 ~ 6000			54
1000 ~ 3000		Peak / 1 MHz	70
3000 ~ 6000			74

Conditional testing frequency:

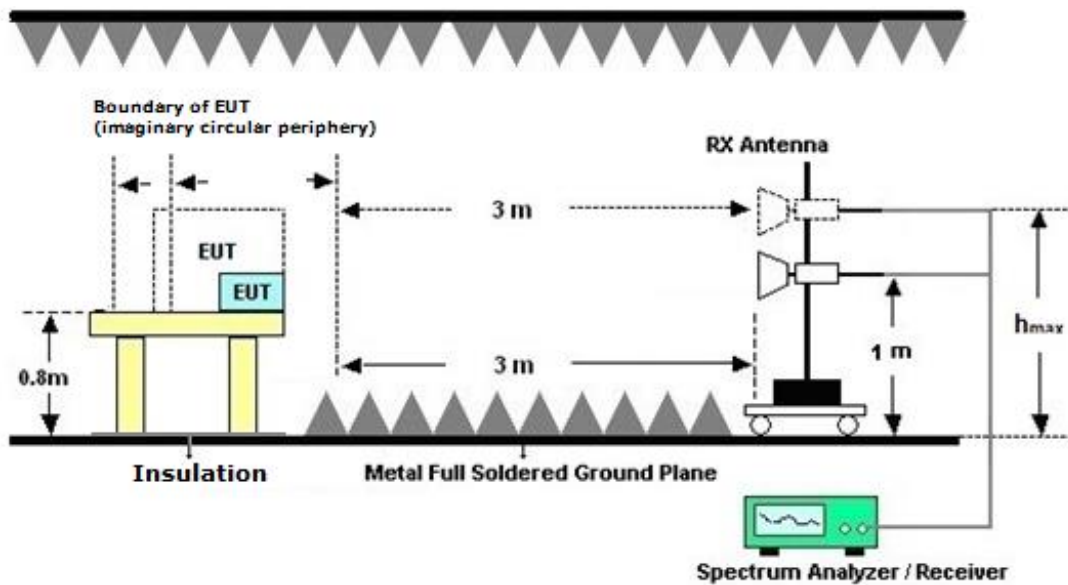
Highest measured frequency	Highest measured frequency
$F_x \leq 108 \text{ MHz}$	1 GHz
$108 \text{ MHz} < F_x \leq 500 \text{ MHz}$	2 GHz
$500 \text{ MHz} < F_x \leq 1 \text{ GHz}$	5 GHz
$F_x > 1 \text{ GHz}$	5 x F_x up to a maximum of 6 GHz
NOTE: For FM and TV broadcast receivers, F_x is determined 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>

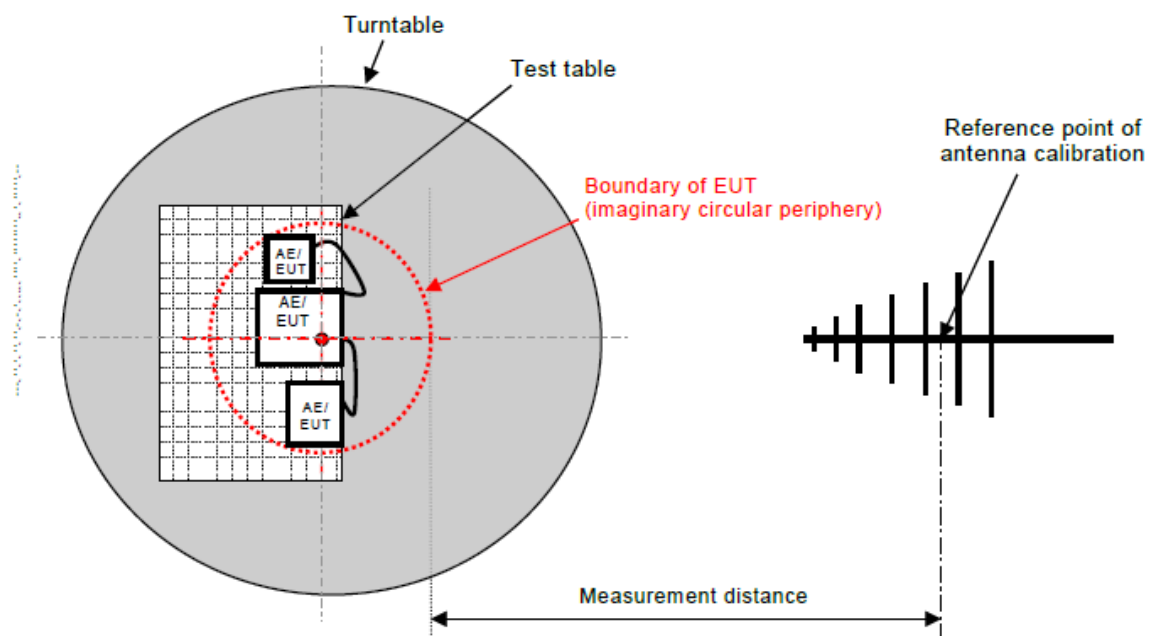


<Radiated Emissions Frequency: 1000 MHz to 6000 MHz>



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

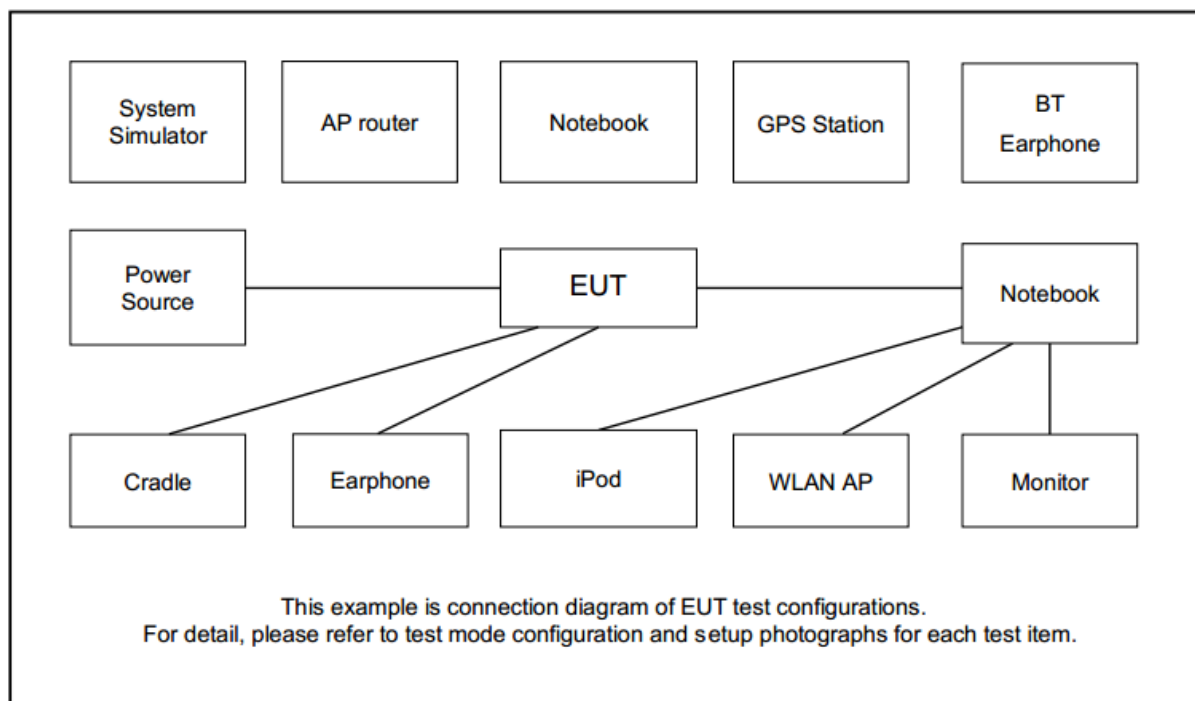
< Radiated Emissions Setup Configuration >



