Certificate

Issue Date: September 11, 2023
Ref. Report No. ISL-23LR0074E489

Product Name	:	Bluetooth 5.3 module
Main Model	:	BT840N
Series Model	:	BT840NE
Brand	:	Fanstel
Responsible Party	:	Fanstel Corporation, Taipei
Address	:	10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan
Contact Person	:	

We, **International Standards Laboratory Corp.**, hereby certify that:

The device bearing the trade name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in RE Directive 2014/53/EU and EMC Directive 2014/30/EU and UK Directive Electromagnetic Compatibility Regulations 2016. The device was passed the test performed according to :

Standards:

CE
ETSI EN 301 489-1 V2.2.3
ETSI EN 301 489-17 V3.2.4

UK
BS EN 55032:2015+A11:2020 and
BS EN 55032:2015+A1:2020 Class B
BS EN IEC 61000-3-2:2019+A1:2021
BS EN 61000-3-3:2013+A2:2021+AC:2022
BS EN 61000-4-2:2009
BS EN IEC 61000-4-3:2020
BS EN 61000-4-4:2012
BS EN 61000-4-5:2014+A1:2017
BS EN 61000-4-6:2014
BS EN 61000-4-11:2004+A1:2017

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
The determination of the test results is determined by customer agreement, regulations or standard document specifications.
The Laboratory evaluates measurement inaccuracies based on regulatory or standard document specifications and is listed in the report for reference. The quantitative project part judges the conformity of the test results based on the evaluation results of the standard cited uncertainty, and the qualitative project does not temporarily evaluate the measurement uncertainty.

Benson Chen

Benson Chen / Manager

International Standards Laboratory Corp. LT Lab.
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No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

TEST REPORT

of

ETSI EN 301 489-1

ETSI EN 301 489-17

Product:	**Bluetooth 5.3 module**
Main Model:	**BT840N**
Series Model:	**BT840NE**
Brand:	**Fanstel**
Applicant:	**Fanstel Corporation, Taipei**
Address:	**10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City 221 Taiwan**

Test Performed by:

International Standards Laboratory Corp. LT Lab.
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No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

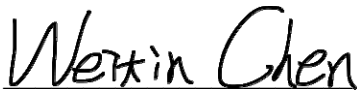
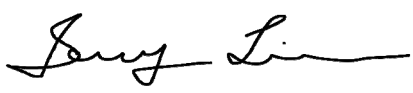
Report No.: **ISL-23LR0074E489**
Issue Date : **September 11, 2023**

Testing Laboratory
0997

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	Please refer to 1.2
Equipment Tested:	Bluetooth 5.3 module
Main Model:	BT840N
Series Model:	BT840NE
Brand:	Fanstel
Applicant:	Fanstel Corporation, Taipei
Sample received Date:	August 15, 2023
Final test Date:	refer to the date of test data
Test Site:	Conduction 02; Chamber 12; Chamber 19; Immunity 02
Test Distance:	10m; 3m (above 1GHz) (EMI test)
Temperature:	refer to each site test data
Humidity:	refer to each site test data
Atmospheric Pressure:	86 kPa to 106 kPa
Input power:	Conduction input power: AC 230 V / 50 Hz Radiation input power: AC 230 V / 50 Hz Immunity input power: AC 230 V / 50 Hz
Test Result:	**PASS**
Report Engineer:	Gigi Yeh
Test Engineer:	 Weitin Chen
Approved By:	 Jerry Liu / Manager

1.2 Test Standards

The tests which this report describes were conducted by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp. in accordance with the following

ETSI EN 301 489-1 V2.2.3 ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility

ETSI EN 301 489-17 V3.2.4 ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard for ElectroMagnetic Compatibility

Standard	Description	Results
EN 61000-4-2:2009 IEC 61000-4-2:2008 BS EN 61000-4-2:2009	Electrostatic discharge immunity	Pass
EN IEC 61000-4-3:2020 IEC 61000-4-3:2020 BS EN IEC 61000-4-3:2020	Radiated, radio-frequency, electromagnetic field immunity	Pass
EN 61000-4-4:2012 IEC 61000-4-4:2012 BS EN 61000-4-4:2012	Electrical fast transient/burst immunity	Pass
EN 61000-4-5:2014+A1:2017 IEC 61000-4-5:2014+A1:2017 BS EN 61000-4-5:2014+A1:2017	Surge immunity	Pass
EN 61000-4-6:2014+AC:2015 IEC 61000-4-6:2013 BS EN 61000-4-6:2014	Immunity to conducted disturbances	Pass
EN 61000-4-11:2004+A1:2017 IEC 61000-4-11:2004+A1:2017 BS EN 61000-4-11:2004+A1:2017	Voltage dips, short interruptions and voltage variations immunity	Pass

Standard	Description	Criteria	Results
EN 55032:2015+A11:2020 EN 55032:2015+A1:2020 CISPR 32:2015+A1:2019 BS EN 55032:2015+A11:2020 BS EN 55032:2015+A1:2020	Conductive Test	Class B (EN 55032)	Pass
	Radiated Test	Class B (EN 55032)	Pass

Standard	Description	Results
EN 61000-3-2:2014 IEC 61000-3-2:2014 EN IEC 61000-3-2:2019+A1:2021 IEC 61000-3-2:2018+A1:2020 BS EN IEC 61000-3-2:2019+A1:2021	Limits for harmonic current emissions (equipment input current ≤ 16A per phase)	Pass
EN 61000-3-3:2013 IEC 61000-3-3:2013 EN 61000-3-3:2013+A2:2021+AC:2022 IEC 61000-3-3:2013+A2:2021+COR1:2022 BS EN 61000-3-3:2013+A2:2021+AC:2022	Limits for voltage fluctuations and flicker in low-voltage supply systems (equipment with input current ≤ 16 A per phase)	Pass

1.2.1 Criteria for Compliance: ETSI EN 301 489-1 V2.2.3

Performance criteria	
Performance criteria for continuous phenomena	During the test, the equipment shall: • continue to operate as intended; • not unintentionally transmit; • not unintentionally change its operating state; • not unintentionally change critical stored data.
Performance criteria for transient phenomena	For all ports and transient phenomena with the exception described below, the following applies: • 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. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies: • 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.

1.2.2 Criteria for Compliance: ETSI EN 301 489-17 V3.2.4

The performance criteria are:

- performance criteria A for immunity tests with phenomena of a continuous nature;
- performance criteria B for immunity tests with phenomena of a transient nature;
- performance criteria C for immunity tests with power interruptions exceeding a certain time.

The equipment shall meet the minimum performance criteria as specified in the following clauses.

Criteria	During test	After test (i.e. as a result of the application of the 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: 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.	

Performance criteria for Continuous phenomena

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.

Performance criteria for Transient phenomena

The performance criteria B shall apply, except for voltage dips greater than or equal to 100 ms and voltage interruptions of 5000 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.

1.3 Test Mode

Applicable standard		EN 301489-17		
Test Configuration		Config 1	Config 2	Config 3
		EUT + Smart mobile phone	EUT + Smart mobile phone	EUT + Smart mobile phone
Operation mode		BT link(BT840N) Antenna:F Type	BT link(BT840NE)	Zigbee link(BT840N) Antenna:F Type
No.	**Description**			
1	radiated emission (30M-1GHz) (1-6GHz)	measured	pretest	measured
2	conducted emission (DC Power)	N/A	N/A	N/A
3	conducted emission (AC Power)	measured	N/A	measured
4	harmonic current emissions	N/A	N/A	N/A
5	voltage fluctuations and flicker	N/A	N/A	N/A
6	Conducted emission (wired network)	N/A	N/A	N/A
7	RF electromagnetic field (80MHz to 6GHz)	measured	measured	measured
8	electrostatic discharge	measured	measured	measured
9	fast transients common mode	N/A	N/A	N/A
10	RF common mode 0,15 MHz to 80 MHz	N/A	N/A	N/A
11	transients and surges	N/A	N/A	N/A
12	voltage dips and interruptions	N/A	N/A	N/A
13	surges, line to line and line to ground	N/A	N/A	N/A

1.4 Description of EUT Test Mode

EUT

General Information	
Product Name:	Bluetooth 5.3 module
Brand Name:	Fanstel
Model Name:	BT840N; BT840NE
Model Difference:	Antenna. Please see table below for detail.
Temperature Range	-45°C to +105°C
Power Supply:	5Vdc

Model Summaries

module	BT840N	BT840NE
SoC	nRF52840	nRF52840
Size, mm	15x29.9x2.0	15x29.9x2.0
32M,32.768kHz crystals	Integrated	Integrated
DCDC inductors,VDD,VDDH	Integrated	Integrated
BT Antenna	PA+PCB	PA+PCB+u.FL
Operating temp.	-40oC to +85oC	-40oC to +85oC
Evaluation board	EV-BT840NE	EV-BT840NE

The I/O ports of EUT are listed below:

I/O Port Type	Quantity
AC In Power Port	N/A
USB 2.0 Port	N/A
Micro USB Port	N/A
Earphone Port	N/A
LAN Port	N/A
Micro SD slot	N/A

All the devices listed below are chosen by the applicant to be the representative configuration for testing in this report. The test worst configuration 1 is listed below:

1.5 Description of Support Equipment

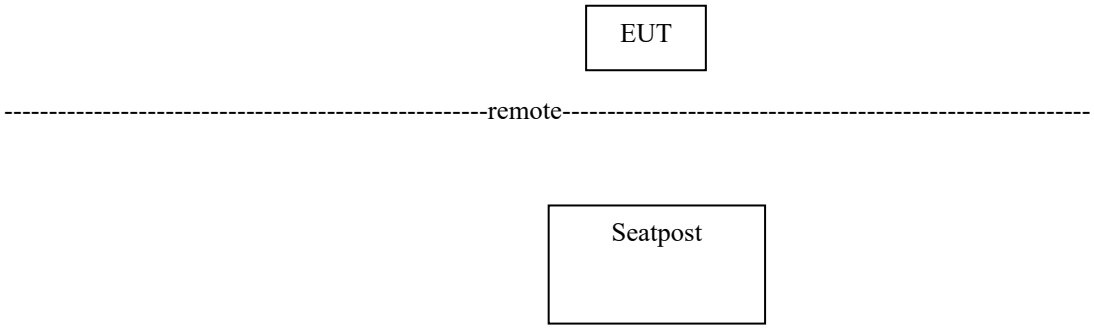
No	Unit	Model Serial No.	Brand	Power Cord	FCC ID
1	iPhone	H02K0R34WW	Apple	Non-shielded	BCG-E4035A

1.6 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	shielded	core	Remark
AC Power cable	N/A	N/A	No	No	

1.7 Configuration of Tested System

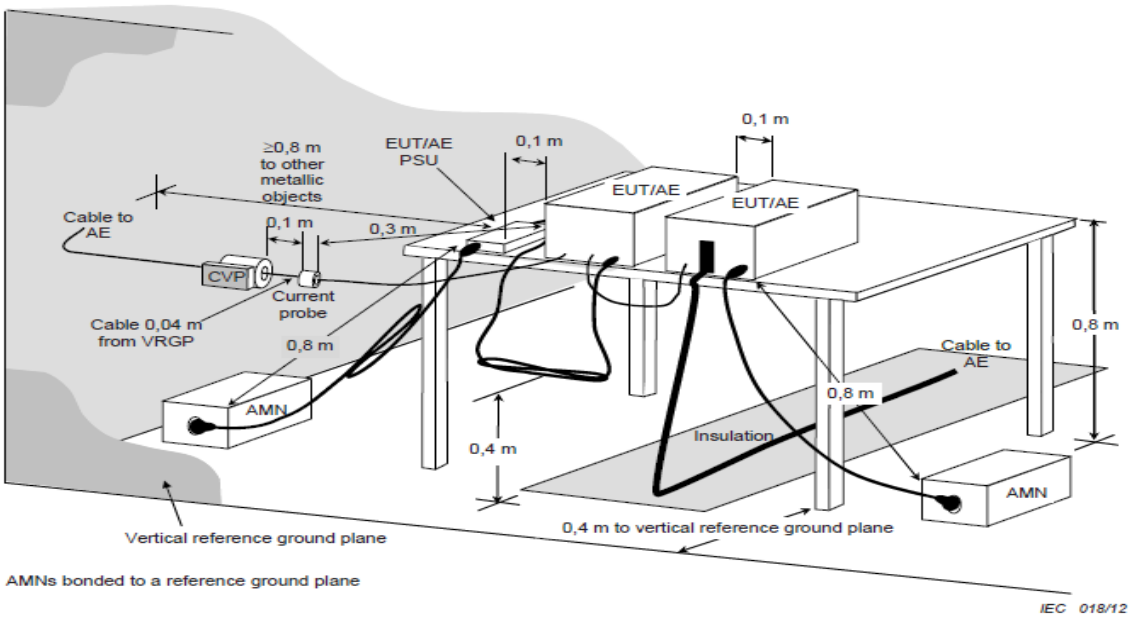
Config 1



2. Power Main Port Conducted Emissions

2.1 Test Setup and Procedure

2.1.1 Test Setup



2.1.2 Test Procedure

The measurements are performed in a shielded room test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the AMN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the AMNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second AMN through a ganged, metal power outlet box which is bonded to the ground plane at the AMN.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, live and neutral, were measured. All of the interface cables were manipulated according to EN 55032 / BS EN 55032 requirements.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

