

# Certificate

Issue Date: January 10, 2022  
Ref. Report No. ISL-21LR042CT

Product Name : Lora module  
Main Model : LR62XE  
Series Model : NA  
Responsible Party : Fanstel Corporation, Taipei  
Address : 10F-10, No. 79, Sec. 1, Hsin Tai Wu Rd.,  
Hsi-Chih, New Taipei City 221 Taiwan

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 the EMI part of RCM Mark. And Our laboratories is the accredited laboratories and are approved according to ISO/IEC 17025. The device was passed the test performed according to :



**Standards:**

AS/NZS CISPR 32:2015+A1:2020: Class B: Electromagnetic compatibility of multimedia equipment- Emission requirements

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.

*Angus Chu*

Angus Chu / Sr. Manager

**International Standards Laboratory Corp. LT Lab.**

TEL: +886-3-263-8888 FAX: +886-3-263-8899

No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

# TEST REPORT

of  
**RCM Class B**

Product: **Lora module**  
Main Model: **LR62XE**  
Series Model: **NA**  
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.**



TEL: +886-3-263-8888 FAX: +886-3-263-8899

No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325,  
Taiwan

Report No.: **ISL-21LR042CT**

Issue Date : **January 10, 2022**

This report totally contains 34 pages including this cover page and contents page.

Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification.

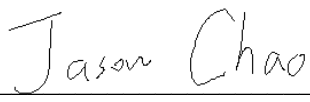
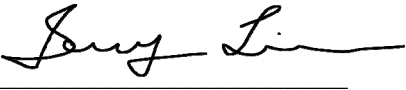
This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory Corp.

## Contents of Report

1.	General .....	1
1.1	Certification of Accuracy of Test Data .....	1
1.2	Summary of Test Result .....	2
1.3	Description of EUT .....	3
1.4	Description of Support Equipment .....	4
2.	Power Main Port Conducted Emissions .....	5
2.1	Test Setup and Procedure .....	5
2.1.1	Test Setup .....	5
2.1.2	Test Procedure .....	5
2.1.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested) .....	6
2.1.4	Limit .....	6
2.2	Conduction Test Data: Configuration 1 .....	8
2.3	Test Setup Photo .....	9
3.	Telecommunication Port Conducted Emissions .....	10
3.1	Test Setup and Procedure .....	10
3.1.1	Test Setup .....	10
3.1.2	Test Procedure .....	10
3.1.3	EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested) .....	10
3.1.4	Limit .....	11
3.2	Test Result .....	11
4.	Radiated Disturbance Emissions .....	12
4.1	Test Setup and Procedure .....	12
4.1.1	Test Setup .....	12
4.1.2	Test Procedure .....	13
4.1.3	Spectrum Analyzer Configuration (for the frequencies tested) .....	14
4.2	Limit .....	14
4.3	Radiation Test Data: Configuration 1 .....	16
4.4	Test Setup Photo .....	22
5.	Voltage Disturbance Emissions at Antenna Terminals .....	24
5.1	Test Setup and Procedure .....	24
5.1.1	Test Setup .....	24
5.1.2	Test Procedure .....	24
5.1.3	EMI Receiver Configuration (for the frequencies tested) .....	24
5.1.4	Limit .....	25
6.	Differential Voltage Emissions .....	26
6.1	Test Setup and Procedure .....	26
6.1.1	Test Setup .....	26
6.1.2	Test Procedure .....	26
6.1.3	EMI Receiver Configuration (for the frequencies tested) .....	26
6.1.4	Limit .....	27
7.	Appendix .....	28
7.1	Appendix A: Test Equipment .....	28
7.1.1	Test Equipment List .....	28
7.1.2	Software for Controlling Spectrum/Receiver and Calculating Test Data .....	29
7.2	Appendix B: Uncertainty of Measurement .....	30

## 1. General

### 1.1 Certification of Accuracy of Test Data

<b>Standards:</b>	AS/NZS CISPR 32:2015+A1:2020: Class B: Electromagnetic compatibility of multimedia equipment- Emission requirements
<b>Equipment Tested:</b>	Lora module
<b>Main Model:</b>	LR62XE
<b>Series Model:</b>	NA
<b>Brand:</b>	Fanstel
<b>Applicant:</b>	Fanstel Corporation, Taipei
<b>Sample received Date:</b>	November 23, 2021
<b>Final test Date:</b>	refer to the date of test data
<b>Test Site:</b>	Chamber12; Chamber 19; Conduction 03; Immunity02
<b>Test Distance:</b>	10m; 3m (above 1GHz)
<b>Temperature:</b>	refer to each site test data
<b>Humidity:</b>	refer to each site test data
<b>Atmospheric Pressure:</b>	86 kPa to 106 kPa
<b>Input power:</b>	Conduction input power: AC 230 V / 50 Hz Radiation input power: 1/10/2022 10:08:46 AM
<b>Test Result:</b>	PASS
<b>Report Engineer:</b>	Gigi Yeh
<b>Test Engineer:</b>	 Jason Chao
<b>Approved By:</b>	 Jerry Liu / Assistant Manager