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. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported for 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

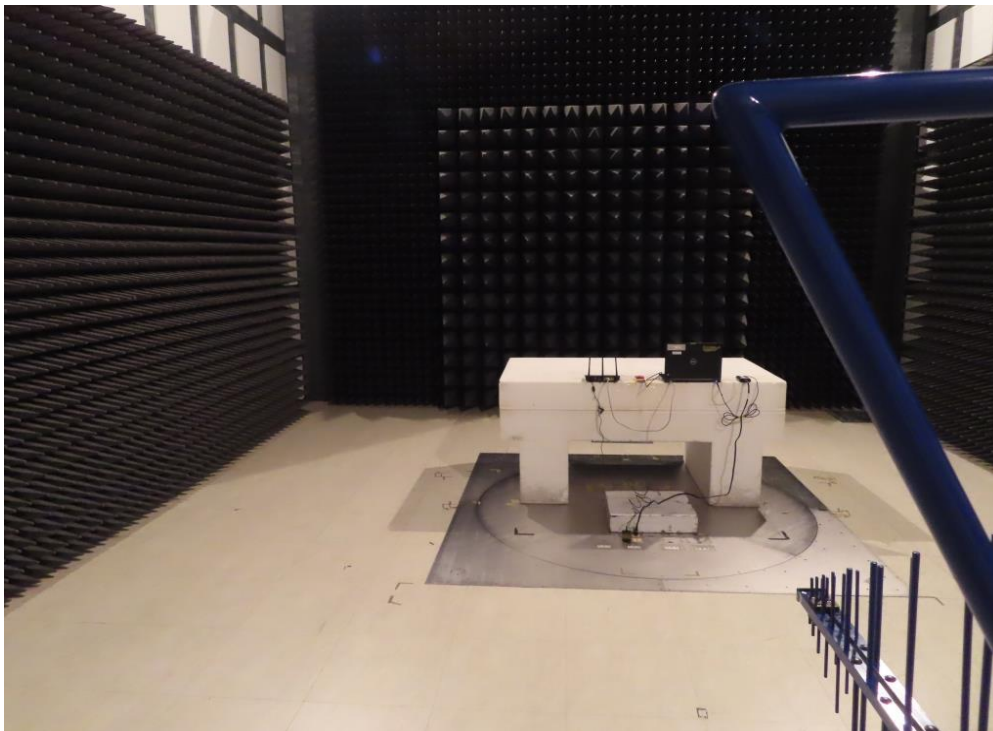


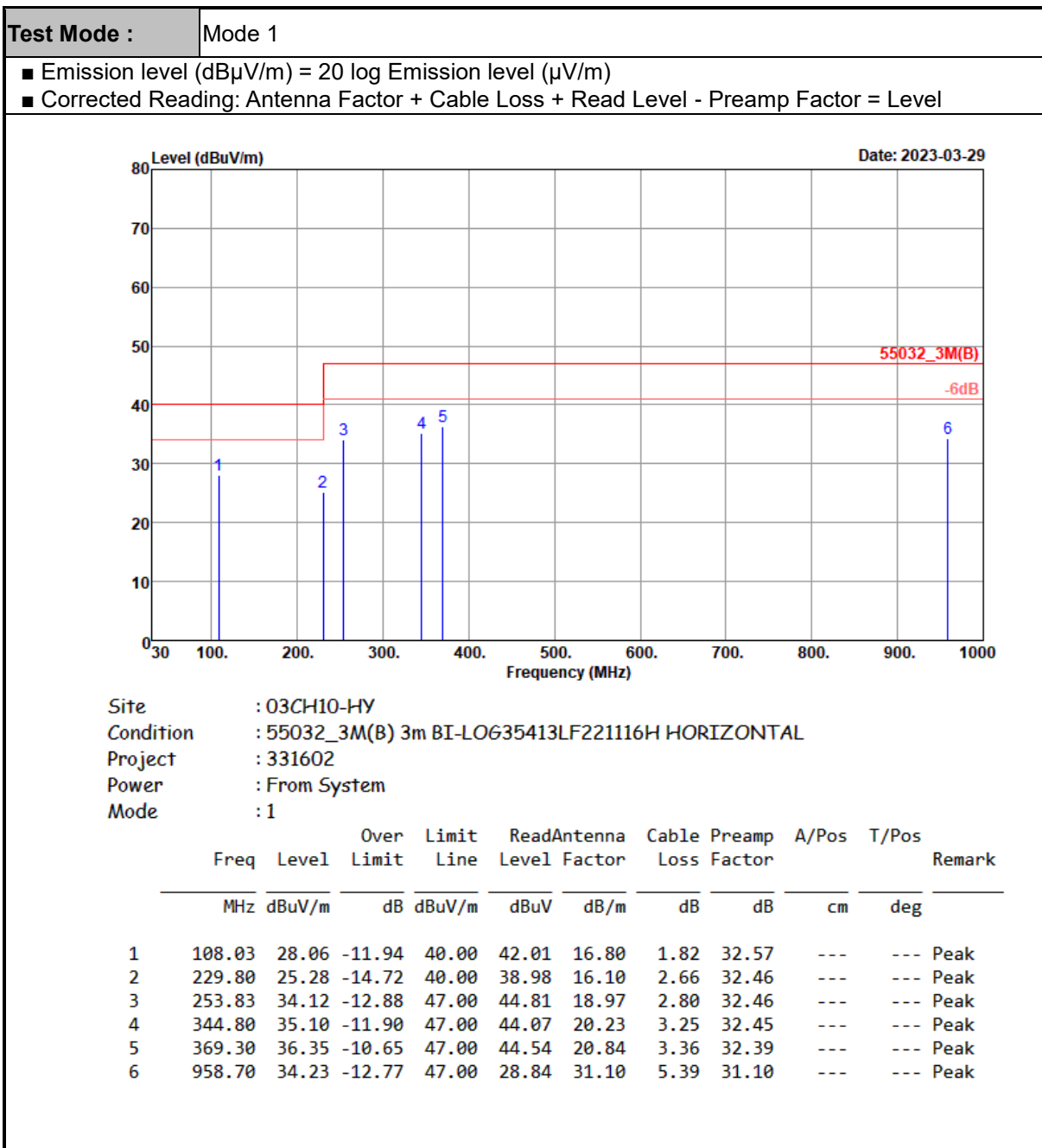
A1.7. Supported Unit Used in Test Configuration and System