2.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150kHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9kHz

2.1.4 Limit

Conducted emissions from the AC mains power ports of Class_A equipment:

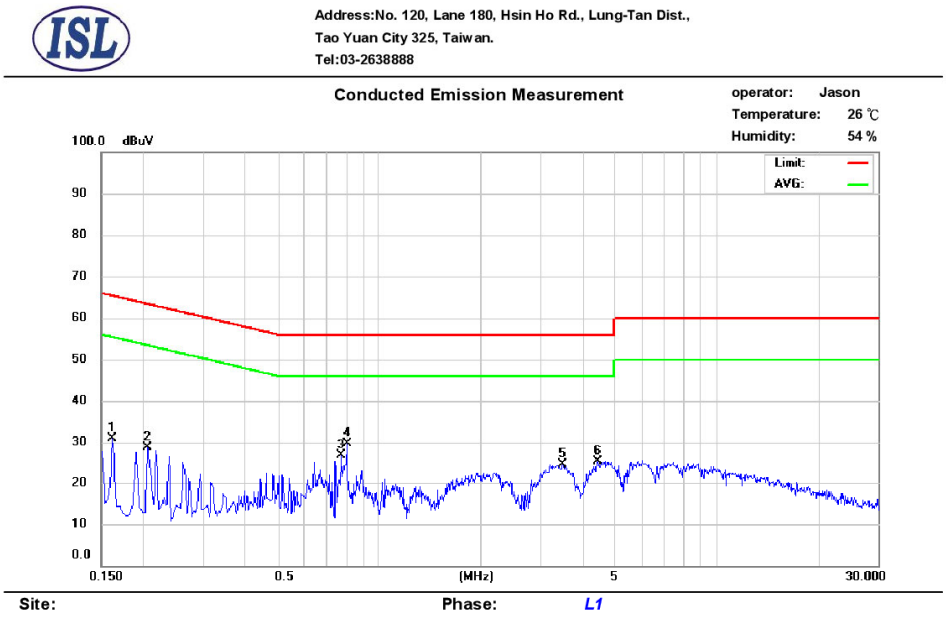
Frequency	QP	AV
MHz	dB(μV)	dB(μV)
0.15-0.50	79	66
0.50-30	73	60
Note: The lower limit shall apply at the transition frequencies		

Conducted emissions from the AC mains power ports of Class_B equipment:

Frequency	QP	AV
MHz	dB(μV)	dB(μV)
0.15-0.50	66-56	56-46
0.50-5.0	56	46
5.0-30	60	50
Note: The lower limit shall apply at the transition frequencies		

2.2 Conduction Test Data: Configuration 1

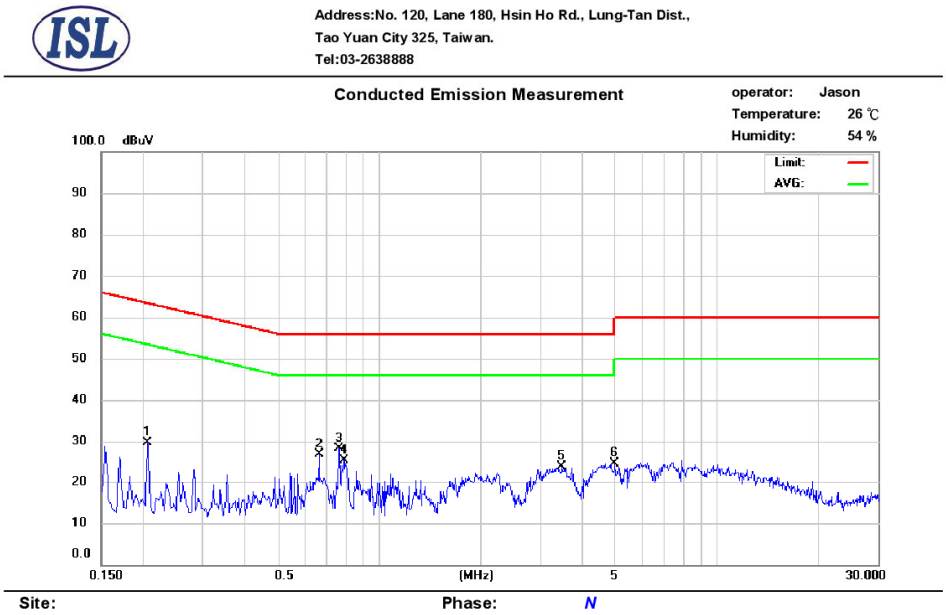
-Line



No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.162	13.72	-1.97	9.70	23.42	65.36	-41.94	7.73	55.36	-47.63
2	0.206	10.56	-2.75	9.70	20.26	63.37	-43.11	6.95	53.37	-46.42
3	0.774	10.29	2.06	9.71	20.00	56.00	-36.00	11.77	46.00	-34.23
4	0.802	10.94	3.84	9.71	20.65	56.00	-35.35	13.55	46.00	-32.45
5	3.506	10.05	2.34	9.79	19.84	56.00	-36.16	12.13	46.00	-33.87
6	4.450	9.97	2.15	9.81	19.78	56.00	-36.22	11.96	46.00	-34.04

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in “QP/AVG Correct” column, if not, QP/AVG data will instead.

- Neutral



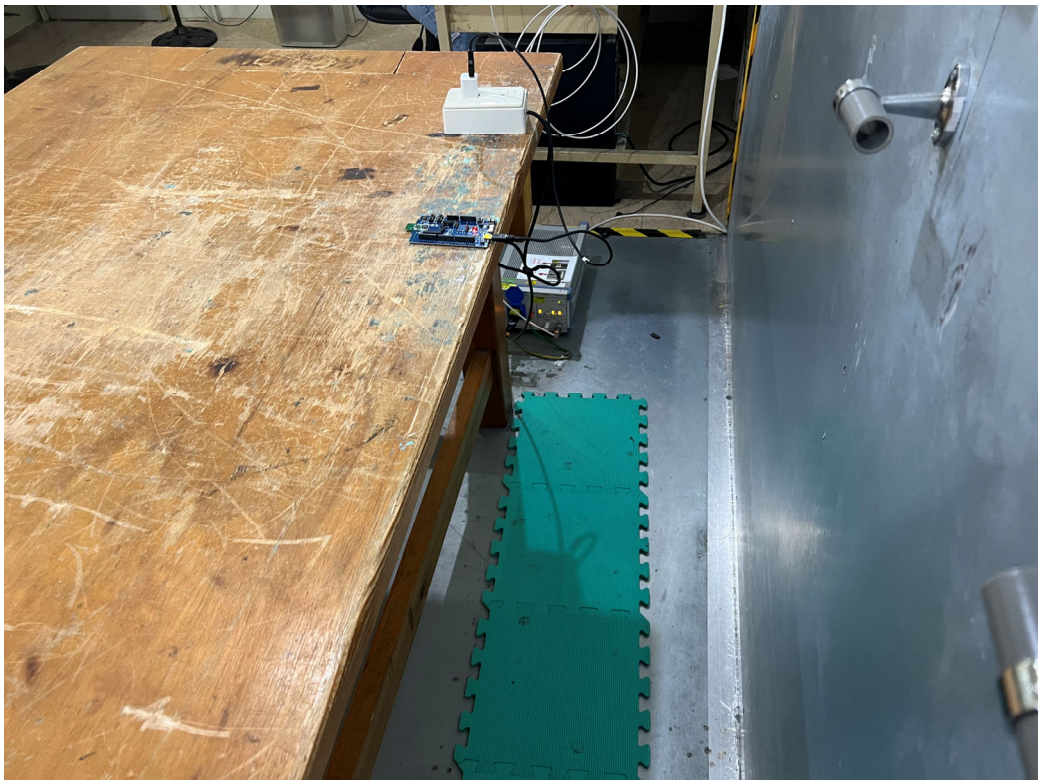
No.	Frequency (MHz)	QP_R (dBuV)	AVG_R (dBuV)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)
1	0.206	10.25	-2.72	9.70	19.95	63.37	-43.42	6.98	53.37	-46.39
2	0.662	6.81	0.55	9.71	16.52	56.00	-39.48	10.26	46.00	-35.74
3	0.762	8.33	-0.77	9.71	18.04	56.00	-37.96	8.94	46.00	-37.06
4	0.790	11.76	3.90	9.71	21.47	56.00	-34.53	13.61	46.00	-32.39
5	3.482	8.90	1.46	9.79	18.69	56.00	-37.31	11.25	46.00	-34.75
6	4.982	8.47	0.58	9.82	18.29	56.00	-37.71	10.40	46.00	-35.60

Note:
Margin = QP/AVG Emission - Limit
QP/AVG Emission = QP_R/AVG_R + Correct Factor
Correct Factor = LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit
The frequency spectrum graph is for final peak graph, and the attached table is for QP/AVG test result.
If peak data can pass, it will be shown in “QP/AVG Correct” column, if not, QP/AVG data will instead.

2.3 Test Setup Photo

Front View

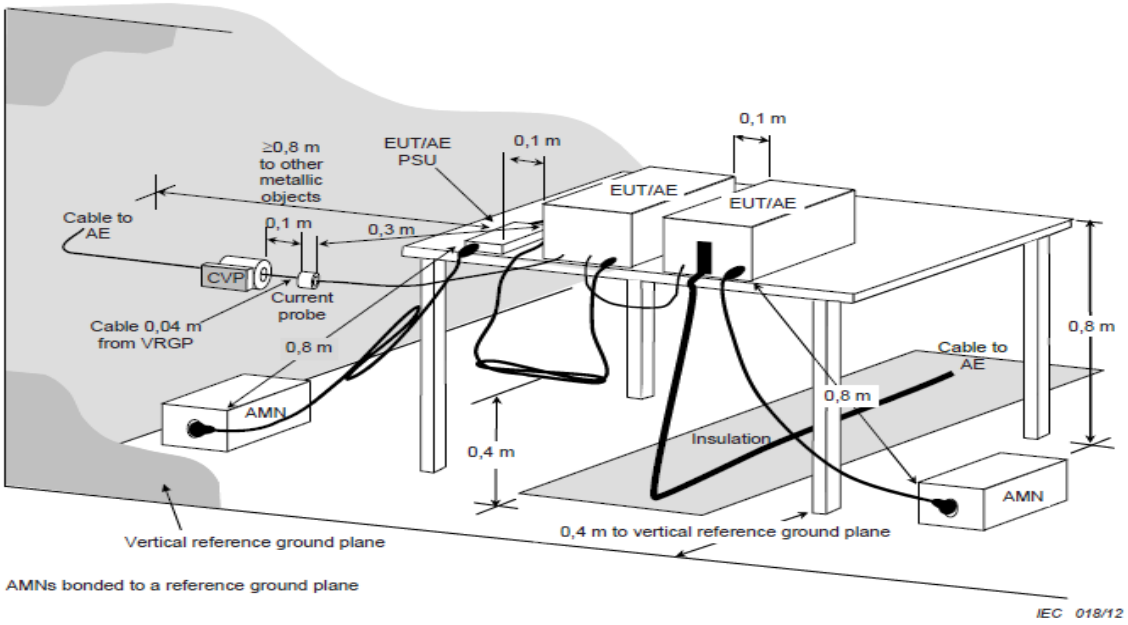
Back View



3. Wired Network Port Conducted Emissions

3.1 Test Setup and Procedure

3.1.1 Test Setup



3.1.2 Test Procedure

The measurements are performed in a shielded room test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

The EUT, any support equipment, and any interconnecting cables were arranged and moved to get the maximum measurement. All of the interface cables were manipulated according to EN 55032 / BS EN 55032 requirements.

The port of the EUT was connected to the support equipment through the AAN and linked in normal condition.

AC input power for the EUT & the support equipment power outlets were obtained from the same filtered source that provided input power to the AMN.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information could be useful in reducing their amplitude.

3.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150kHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9kHz

3.1.4 Limit

Asymmetric mode conducted emissions from Class A equipment:
Applicable to
1. wired network ports.
2. optical fiber ports with metallic shield or tension members.
3. antenna ports.

Frequency range MHz	Coupling device	Detector type / bandwidth	Class A voltage limits dB(μV)	Class A current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	97-87	n/a
0.5-30			87	
0.15-0.5	AAN	Average / 9 kHz	84-74	
0.5-30			74	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	97-87	53-43
0.5-30			87	43
0.15-0.5	CVP and current probe	Average / 9 kHz	84-74	40-30
0.5-30			74	30
0.15-0.5	Current Probe	Quasi Peak / 9 kHz	n/a	53-43
0.5-30				43
0.15-0.5	Current Probe	Average / 9 kHz		40-30
0.5-30				30

Asymmetric mode conducted emissions from Class_B equipment:
Applicable to:
1. wired network ports.
2. optical fiber ports with metallic shield or tension members.
3. broadcast receiver tuner ports.
4. antenna ports.

Frequency range MHz	Coupling device	Detector type / bandwidth	Class_B voltage limits dB(μV)	Class_B current limits dB(μA)
0.15-0.5	AAN	Quasi Peak / 9 kHz	84-74	n/a
0.5-30			74	
0.15-0.5	AAN	Average / 9 kHz	74-64	
0.5-30			64	
0.15-0.5	CVP and current probe	Quasi Peak / 9 kHz	84-74	40-30
0.5-30			74	30
0.15-0.5	CVP and current probe	Average / 9 kHz	74-64	30-20
0.5-30			64	20
0.15-0.5	Current Probe	Quasi Peak / 9 kHz	n/a	40-30
0.5-30				30
0.15-0.5	Current Probe	Average / 9 kHz		30-20
0.5-30				20

****Remarks: It is not necessary to be tested on this item.**

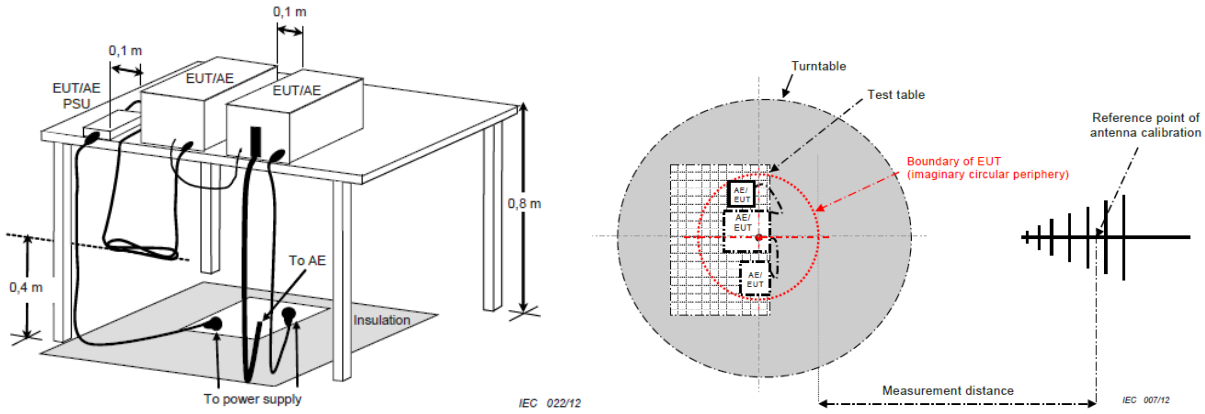
3.2 Test Setup Photo

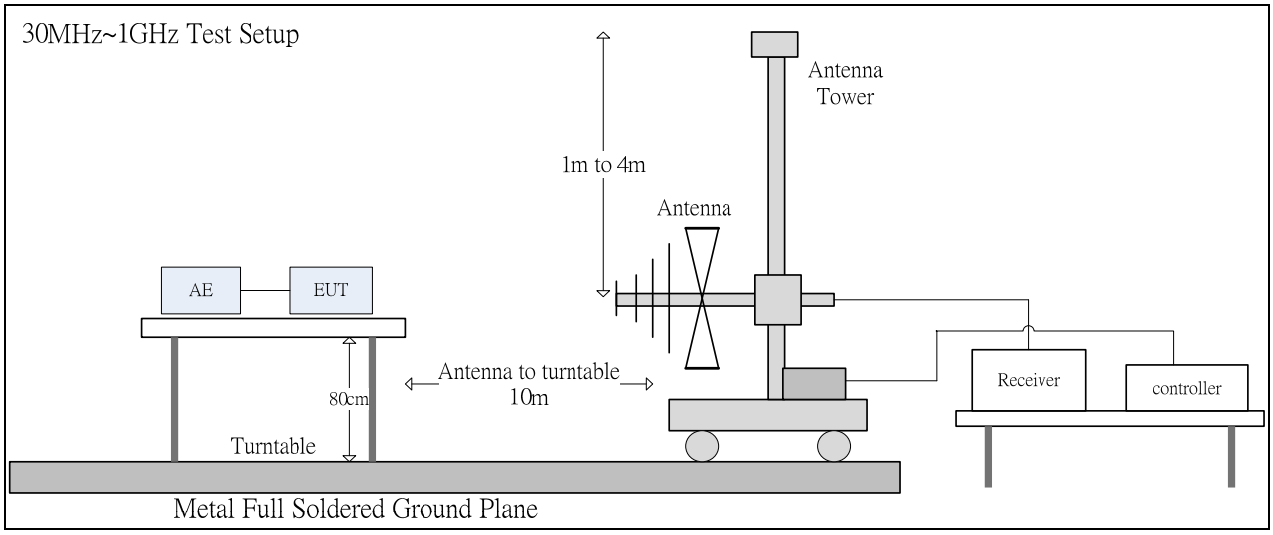
Refer to the Setup Photos for Power Main Port Conducted Emissions

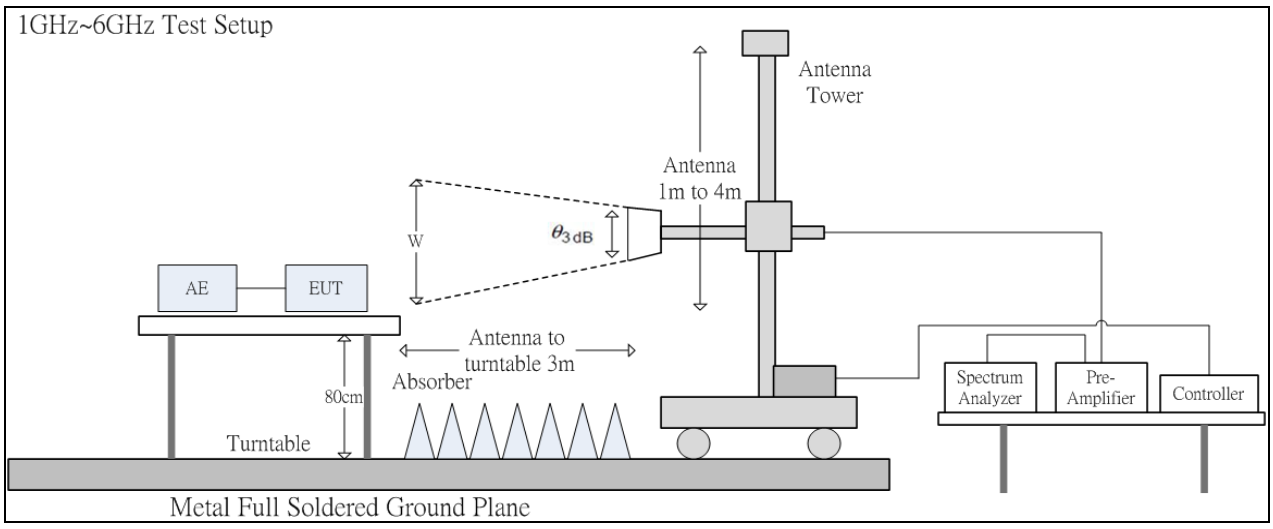
4. Radiated Disturbance Emissions

4.1 Test Setup and Procedure

4.1.1 Test Setup







The 3dB beam width of the horn antenna used for the test is as shown in the table below.

Frequency (GHz)	E-plane	H-plane	$\theta_{3\,dB}$ (min)	d= 3 m
				w (m)
1	88°	147°	88°	5.79
2	68°	119°	68°	4.04
3	73°	92°	73°	4.44
4	70°	89°	70°	4.20
5	55°	60°	55°	3.12
6	63°	62°	62°	3.60

4.1.2 Test Procedure

The radiated emissions test will then be repeated on the chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 10 meter chamber. Desktop EUT are set up on a FRP stand 0.8 meter above the ground or floor-standing arrangement shall be placed on the horizontal ground reference plane.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. The highest emissions between 1 GHz to 6 GHz were analyzed in details by operating the spectrum analyzer in peak and average mode to determine the precise amplitude of the emissions. The test volume for a height of up to 30 cm may be obstructed by absorber placed on the ground plane.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings. All of the interface cables were manipulated according to EN 55032 / BS EN 55032 requirements.

The highest internal source of an EUT is defined as the highest frequency generated or used within the EUT or on which the EUT operates or tunes.

If the highest frequency of the internal sources of the EUT is less than 108 MHz, the measurement shall only be made up to 1 GHz.

If the highest frequency of the internal sources of the EUT is between 108 MHz and 500 MHz, the measurement shall only be made up to 2 GHz.

If the highest frequency of the internal sources of the EUT is between 500 MHz and 1 GHz, the measurement shall only be made up to 5 GHz.

If the highest frequency of the internal sources of the EUT is above 1 GHz, the measurement shall be made up to 5 times the highest frequency or 6 GHz, whichever is less.

4.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range: 30MHz--1000MHz
Detector Function: Quasi-Peak Mode
Resolution Bandwidth: 120kHz

Frequency Range: Above 1 GHz to 6 GHz
Detector Function: Peak/Average Mode
Resolution Bandwidth: 1MHz

4.2 Limit

Radiated emissions at frequencies up to 1 GHz for Class_A equipment:

Frequency range MHz	Measurement		Class A limits dB(μV/m)
	Distance m	Detector type / bandwidth	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	40
230-1000			47
30-230	3		50
230-1000			57

Radiated emissions at frequencies above 1 GHz for Class_A equipment of the EN 55032:2015+A11:2020:

Frequency range MHz	Measurement		Class_A limits dB(μV/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-3000	3	Average / 1MHz	56
3000-6000			60
1000-3000		Peak / 1MHz	76
3000-6000			80

Radiated emissions at frequencies above 1 GHz for Class_A equipment of the EN 55032:2015+A1:2020:

Frequency range MHz	Measurement		Class_A limits dB(μV/m)
	Distance m	Detector type / bandwidth	FSOATS
1000-6000	3	Average / 1MHz	60
1000-6000		Peak / 1MHz	80

Note 1: The radiated emissions at frequencies above 1 GHz test limit in this report is based on EN 55032:2015+A11:2020.

Note 2: Test data in this report has been taken against the EN 55032:2015+A11:2020 limit as it is the most stringent limit. By complying with the more restrictive EN 55032:2015+A11:2020 limit compliance with the EN 55032:2015+A1:2020 limit is also demonstrated.

Radiated emissions at frequencies up to 1 GHz for Class_B equipment:

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

Radiated emissions at frequencies above 1 GHz for Class_B equipment of the 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 / 1MHz	50
3000-6000			54
1000-3000		Peak / 1MHz	70
3000-6000			74

Radiated emissions at frequencies above 1 GHz for Class_B equipment of the 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 / 1MHz	54
1000-6000		Peak / 1MHz	74

Note 1:The radiated emissions at frequencies above 1 GHz test limit in this report is based on EN 55032:2015+A11:2020.