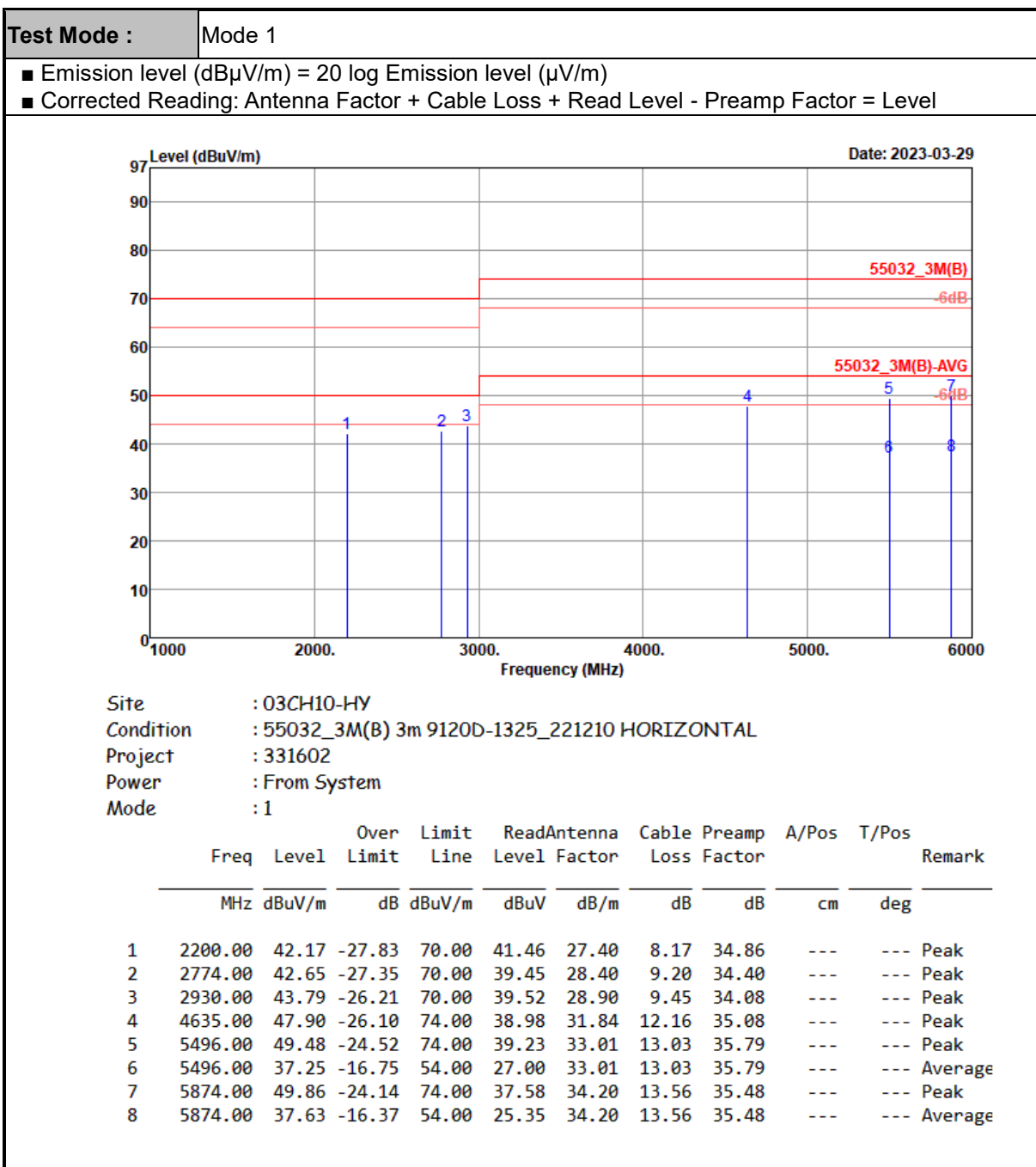
Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
Notebook	Dell	Latitude5480	FCC DoC	Shielded, 0.3 m	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	Unshielded, 1.0 m	Unshielded, 1.8 m