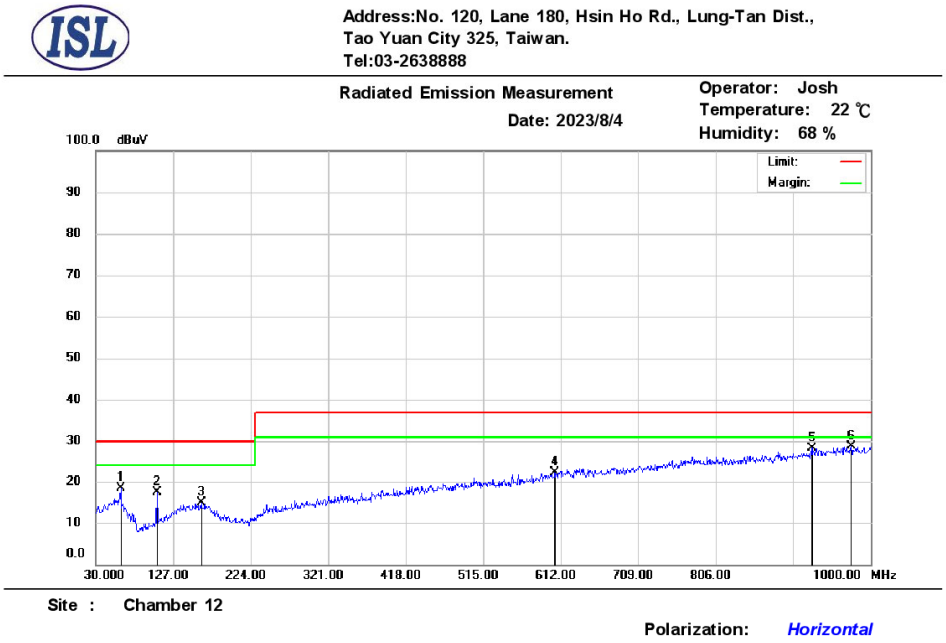
Note 2:Test data in this report has been taken against the EN 55032:2015+A11:2020 limit as it is the most stringent limit. By complying with the more restrictive EN 55032:2015+A11:2020 limit compliance with the EN 55032:2015+A1:2020 limit is also demonstrated.

Radiated emissions from FM receivers:

Frequency range MHz	Measurement		Class_B limits dB(μV/m)	
	Distance m	Detector type / bandwidth	Fundamental	Harmonics
			OATS/SAC	OATS/SAC
30-230	10	Quasi Peak / 120 kHz	50	42
230-300				42
300-1000				46
30-230	3		60	52
230-300				52
300-1000				56

4.3 Radiation Test Data: Configuration 1

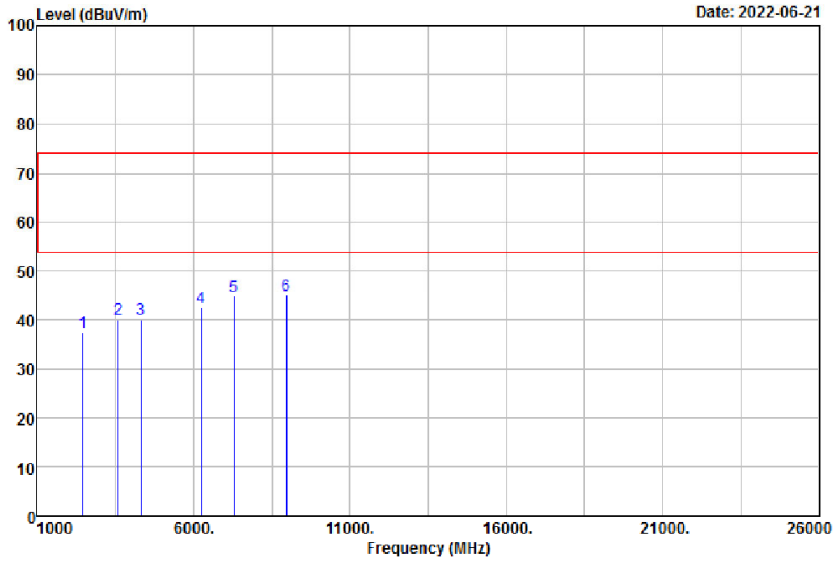
- Radiated Emissions (Horizontal)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	61.04	35.37	-16.91	18.46	30.00	-11.54	300	79	peak
2	106.63	37.16	-19.87	17.29	30.00	-12.71	400	318	peak
3	161.92	30.43	-15.64	14.79	30.00	-15.21	399	360	peak
4	605.21	29.33	-7.24	22.09	37.00	-14.91	206	0	peak
5	926.28	30.31	-2.26	28.05	37.00	-8.95	116	360	peak
6*	975.75	29.76	-1.25	28.51	37.00	-8.49	300	289	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 10 meters
If the peak measured value meets the QP limit, The QP value is inherently compliant.

International Standard Laboratory Corp.
Company Address:No.120,Lane 180, Hsin Ho Rd.
Lung-Tan Dist., Tao Yuan City 325, Taiwan
Tel:(03)2638888 ; Fax:(03)2638899
Web:www.isl.com.tw



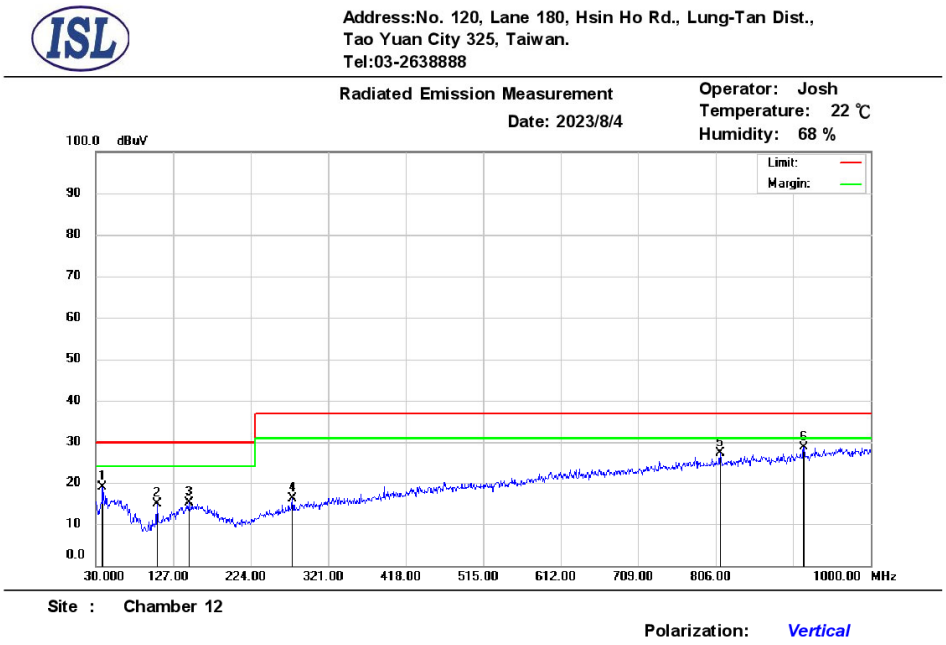
Condition: FCC CLASS B 3M PK 3m HORIZONTAL
Site : Chamber 19
Model : BT840N
Test Mode: Config 2
Operator : Weitin Chen
Temp : 24
Hum : 78

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	2450.00	48.90	-11.52	37.38	74.00	-36.62	Peak	HORIZONTAL
2	3575.00	49.23	-9.27	39.96	74.00	-34.04	Peak	HORIZONTAL
3	4325.00	47.99	-7.93	40.06	74.00	-33.94	Peak	HORIZONTAL
4	6250.00	45.61	-3.17	42.44	74.00	-31.56	Peak	HORIZONTAL
5	7300.00	47.96	-3.24	44.72	74.00	-29.28	Peak	HORIZONTAL
6	8975.00	45.42	-0.25	45.17	74.00	-28.83	Peak	HORIZONTAL

- 1 -

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
If the peak measured value meets the Average limit, The Average value is inherently compliant.

-Radiated Emissions (Vertical)



Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB)	Emission (dBuV)	Limit (dBuV)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	38.73	36.69	-17.77	18.92	30.00	-11.08	121	360	peak
2	106.63	34.73	-19.87	14.86	30.00	-15.14	100	12	peak
3	146.40	31.15	-15.92	15.23	30.00	-14.77	400	243	peak
4	276.38	31.26	-15.07	16.19	37.00	-20.81	200	64	peak
5	811.82	31.27	-4.10	27.17	37.00	-9.83	126	360	peak
6*	916.58	31.08	-2.54	28.54	37.00	-8.46	200	223	peak

* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 10 meters
If the peak measured value meets the QP limit, The QP value is inherently compliant.

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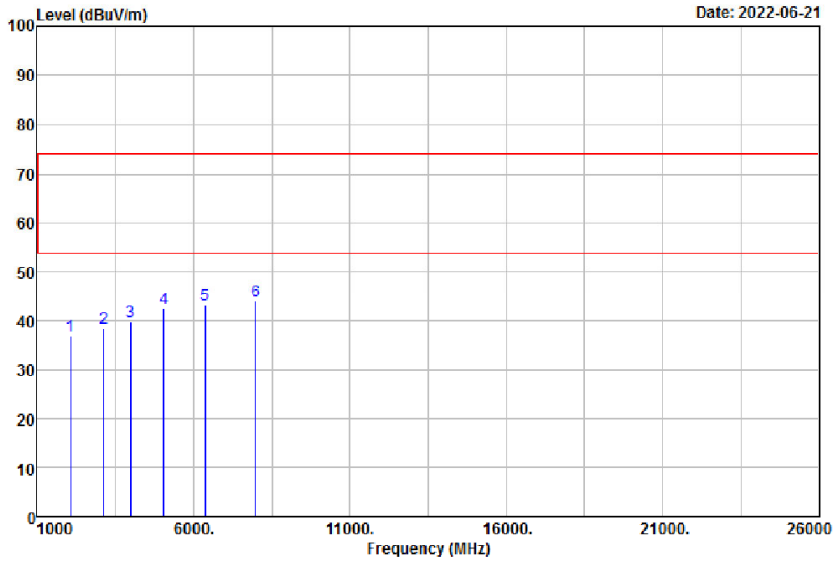


Condition: FCC CLASS B 3M PK 3m VERTICAL
Site : Chamber 19
Model : BT840N
Test Mode: Config 2
Operator : Weitin Chen
Temp : 24
Hum : 78

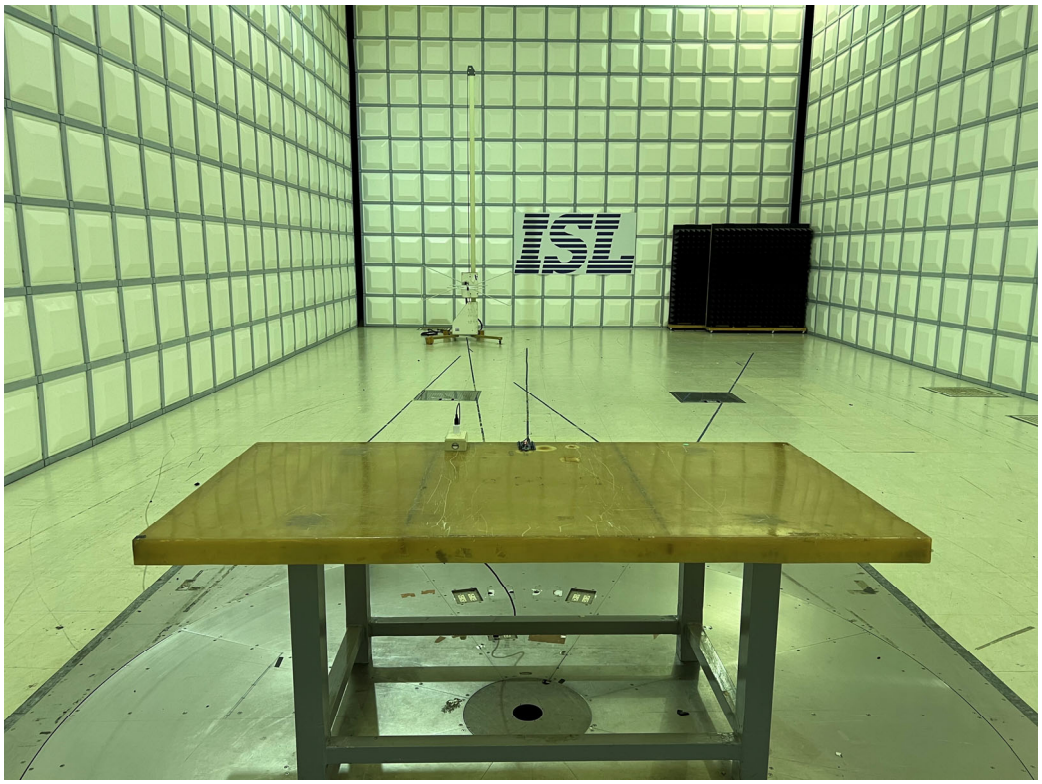
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	2050.00	49.58	-12.89	36.69	74.00	-37.31	Peak	VERTICAL
2	3125.00	48.78	-10.30	38.48	74.00	-35.52	Peak	VERTICAL
3	3975.00	48.52	-8.80	39.72	74.00	-34.28	Peak	VERTICAL
4	5050.00	49.07	-6.67	42.40	74.00	-31.60	Peak	VERTICAL
5	6375.00	46.50	-3.24	43.26	74.00	-30.74	Peak	VERTICAL
6	7975.00	46.34	-2.29	44.05	74.00	-29.95	Peak	VERTICAL