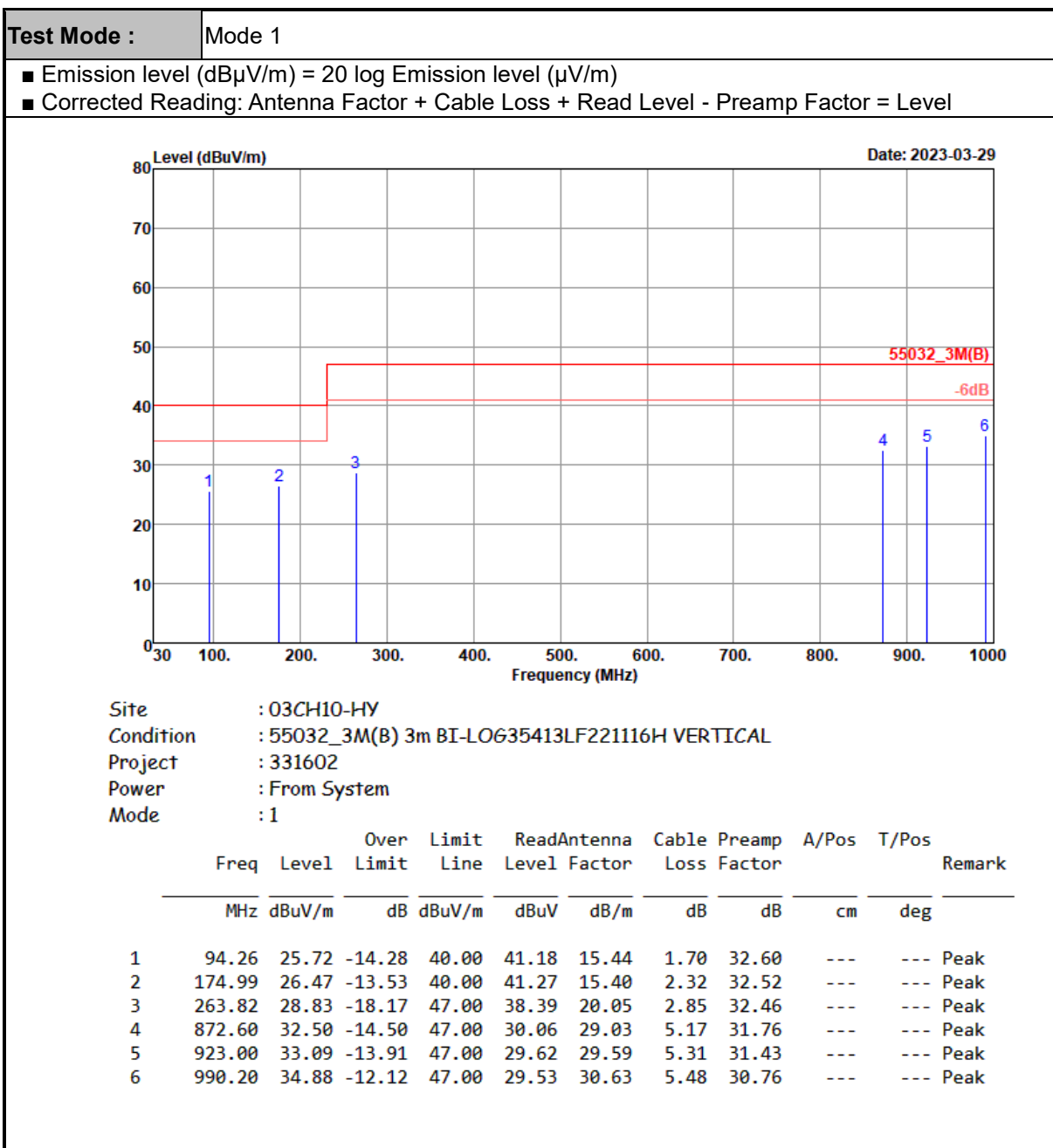
**A1.8. List of Measuring Equipment**

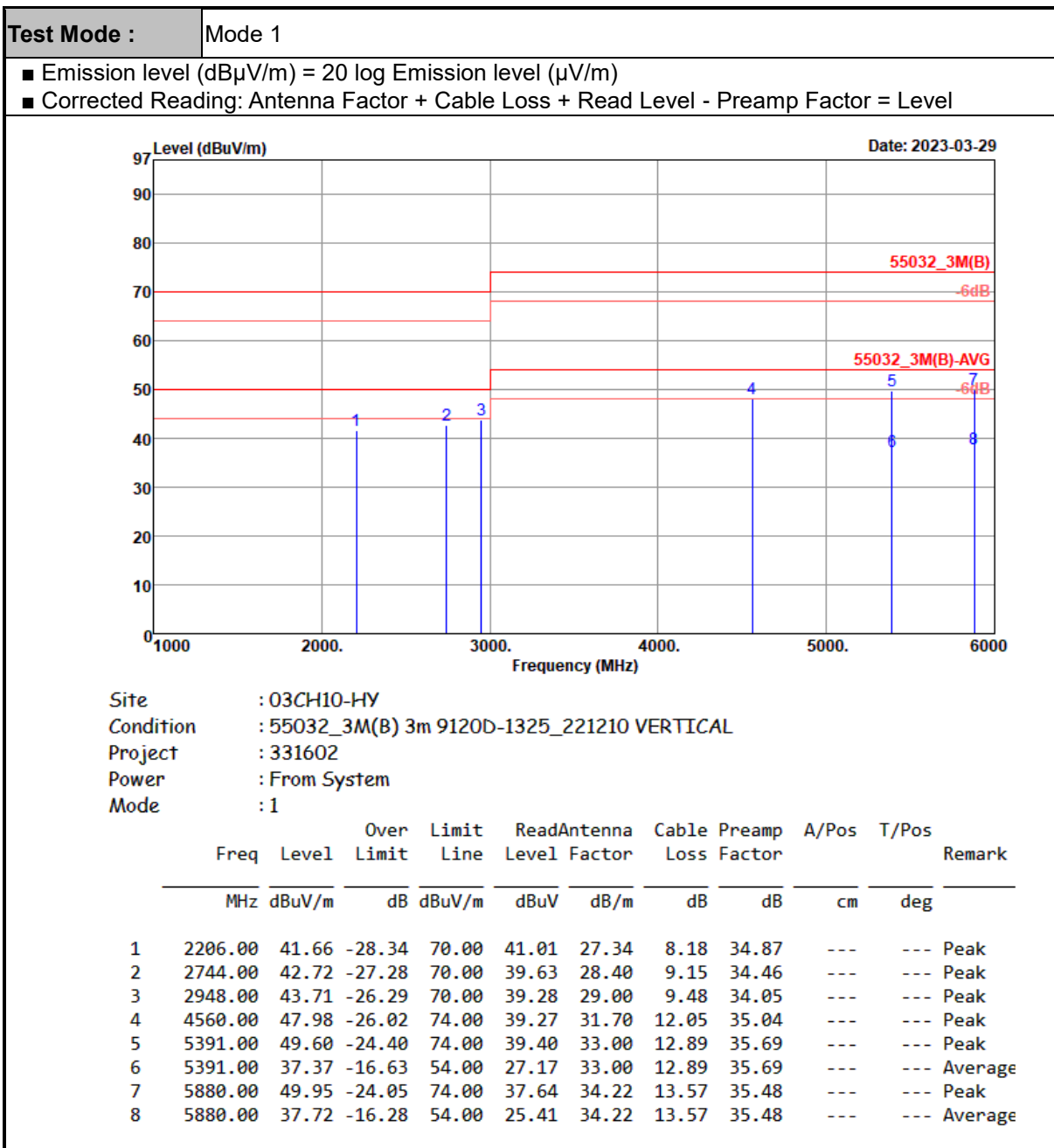
Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 19, 2022	Mar. 29, 2023	Oct. 18, 2023	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35413 & 02	30MHz~1GHz	Nov. 06, 2022	Mar. 29, 2023	Nov. 05, 2023	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1325	1GHz~18GHz	Oct. 27, 2022	Mar. 29, 2023	Oct. 26, 2023	Radiation (03CH10-HY)
Amplifier	E-INSTRUMENT TECH LTD.	ERA-10M-7000-MR	EC1900248	10MHz-7GHz	Nov. 15, 2022	Mar. 29, 2023	Nov. 14, 2023	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Mar. 29, 2023	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Mar. 29, 2023	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Mar. 29, 2023	N/A	Radiation (03CH10-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Mar. 29, 2023	N/A	Radiation (03CH10-HY)
EMI Test Receiver	Keysight	N9038A	MY59053012	3Hz~26.5GHz	Nov. 18, 2022	Mar. 29, 2023	Nov. 17, 2023	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	519226/2, 804014/2, 804026/2	30MHz~40GHz	Nov. 02, 2022	Mar. 29, 2023	Nov. 01, 2023	Radiation (03CH10-HY)

A1.9. Setup Photograph**Mode 1****Frequency: 30 MHz to 1000 MHz****Frequency: 1000 MHz to 6000 MHz**

A1.10.Test Raw Data








A5. Test Results of RS Test

Information of Testing Environment			
Temperature	20.2~25.2 °C	Humidity	42.7~57.6 %
Test Site	RS02-HY	Test Engineer	Howard Hu
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)		
Test Date	Apr. 11, 2023		
Test Software and its Version	Test Software: EMC32 , version: 10.50.40		

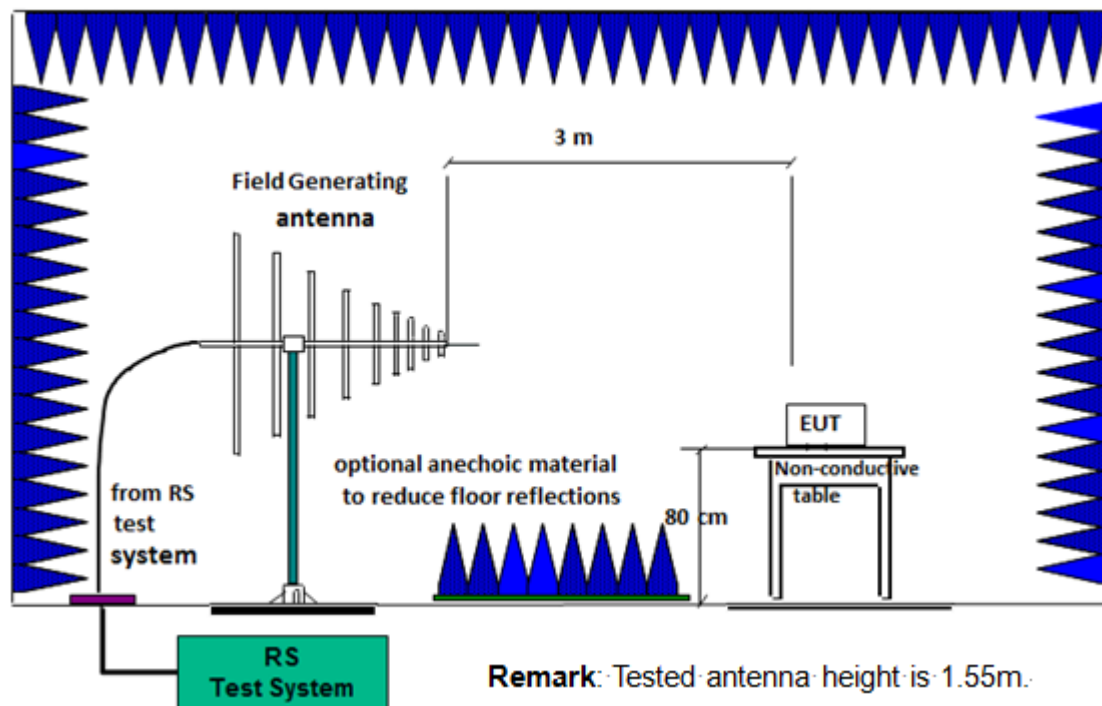
A5.1. Summary

Worst Mode	Mode 2
EUT Operated Voltage During Test	From system
Frequency Range	80-6000 MHz
Test Level	3 V/m
Frequency Step Size	1% increment
Modulation	80% AM (1kHz)
Dwell Time	3 seconds
Polarity	Horizontal and Vertical
Azimuth	0°, 90° 180° 270
Required Performance Criteria	CT/CR
EUT Performance Criteria	CT/CR
Result	PASS

A5.2. Details of EUT Test Modes

Details of Test line Items
Radio Frequency Electromagnetic Field
Mode 1: Bluetooth - LE Packet TX + USB Cable (Charging from Notebook)
Mode 2: Bluetooth - LE (PER) Packet RX + USB Cable (Charging from Notebook)