- 1 -

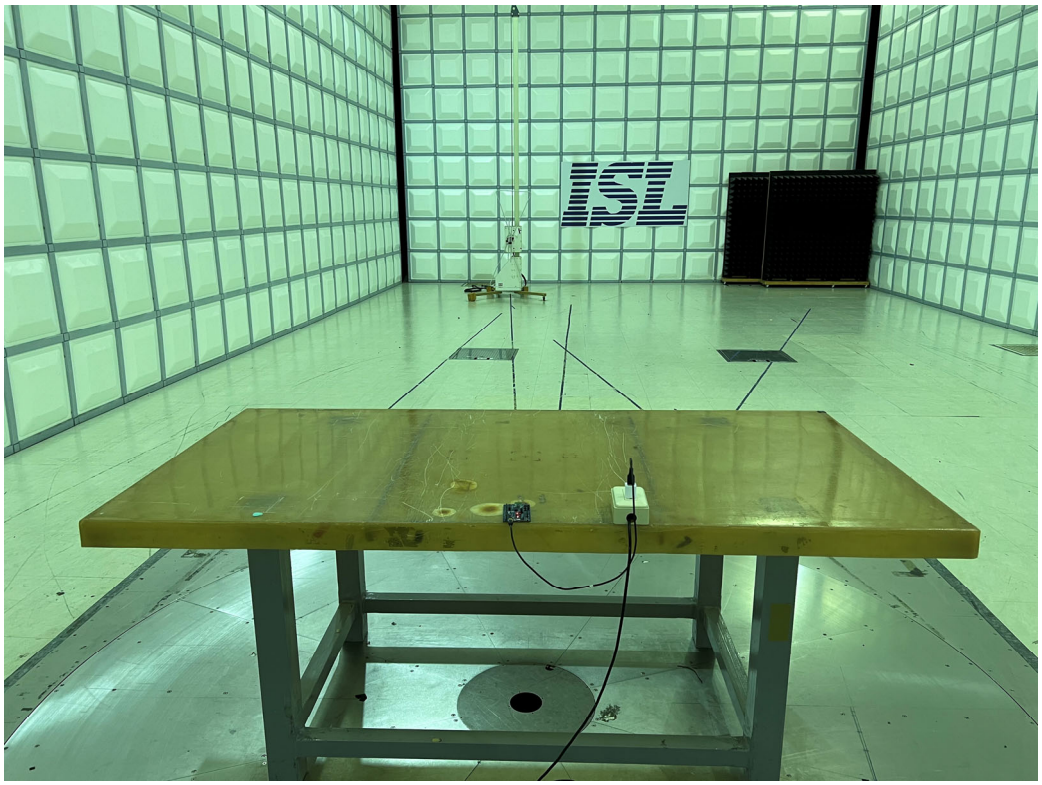
* Note:
Margin = Emission – Limit
Emission = Radiated Amplitude + Correct Factor
Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
Antenna Distance: 3 meters
If the peak measured value meets the Average limit, The Average value is inherently compliant.

4.4 Test Setup Photo

Front View (30MHz~1GHz)



Back View (30MHz~1GHz)



Front View (above 1GHz)

Back View (above 1GHz)

5. Electrostatic discharge immunity

5.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-2 / IEC61000-4-2 / BS EN 61000-4-2 (details referred to Sec 1.2)
Test Level:	Air +/- 2 kV, +/- 4 kV, +/- 8 kV Contact +/- 2 kV, +/- 4 kV
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S7

Selected Test Point

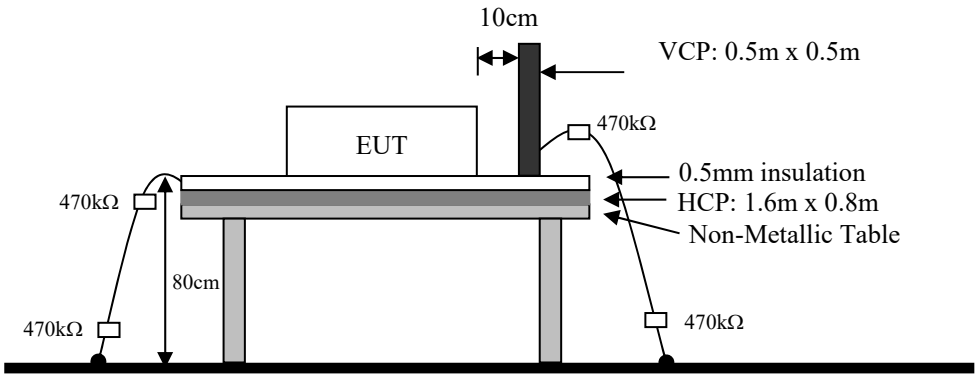
Air: discharges were applied to slots, aperture or insulating surfaces. 10 single air discharges were applied to each selected points.

Contact: Total 200 points minimum were to the selected contact points.

Indirect Contact Points: 25 discharges were applied to center of one edge of VCP and each EUT side of HCP with 10 cm away from EUT.

5.2 Test Setup

EUT is 1m from the wall and other metallic structure. When Battery test mode is needed, a cable with one 470kΩ resister at two rare ends is connected from metallic part of EUT and screwed to HCP.



Ground reference Plane

5.3 Test Result

Performance of EUT complies with the given specification.

5.4 Test Data:

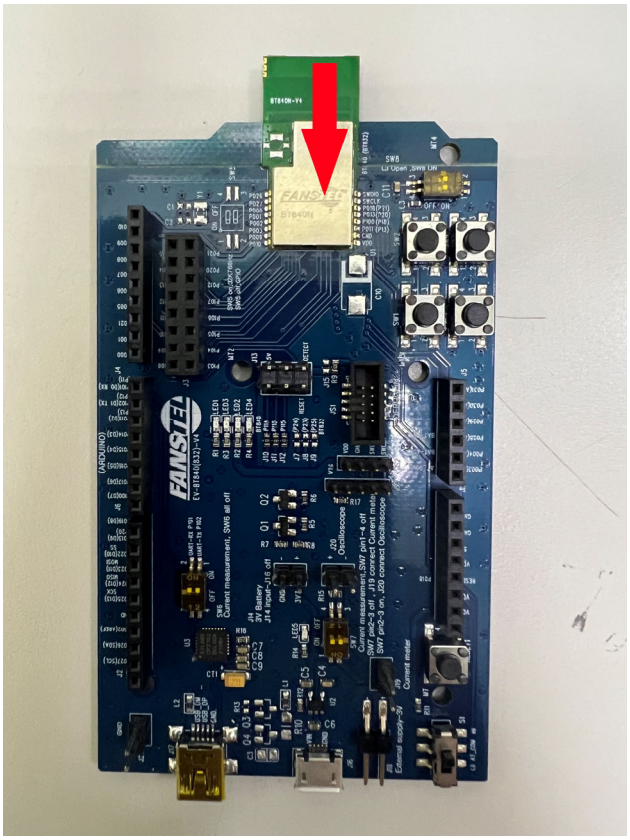
Operation Mode	Config 1, 2, 3	Test Date	2023/08/04
Temperature	25 ℃	Humidity	51%
Barometer Pressure	100.5kPa	Test By	Weitin Chen

Air Discharge							
Test Levels						Results	
±2kV	Performance Criterion	±4kV	Performance Criterion	± 8kV	Performance Criterion	Pass	Fail
☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☐
Contact Discharge							
Test Levels						Results	
±2kV	Performance Criterion	±4kV	Performance Criterion	± 6kV	Performance Criterion	Pass	Fail
☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☐	☐CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☐
Discharge To VCP							
Test Levels						Results	
±2kV	Performance Criterion	±4kV	Performance Criterion	± 6kV	Performance Criterion	Pass	Fail
☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☐	☐CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☐
Discharge To HCP							
Test Levels						Results	
±2kV	Performance Criterion	±4kV	Performance Criterion	± 6kV	Performance Criterion	Pass	Fail
☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☒CT/CR, A ☐TT/TR, B ☐TT/TR, C	☐	☐CT/CR, A ☐TT/TR, B ☐TT/TR, C	☒	☐
Remark: A: No degradation in the performance of the EUT was observed.							

5.5 Test Point

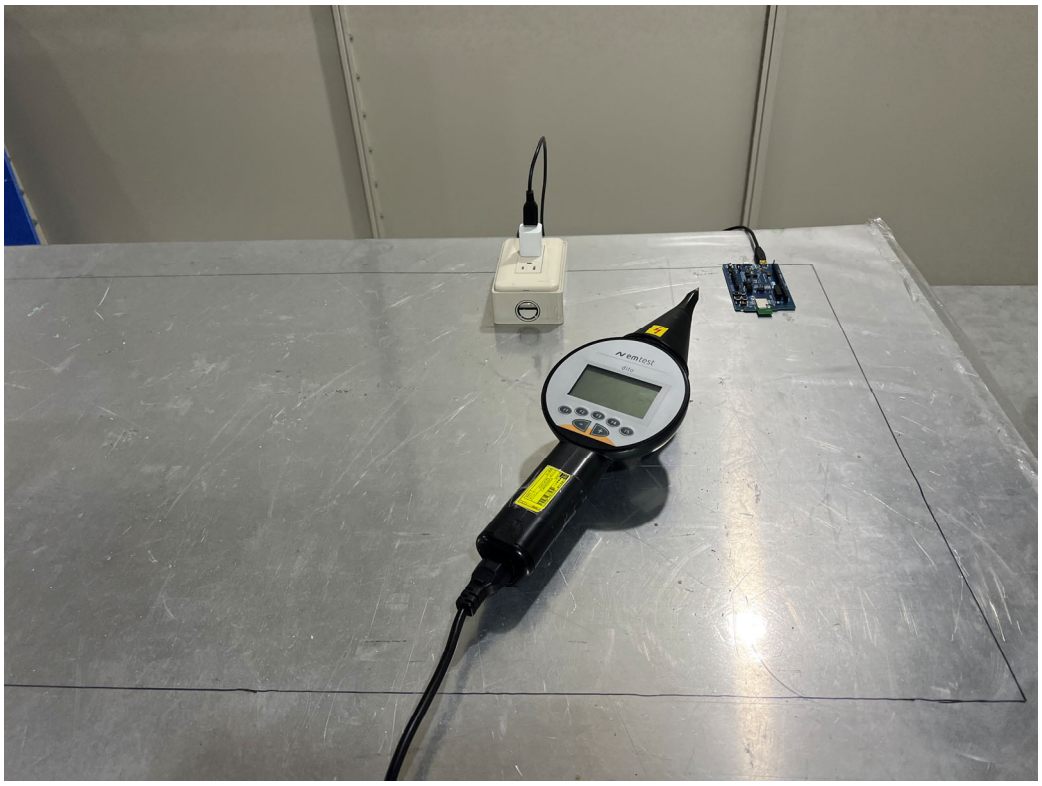
Red arrow lines indicate the contact points, and blue arrow lines indicate the air points.