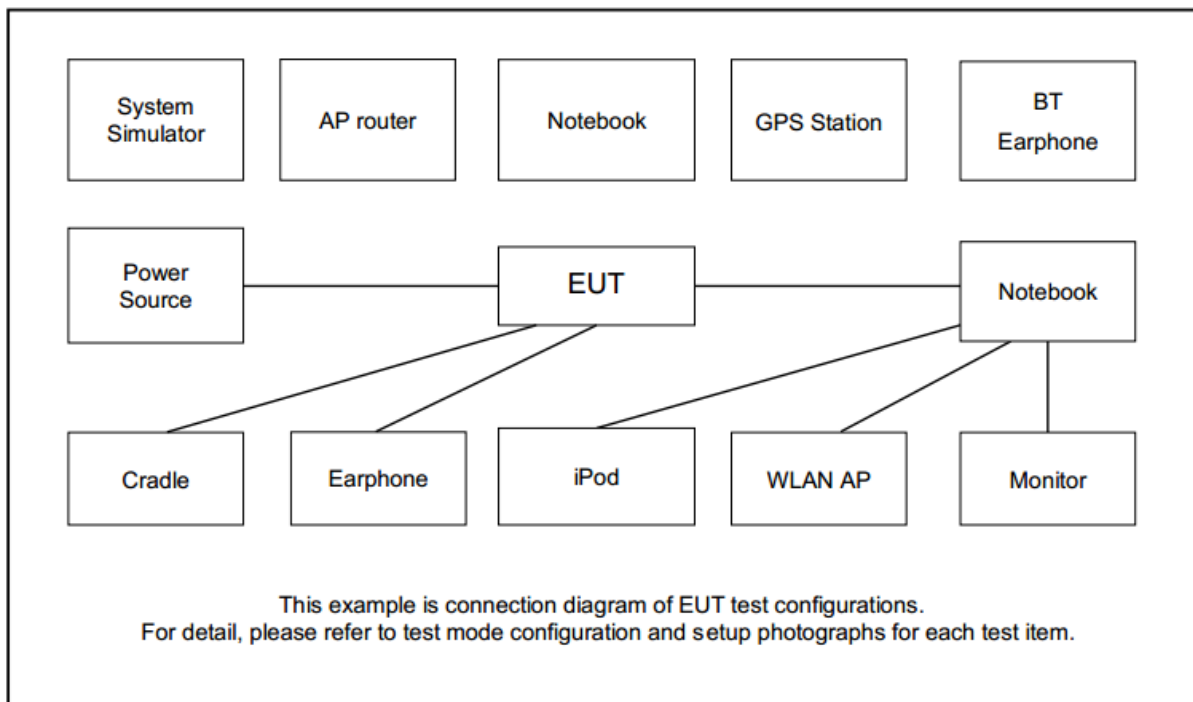
A5.3. Test Setup



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

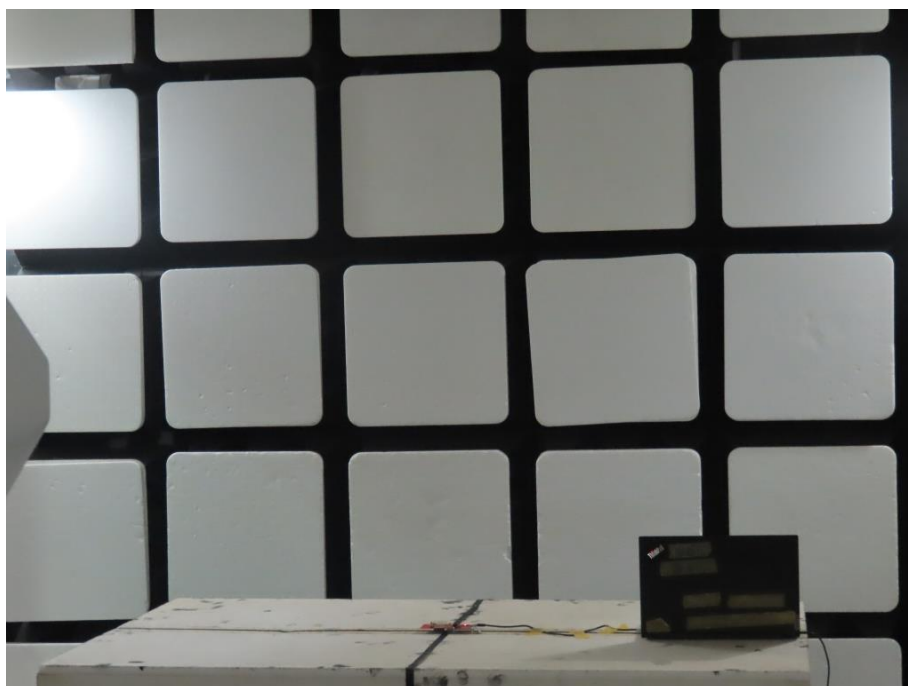


A5.6. Supported unit used in test configuration and system

Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
Notebook	Lenovo	E540	FCC DOC	Shielded, 0.3m	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
Notebook	Dell	Latitude 3400	FCC DoC	Shielded, 0.3m	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m

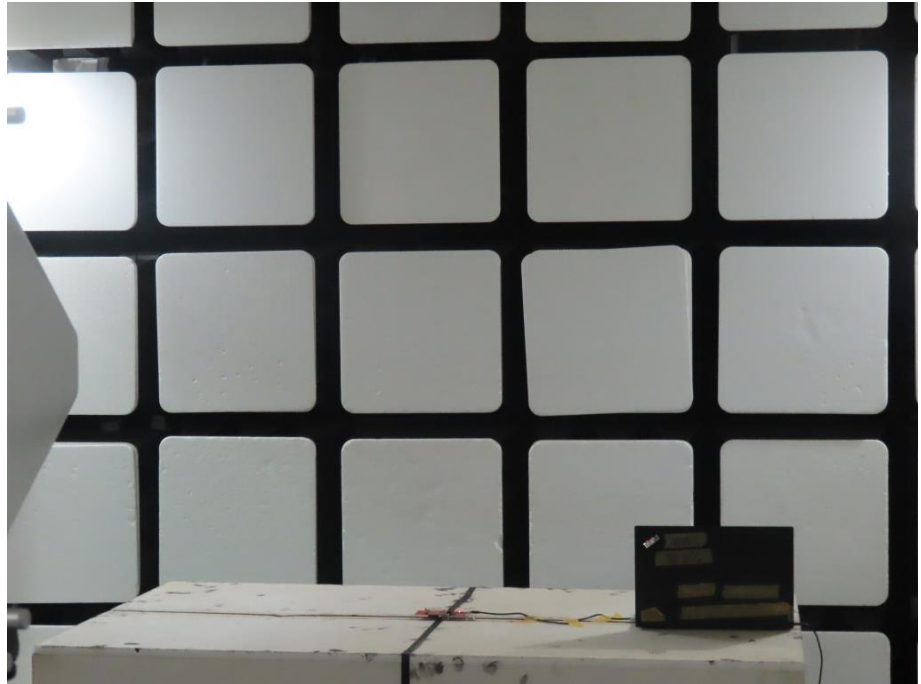
A5.7. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Sensor	Rohde & Schwarz	NRP6A	101208	N/A	Jul. 01, 2022	Apr. 11, 2023	Jun. 30, 2023	RS (RS02-HY)
Power Sensor	Rohde & Schwarz	NRP6A	101209	N/A	Jul. 01, 2022	Apr. 11, 2023	Jun. 30, 2023	RS (RS02-HY)
Signal Generator	Rohde & Schwarz	SMB100A	114307	9kHz~6GHz	Jul. 21, 2022	Apr. 11, 2023	Jul. 20, 2023	RS (RS02-HY)
Antenna	SCHWARZBECK	STLP 9129	00026	70 MHz – 10 GHz	N/A	Apr. 11, 2023	N/A	RS (RS02-HY)
Amplifier	Rohde & Schwarz	BBA100	103435	80MHz~1GHz	N/A	Apr. 11, 2023	N/A	RS (RS02-HY)
Amplifier	Rohde & Schwarz	BBA150	103930	0.69GHz~3.2GHz 2.5GHz~6GHz	N/A	Apr. 11, 2023	N/A	RS (RS02-HY)
Field Sensor	A. R.	FL7006	0343231	100kHz~6GHz	Sep. 14, 2022	Apr. 11, 2023	Sep. 13, 2023	RS (RS02-HY)
Software	Rohde & Schwarz	EMC32	N/A	N/A	N/A	Apr. 11, 2023	N/A	RS (RS02-HY)
INTEGRATED MEASUREMENT SYSTEM	Rohde & Schwarz	IMS	N/A	80MHz~6GHz	Oct. 12, 2022	Apr. 11, 2023	Oct. 11, 2023	RS (RS02-HY)

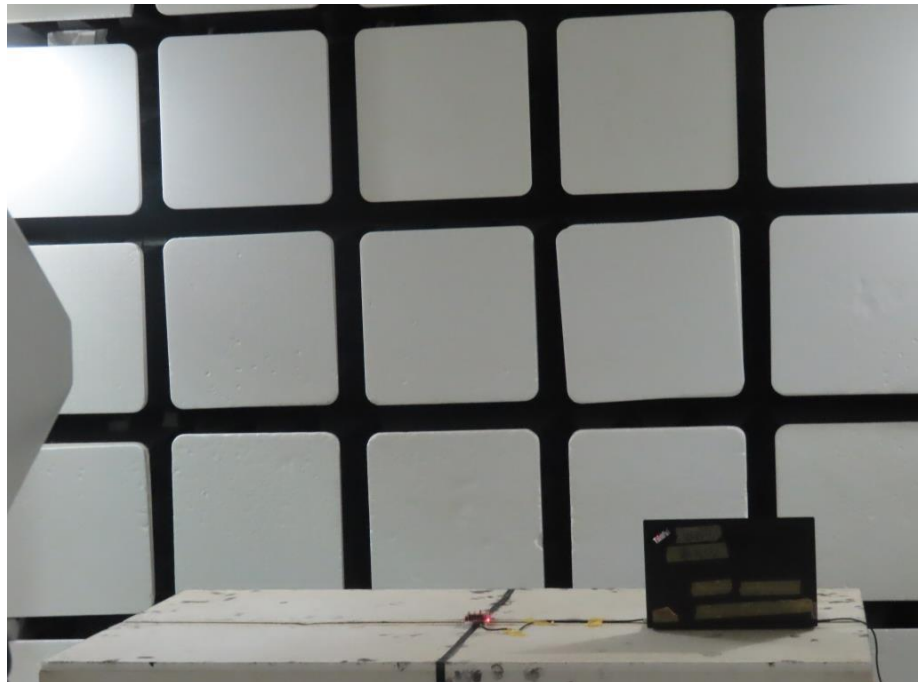
A5.8. Setup Photograph**Mode 1**Position 0°
(Front View)