Photo 1

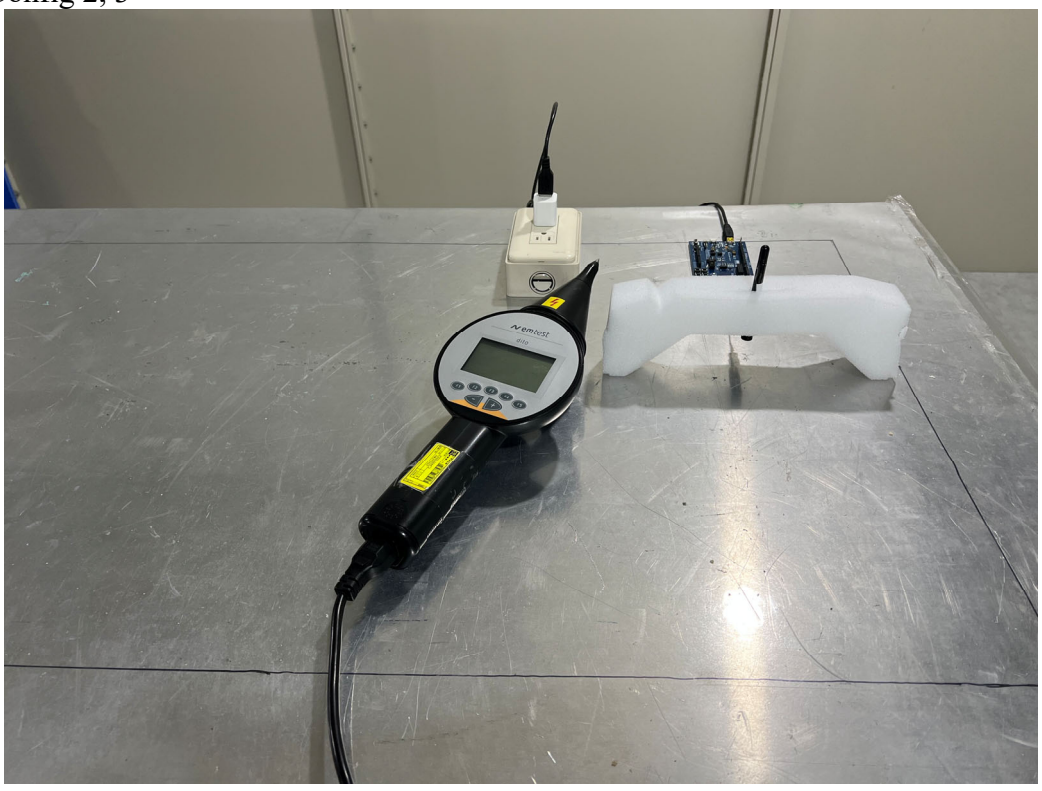


5.6 Test Setup Photo

Config 1



Config 2, 3



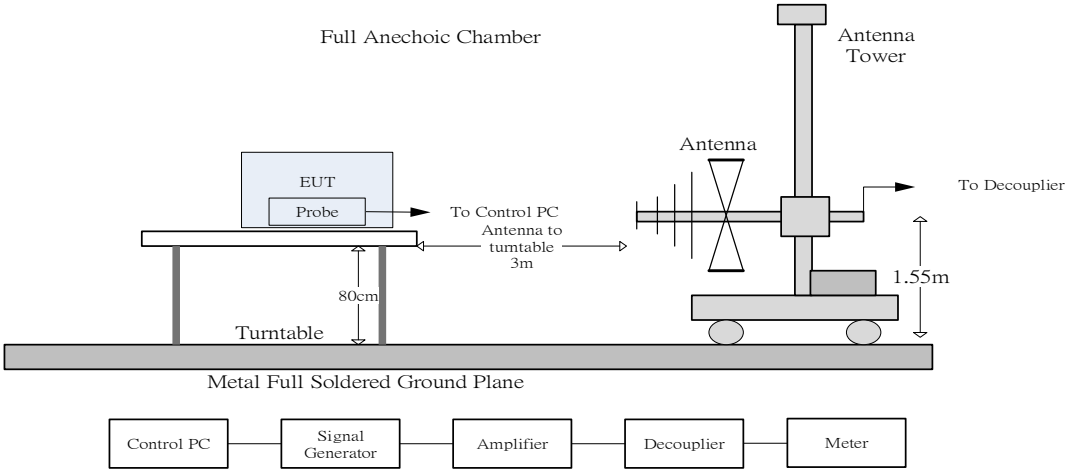
6. Radiated, radio-frequency, electromagnetic field immunity

6.1 Test Specification

Port:	Enclosure
Basic Standard:	EN 61000-4-3 / IEC61000-4-3 / BS EN IEC 61000-4-3 (details referred to Sec 1.2)
Test Level:	3 V/m
Modulation:	AM 1kHz 80%
Frequency range:	80 MHz~6 GHz
Frequency Step:	1% of last step frequency
Dwell time:	2s
Polarization:	Vertical and Horizontal
EUT Azimuth Angle	☒0° ☒90° ☒180° ☒270°
Criteria:	A
Test Procedure:	refer to ISL QA -T4-E-S8

6.2 Test Setup

The field sensor is placed at one calibration grid point to check the intensity of the established fields on both polarizations. EUT is adjusted to have each side of EUT face coincident with the calibration plane. A CCD camera and speakers are used to monitor the condition of EUT for the performance judgment.



6.3 Test Result

Performance of EUT complies with the given specification.

6.4 Test Data:

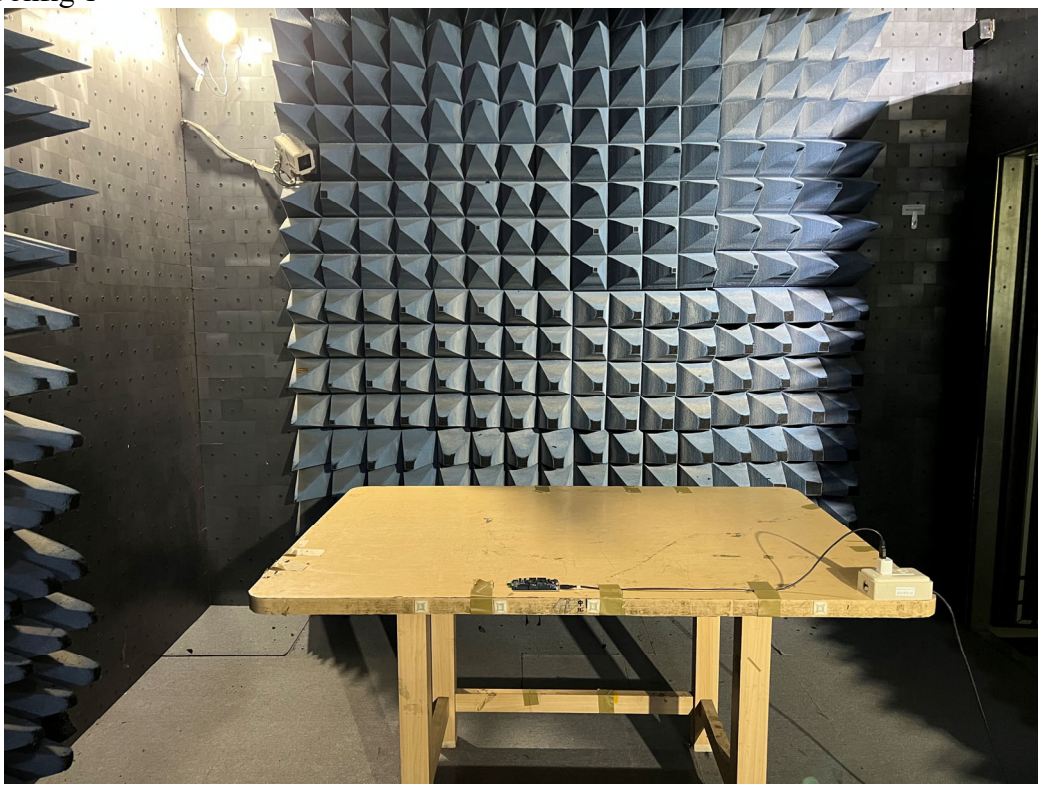
Operation Mode	Config 1, 3	Test Date	2023/08/04
Temperature	25 ℃	Humidity	53%
Barometer Pressure	100.7kPa	Test By	Weitin Chen

No.	Frequency (MHz)	Antenna Orientation	EUT Orientation	Observation
1	80 ~ 6000	V/H	0 degree	CT/CR, A
2	80 ~ 6000	V/H	90 degree	
3	80 ~ 6000	V/H	180 degree	
4	80 ~ 6000	V/H	270 degree	

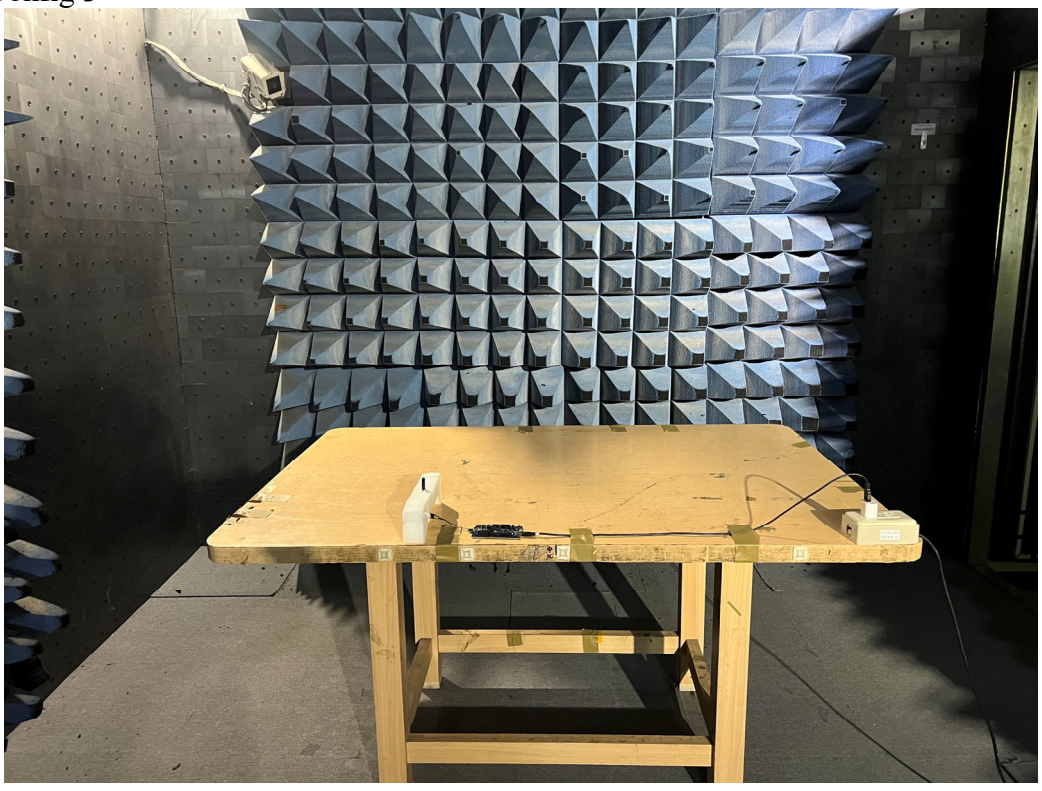
Remark:
A : No degradation in the performance of the EUT was observed.
N/A : Not Applicable.

6.5 Test Setup Photo

Config 1



Config 3



7. Electrical fast transient/burst immunity

7.1 Test Specification

Port:	Mains;
Basic Standard:	EN 61000-4-4 / IEC61000-4-4 / BS EN 61000-4-4 (details referred to Sec 1.2)
Test Level:	AC Power Port: +/- 1 kV DC Power Port: +/- 0.5 kV (I/O Cables): +/- 0.5 kV
Rise Time:	5ns
Hold Time:	50ns
Burst Period:	300ms
Repetition Frequency:	5kHz, 100kHz for xDSL wired network.
Criteria:	B
Test Procedure:	refer to ISL QA -T4-E-S9

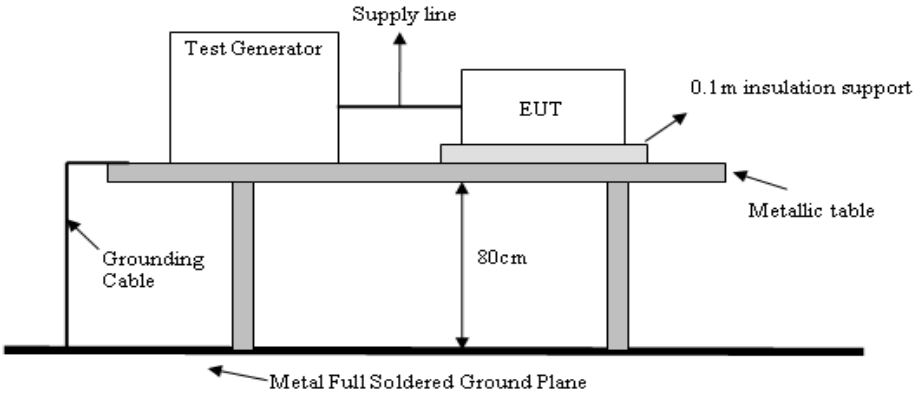
Test Procedure

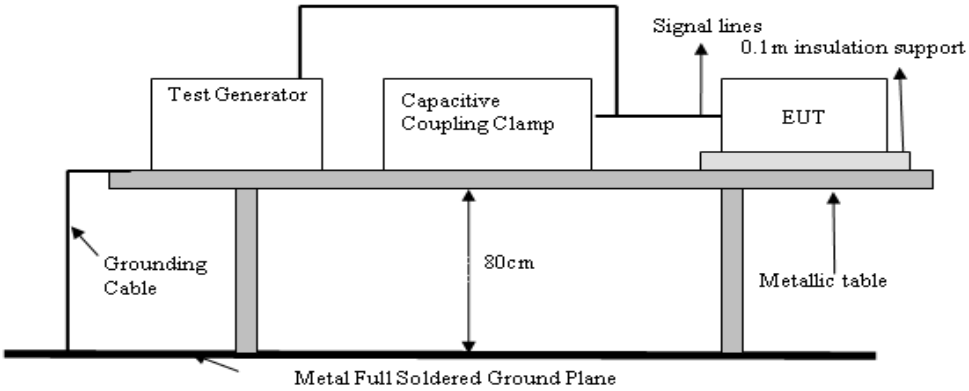
The EUT was setup on a nonconductive table 0.1 m above a reference ground plane.