Mode2

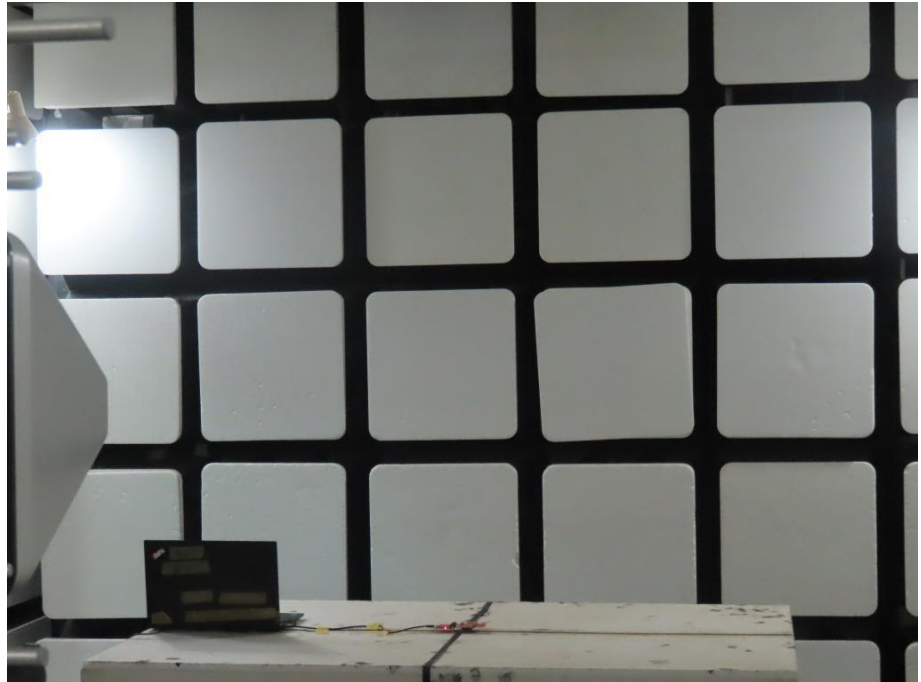
Position 0°
(Front View)



Position 90 °
(Remote View)



Position 180°
(Front View)



Position 270°
(Front View)



A5.9. Test Raw Data

None



A6. Test Results of ESD Test

Information of Testing Environment			
Temperature	21.8 ~ 25.1 °C	Humidity	40.9 ~ 45.1 %
Atmospheric Pressure	98kPa	ESD Generator	Noiseken
Test Site	ES04-HY	Test Engineer	Giant Chen
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)		
Test Date	Apr. 13, 2023		

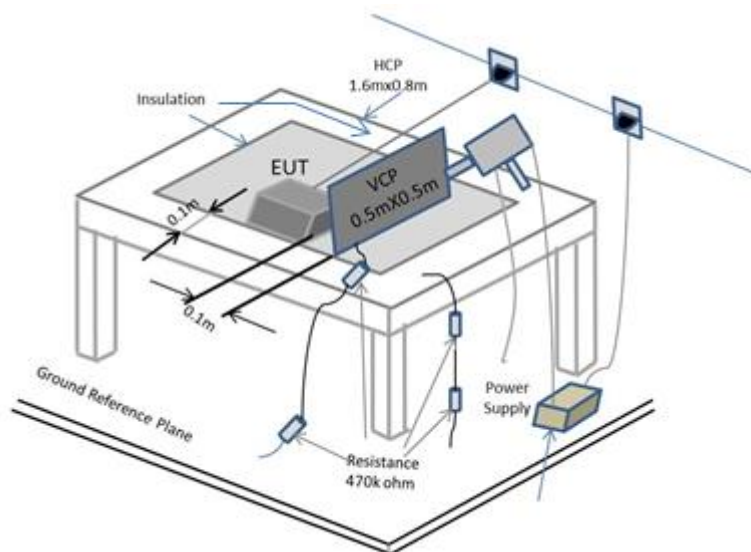
A6.1. Summary

Worst Mode	Mode 1
EUT Operated Voltage During Test	From system
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
Required Performance Criteria	TT/TR
EUT Performance Criteria	CT/CR
Result	PASS

A6.2. Details of EUT Test Modes

Details of Test line Items
Electrostatic Discharge
Mode 1: Bluetooth - LE Packet TX + USB Cable (Charging from Notebook)
Mode 2: Bluetooth - LE (PER) Packet RX + USB Cable (Charging from Notebook)

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.

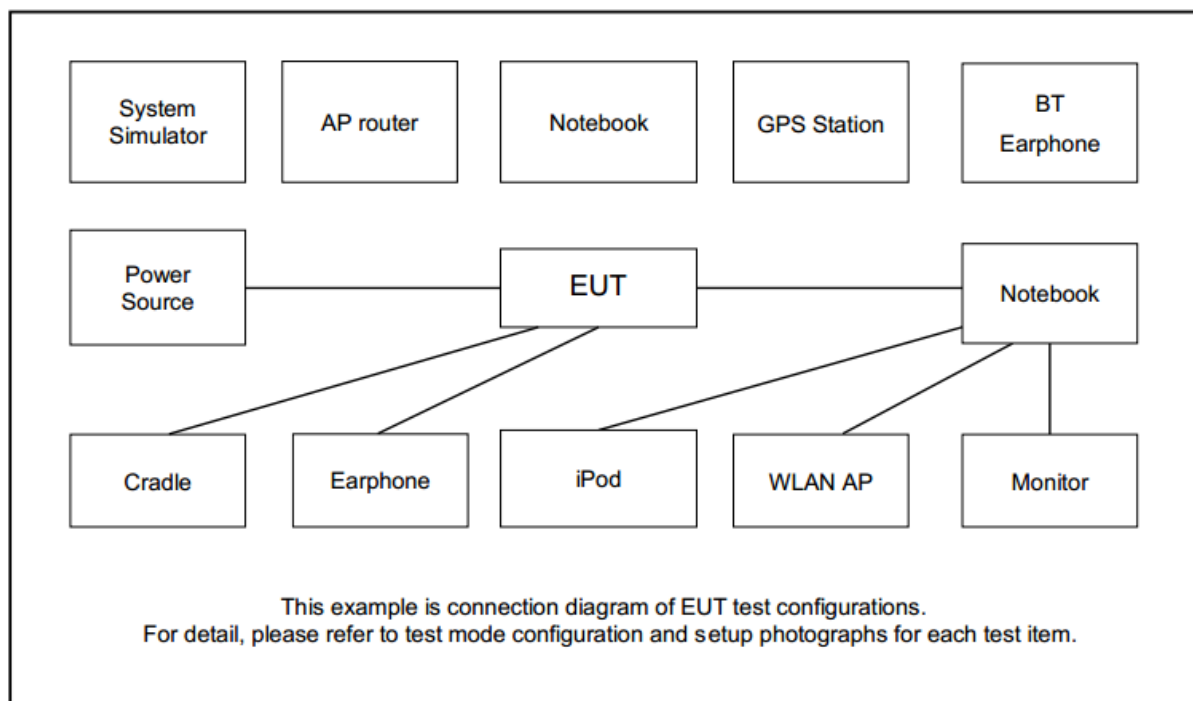
b. Air Discharge to apertures and insulation surfaces:

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

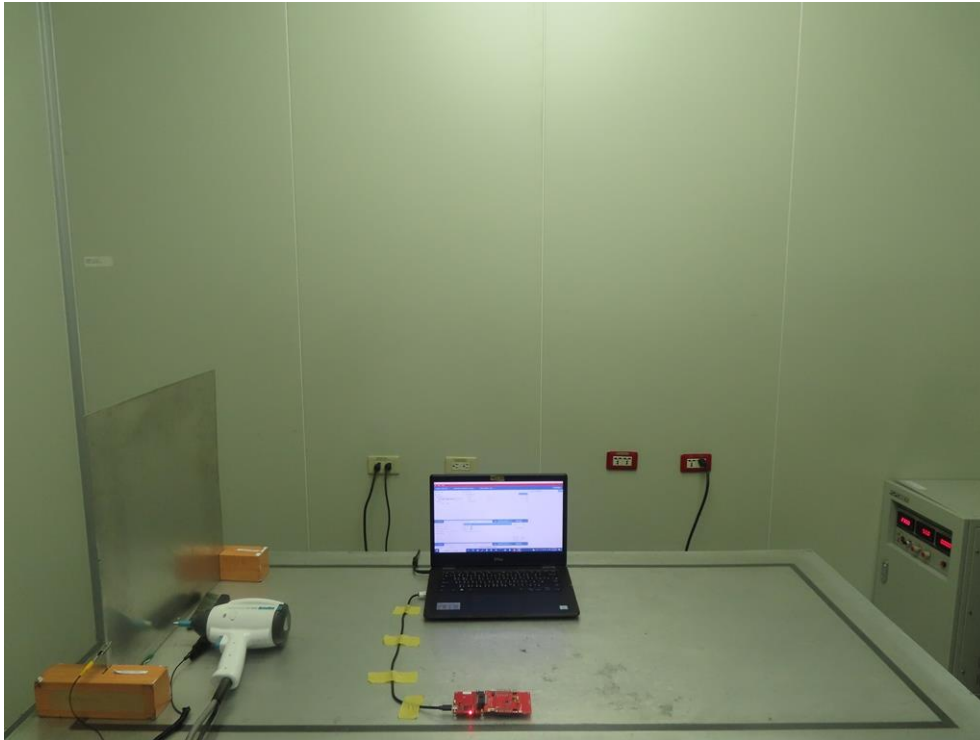
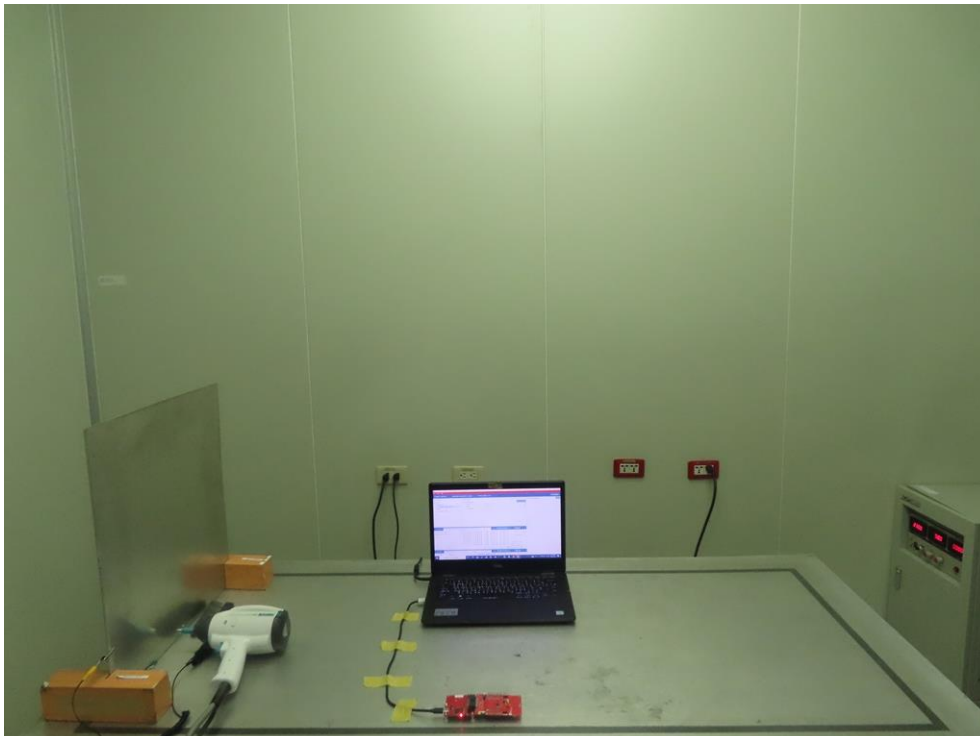
Remark: Only carry out HCP/ VCP test.

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	Shielded, 0.3m	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m
Notebook	Dell	Latitude3400	FCC DoC	Shielded, 0.3m	AC I/P : Unshielded, 1.2 m DC O/P : Shielded, 1.8 m

A6.8. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
ESD Simulator	NoiseKen	ESS-B3011A	ESS1766201	±0.2 kV ~±30 kV	Apr. 25, 2022	Apr. 13, 2023	Apr. 24, 2023	ESD (ES04-HY)
Anti-Static Dust Removal Brush	VORTEX	914	N/A	N/A	N/A	Apr. 13, 2023	N/A	ESD (ES04-HY)
Electrostatic Voltmeter	Trek	520	N/A	0~±2kV	N/A	Apr. 13, 2023	N/A	ESD (ES04-HY)

A6.9. Setup Photograph**Mode 1****Mode 2**

————THE END————