Test Points	Polarity	EUT Condition	Comment
Line	+	operating	60 sec
	-	operating	60 sec
Neutral	+	operating	60 sec
	-	operating	60 sec
Ground	+	operating	60 sec
	-	operating	60 sec
Line and Neutral	+	operating	60 sec
	-	operating	60 sec
Line and Ground	+	operating	60 sec
	-	operating	60 sec
Neutral and Ground	+	operating	60 sec
	-	operating	60 sec
Line and Neutral and Ground	+	operating	60 sec
	-	operating	60 sec
Capacitive coupling clamp	+	operating	60 sec
	-	operating	60 sec

7.2 Test Setup

EUT is at least 50cm from the conductive structure.





7.3 Test Result

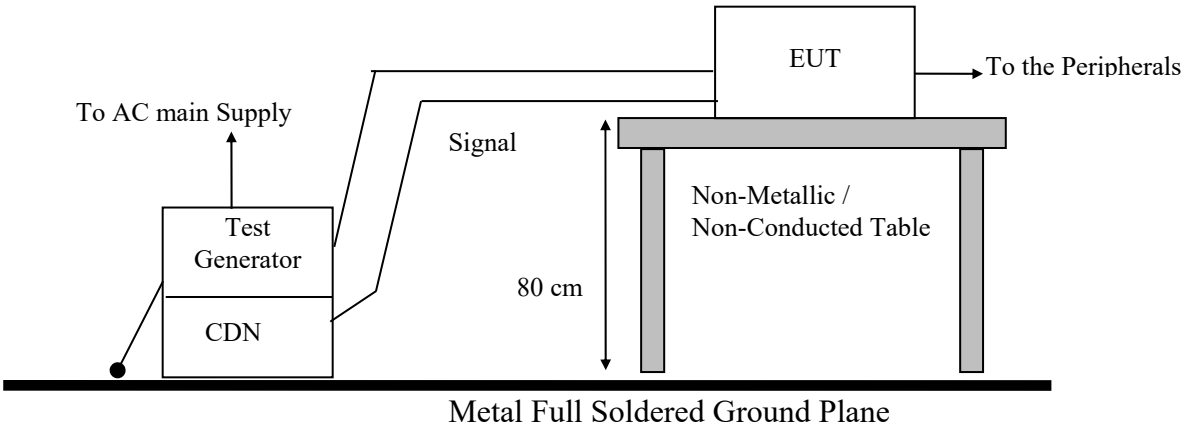
****Remarks: It is not necessary to be tested on this item.**

8. Surge immunity

8.1 Test Specification

Port:	AC mains	Signal and telecommunication port-
Basic Standard:	EN 61000-4-5 / IEC61000-4-5 / BS EN 61000-4-5 (details referred to Sec 1.2)	
Test Level:	Line to Line: +/- 0.5 kV, +/- 1 kV Line to Earth: +/- 0.5 kV, +/- 1 kV, +/- 2kV (1.2/50μs)	☒ (symmetrically operated) directly connected to outdoor: Line to Earth: +/- 0.5 kV, +/- 1 kV (10 /700μs) ☒ (non-symmetrically operated) directly connected to outdoor: line to line +/- 0.5 kV;, line to ground, or shield to ground+/- 1 kV; (1.2/50μs) ☒Indoor cables (longer than 30 m): +/- 0.5 kV (applied line to ground, or shield to ground). (1.2/50μs)
Repetition Rate:	30 seconds	
Angle:	☒0° ☒90° ☒180° ☒270°	NA
Criteria:	B	B
Test Procedure:	refer to ISL QA -T4-E-S10	
Temperature:	°C	
Humidity:	%	

8.2 Test Setup



8.3 Test Result

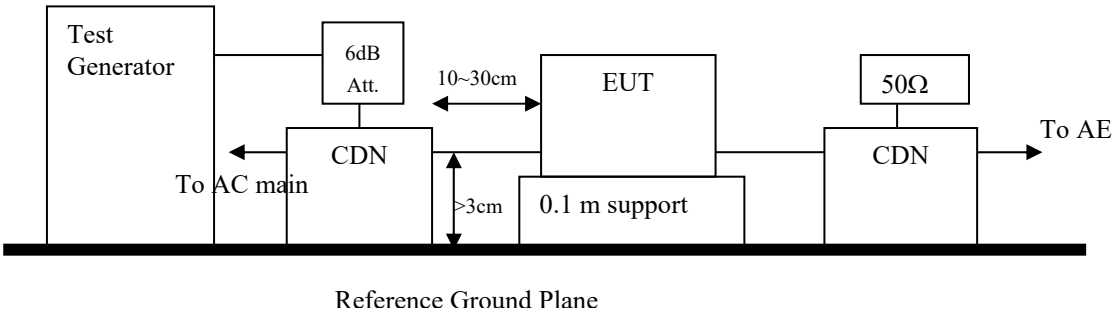
****Remarks: It is not necessary to be tested on this item.**

9. Immunity to conducted disturbances

9.1 Test Specification

Port:	Mains;
Basic Standard:	EN 61000-4-6 / IEC61000-4-6 / BS EN 61000-4-6 (details referred to Sec 1.2)
Test Level:	3 V rms
Modulation:	AM 1kHz 80%
Frequency range:	0.15 MHz - 80MHz
Frequency Step:	1% of last Frequency
Dwell time:	2s
Criteria:	A
CDN Type:	CDN M2+M3, CDN T2, CDN T4, CDN T8, EM Clamp
Test Procedure:	refer to ISL QA -T4-E-S11

9.2 Test Setup



Reference Ground Plane

9.3 Test Result

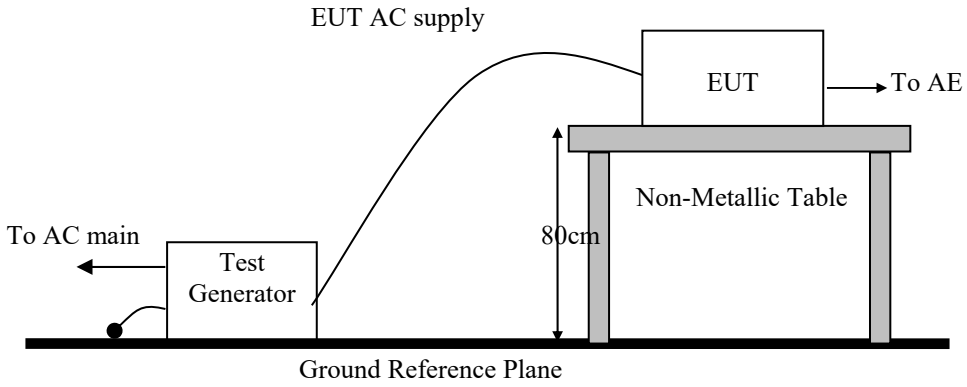
****Remarks: It is not necessary to be tested on this item.**

10. Voltage dips, short interruptions and voltage variations immunity

10.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-4-11 / IEC61000-4-11 / BS EN 61000-4-11 (details referred to Sec 1.2)
When the product is greater than 16A does not apply to this Standard, it is not necessary to be tested on this item. In addition, IEC/EN 61000-4-34 Standard was used to evaluating.	
Test Level: Criteria:	0% in 0.5 cycle B
Test Level: Criteria:	0% in 1 cycle B
Test Level: Criteria:	70% in 25 cycle C
Test Level: Criteria:	0% in 250 cycle C
Phase:	0°; 180°
Test intervals:	3 times with 10s each
Test Procedure:	refer to ISL QA -T4-E-S13

10.2 Test Setup



10.3 Test Result

****Remarks: It is not necessary to be tested on this item.**

11. Harmonics

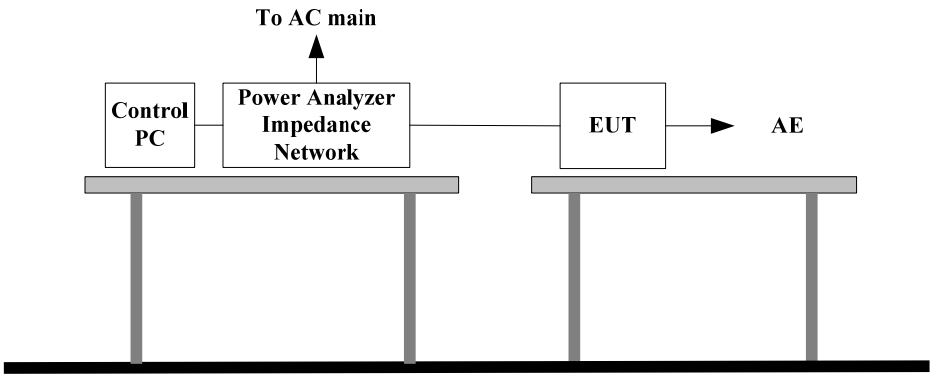
11.1 Test Specification

Port:	AC mains
Active Input Power:	
Basic Standard:	EN IEC 61000-3-2 / IEC61000-3-2 / BS EN IEC 61000-3-2 (details referred to Sec 1.2)
Test Duration:	2.5min
Class:	D
Test Procedure:	refer to ISL QA -T4-E-S14
Temperature:	24 °C
Humidity:	63%

Test Procedure

The EUT is supplied in series with shunts or current transformers from a source having the same nominal voltage and frequency as the rated supply voltage and frequency of the EUT. The EUT is configured to its rated current with additional resistive load when the testing is performed.
Equipment having more than one rated voltage shall be tested at the rated voltage producing the highest harmonics as compared with the limits.

11.2 Test Setup



11.3 Test Result

****Remarks: It is not necessary to be tested on this item.**

12. Voltage fluctuations and flicker

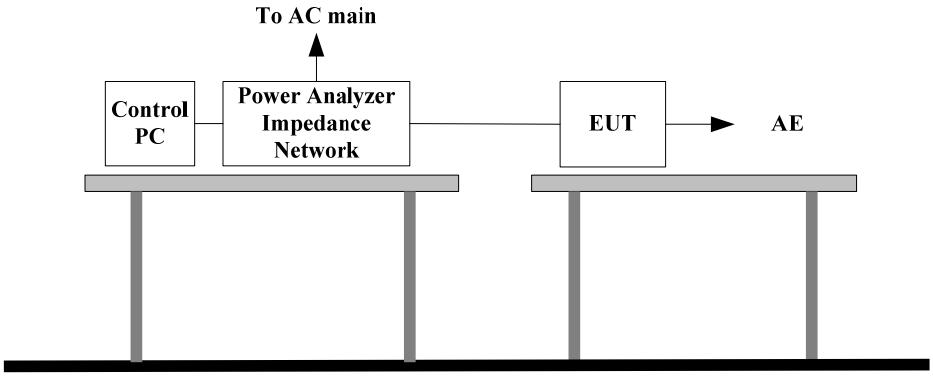
12.1 Test Specification

Port:	AC mains
Basic Standard:	EN 61000-3-3 / IEC61000-3-3 / BS EN 61000-3-3 (details referred to Sec 1.2)
Test Procedure:	refer to ISL QA -T4-E-S14
Observation period:	For Pst 10min
	For Plt 2 hours
Temperature:	24 °C
Humidity:	63%

Test Procedure

The EUT is supplied in series with reference impedance from a power source with the voltage and frequency as the nominal supply voltage and frequency of the EUT.

12.2 Test Setup



12.3 Test Result

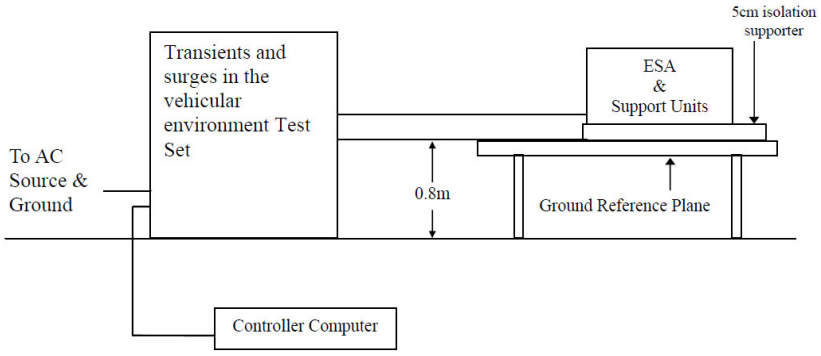
****Remarks: It is not necessary to be tested on this item.**

13. Transients and surges in the vehicular environment

13.1 Test Specification

Port:	12Vdc or 24Vdc of Vehicle
Basic Standard:	ISO 7637-2:2004 (details referred to Sec 1.2)
Test Level:	Level III
Criteria:	B for Pulse 1, 2a, 2b, 4 A for Pulse 3a, 3b
Test Procedure:	refer to ISL QA-T4-V-S2

13.2 Test Setup



13.3 Test Result

****Remarks: It is not necessary to be tested on this item.**

14. Appendix

14.1 Appendix A: Test Equipment

14.1.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 02	EMI Receiver 19	R&S	ESR3	102460	05/08/2023	05/08/2024
Conduction 02	Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	10/11/2022	10/11/2023
Conduction 02	LISN 26	R&S	ENV216	102378	12/08/2022	12/08/2023
Conduction 02	LISN 15	R&S	ENV216	101335	12/08/2022	12/08/2023
Conduction 02	ISN T8 CAT6A_02	SCHWARZBECK	NTFM 8158	NTFM 8158-00370	07/07/2023	07/07/2024
Conduction 02	ISN T4 08	TESEQ	ISN T400A	49913	08/18/2023	08/18/2024
Conduction 02	ISN T8 10	TESEQ	ISN T800	42773	08/07/2023	08/07/2024
Conduction 02	CDN ISN ST08A_1	Teseq GmbH	CDN ISN ST08A	43352	10/04/2022	10/04/2023
Conduction 02	Capacitive Voltage Probe 01	SCHAFFNER	CVP 2200A	18711	02/22/2023	02/22/2024
Conduction 02	Current Probe	SCHAFFNER	SMZ 11	18030	02/22/2023	02/22/2024

Location Chmb12	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber12)	BILOG Antenna 18	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N -6-05	646	03/15/2023	03/15/2024
Radiation (Chamber12)	Preamplifier 26	EMCI	EMC9135	980297	03/03/2023	03/03/2024
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	10/04/2022	10/04/2023
Radiation (Chamber12)	EMI Receiver 18	ROHDE & SCHWARZ	ESCI	101392	05/25/2023	05/25/2024

Location Conducted	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 19	Spectrum analyzer	R&S	FSV40	101919	08/17/2023	08/17/2024
Chamber 19	EMI Receiver	R&S	ESR3	102461	05/08/2023	05/08/2024
Chamber 19	Loop Antenna	EM	EM-6879	271	10/05/2022	10/05/2023
Chamber 19	Bilog Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168 w 6dB Att.	9168-736	03/09/2023	03/09/2024
Chamber 19	Horn antenna (1GHz-18GHz)	ETS	3117	00218718	10/12/2022	10/12/2023
Chamber 19	Horn antenna (18GHz-26GHz)	Com-power	AH-826	081001	11/24/2022	11/24/2023
Chamber 19	Horn antenna (26GHz-40GHz)	Com-power	AH-640	100A	03/25/2023	03/25/2024
Chamber 19	Preamplifier (9kHz-3GHz)	EM	EM330	060822	01/05/2023	01/05/2024
Chamber 19	Preamplifier (1GHz-26GHz)	HP	8449B	3008A02471	10/26/2022	10/26/2023
Chamber 19	Preamplifier (26GHz-40GHz)	MITEQ	JS4-26004000-27-5A	818471	05/04/2023	05/04/2024
Chamber 19	RF Cable (100kHz-26.5GHz)	Huber Suhner	Sucoflex 104A	MY1394/4A & 50886/4A	09/02/2023	09/02/2024
Chamber 19	RF Cable (18GHz-40GHz)	HUBER SUHNER	Sucoflex 102	27963/2&37421/2	11/23/2022	11/23/2023
Chamber 19	Signal Generator	Anritsu	MG3692A	20311	12/29/2022	12/29/2023
Chamber 19	Test Software	Audix	E3 Ver:6.120203b	N/A	N/A	N/A

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
EN61K-4-2	ESD Gun 12	EM TEST	Dito	P1650188689	04/10/2023	04/10/2024
EN61K-4-2	ESD Gun 07	NoiseKen	ESS-2002EX	ESS0878638	12/28/2022	12/28/2023
EN61K-4-2	ESD Gun 11	TESEQ	NSG438	1278	11/02/2022	11/02/2023
EN61K-4-3	Broadband Log-Periodic Antenna	AR	AT1080	310698	N/A	N/A
EN61K-4-3	Horn Antenna RF-01	AR	ATS700M11G	0335864	N/A	N/A
EN61K-4-3	Amplifier 80Mz~1GHz 250W	AR	250W1000C	358877	N/A	N/A
EN61K-4-3	Amplifier 0.7~6GHz 60W	AR	60S1G6	358973	N/A	N/A
EN61K-4-3	Broadband Coupler 80M~1GHz	Amplifier Research	DC6180A	0341805	N/A	N/A
EN61K-4-3	Coaxial Cable	INSULATED	NPS-4806-2360-NP3	108599.003.01.03	N/A	N/A
EN61K-4-3	Broadband Coupler 1-6GHz	Woken	STI07-0005-40	N/A	N/A	N/A
EN61K-4-3	Signal Generator 07	R&S	SMB100A	107780	01/05/2023	01/05/2024
EN61K-4-3	Couditioning Amplifier_3	B&K	WH 3278	3011361	03/04/2023	03/04/2024
EN61K-4-3	Microphone Type 4192-2	B&K	4192	2752005	03/15/2023	03/15/2024
EN61K-4-4	Signal Generator 10	EMC Partner	IMU3000	1547	09/14/2022	09/14/2023
EN61K-4-4	EFT Clamp	EMC-PARTNER	CN-EFT1000	CNEFT1000-103	04/13/2023	04/13/2024
EN61K-4-5	CDN-UTP8_ED3	EMC-PARTNER	CDN-UPT8	1509	04/10/2023	04/10/2024
EN61K-4-5	Surge Tester	EMC Partner	MIG0603IN3	523	07/11/2023	07/11/2024
EN61K-4-6	CDN M2+M3 05	FRANKONIA	CDN M2+M3	A2210235/2013	08/30/2023	08/30/2024
EN61K-4-6	CDN T4 03	FCC Inc.	FCC-801-T4	02068	08/15/2023	08/15/2024
EN61K-4-6	CDN T8-10_1	Teseq GmbH	CDN T8-10	41242	12/23/2022	12/23/2023
EN61K-4-6	Coaxial Cable 4-6 02-1			4-6 02-1	N/A	N/A
EN61K-4-6	Conducted Immunity Test System 02	Frankonia	CIT-10-75-DC	126B1301/2014	03/21/2023	03/21/2024
EN61K-4-6	EM Clamp_02	Teseq GmbH	KEMZ801	41397	12/12/2022	12/12/2023
EN61K-4-6	Couditioning Amplifier_1	B&K	WH 3278	3003172	03/24/2023	03/24/2024
EN61K-4-6	Microphone Type 4192-1	B&K	4192	2752003	08/16/2023	08/16/2024
EN61K-4-8	Magnetic Field Immunity Loop	FCC	F-1000-4-8-L-1M	01037	05/11/2023	05/11/2024
EN61K-4-8	Magnetic Field Test Generator	FCC	F-1000-4-8-G-125A	01038	05/11/2023	05/11/2024
EN61K-4-11	Voltage Dip and UP Simulator	NoiseKen	VDS-2002	VDS0640162	09/20/2022	09/20/2023
EN61K-4-34	Voltage Dip and UP Simulator 50A	PRIMA	DRP61011CX	PR17096386	07/19/2023	07/19/2024
EN61K-3-2/3, EN61K-3-11-12	Harmonics & Flickers Test System 04	PACIFIC*APS	ECTS2-3450F-n	550072	04/27/2023	04/27/2024

PS: N/A => The equipment does not need calibration.

**Software for Controlling Spectrum/Receiver and Calculating Test Data

Test Item	Filename	Version
EN IEC 61000-3-2	California Instruments	CTSMXL V2.26.0
EN 61000-3-3	California Instruments	CTSMXL V2.26.0
EN 61000-3-11	California Instruments	CTSMXL V2.23.0
EN 61000-3-12	California Instruments	CTSMXL V2.23.0
EN IEC 61000-3-2	HFa-16 Program	v1.0.0.14
EN 61000-3-3	HFa-16 Program	v1.0.0.14
EN 61000-3-11	HFa-75 Program	v1.0.0.2.5
EN 61000-3-12	HFa-75 Program	v1.0.0.2.5
EN 61000-4-2	N/A	2.0
EN IEC 61000-4-3	i2	529b
EN 61000-4-4	TEM A3000	v4.6.1
EN 61000-4-5	EMC Partner	1.69
EN 61000-4-6	i2	529b
EN 61000-4-8	N/A	
EN IEC 61000-4-11 (<16A)	NOISE KEN	2.0
EN IEC 61000-4-11 (>16A)	DRP61011CX	V1.0.0.2.20171219

Site	Filename	Version
Conduction/Radiation	EZ EMC	ISL-03A2

14.2 Appendix B: Uncertainty of Measurement

The laboratory measurement uncertainty accordance with refers to CISPR 16-4-2. If Ulab is less than or equal to Ucispr in Table 1, then the test report may either state the value of Ulab or state that Ulab is less than Ucispr.
The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 02>
AMN: ± 2.90dB
ISN T2: ± 3.18dB
ISN T4: ± 3.19dB
ISN T8: ± 3.19dB
ISN-T8(Cat 6a_10Gbps): ± 3.20dB
CVP: ± 3.62dB
CP: ± 2.88dB

<Chamber 12 (10m)>
Horizontal
30MHz~200MHz: ±4.56dB
200MHz~1000MHz: ±4.20dB
Vertical
30MHz~200MHz: ±4.58dB
200MHz~1000MHz: ±4.78dB

<Chamber 19 (3m)>
30MHz~1000MHz: ±4.22 dB
1GHz~40GHz: ±4.08 dB

<Immunity 02>

Test item	Uncertainty	Test item	Uncertainty
EN 61000-4-2 (ESD)		EN 61000-4-6 (CS)	
Rise time tr	≦ 9.81%	CDN	1.73 dB
Peak current Ip	≦ 4.83%	EM Clamp	3.37 dB
current at 30 ns	≦ 4.84%	EN 61000-4-8 (Magnetic)	5.49 %
current at 60 ns	≦ 4.84%	EN IEC 61000-4-11 (Dips)	2.04 %
EN IEC 61000-4-3 (RS)	2.66 dB	EN IEC 61000-3-2 (Harmonics)	0.43 %
EN 61000-4-4 (EFT)		EN 61000-3-3 (Fluctuations and Flicker)	8 %
voltage rise time (tr)	5.4 %	EN 61000-3-12 (Harmonics)	0.55 %
peak voltage value (VP)	6.34 %	EN 61000-3-11 (Fluctuations and Flicker)	8 %
voltage pulse width (t_w)	3.5 %	EN 61000-4-34 (Dips)	6.13 %
EN 61000-4-5 (Surge)			
open-circuit voltage front time	10.5 %		
open-circuit voltage peak value	7.5 %		
open-circuit voltage duration (T_d)	53.33 µs		

EN 61000-4-9 (Pulse magnetic field)		IEC 61000-4-18 (Damped oscillatory wave)	
surge current front time	8.95 µs	Rise Time	5.3 ns
peak of surge current	8.6 %	Peak	0.97 kV
current impulse width	22.3 µs	IEC 61000-4-29 (Voltage dips on d.c)	
IEC 61000-4-17 (Ripple)		Voltage	17 µV/V
Voltage	18 µV/V	Current	0.83 mA/A
Current	0.83 mA/A	Time	2.8 %

14.3 Appendix C: Photographs of EUT

Please refer to the File of **ISL-23LR0074P**

--- END ---