## 1.2 Summary of Test Result

Performed Item	Test Performed	Deviation	Result
Conducted emissions from the AC mains power ports	Yes	No	PASS
Telecommunication Port Conducted Emissions (asymmetric mode)	Yes	No	N/A
Radiated emissions at frequencies below 1 GHz	Yes	No	PASS
Radiated emissions at frequencies above 1 GHz	Yes	No	PASS
Radiated emissions from FM receivers	N/A	N/A	N/A
Voltage Disturbance Emissions at Antenna Terminals	N/A	N/A	N/A
Differential voltage emissions	N/A	N/A	N/A
Outdoor units of home satellite receiving systems	N/A	N/A	N/A

### 1.3 Description of EUT

#### EUT

General:

Product Name:	Lora transceiver module
Brand Name:	Fanstel
Model Name:	LR62XE
Model Difference:	N/A
Power Supply:	5Vdc from USB (JIG)
RF function	Lora

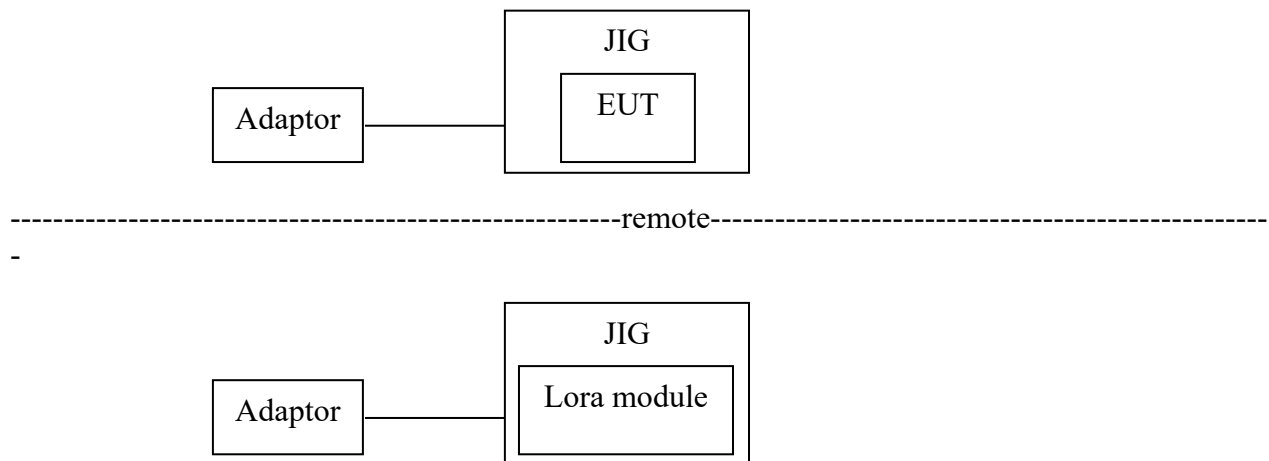
#### Test Plan

Applicable standard		AS/NZS CISPR 32	
Test Configuration		Config 1	Config 2
		EUT + LoRa modular	EUT + LoRa modular
Operation mode		LoRa link(long antenna)	LoRa link(short antenna)
No.	Description		
1	Radiated emission(30M~1GHz)(above 1GHz)	Measured	Pre-test
2	Conducted emission (AC Power)	Measured	N/A

## 1.4 Description of Support Equipment

Fig. 1-1 Configuration

Config 1



**Table 1-1 Support Equipment Used in Tested System**

Item	Equipment	Mrf/Brand	Model name	Series No	Data Cable	Power Cable
1	adaptor	Apple	A1385	N/A	N/A	Non-Shielded /0.5m

**I/O Cable Condition of EUT and Support Units**

Description	Path	Cable Length	Cable Type	Connector Type
USB power cable	Adaptor USB port to JIG micro USB port	0.5m	Non-Shielded	Metal Head

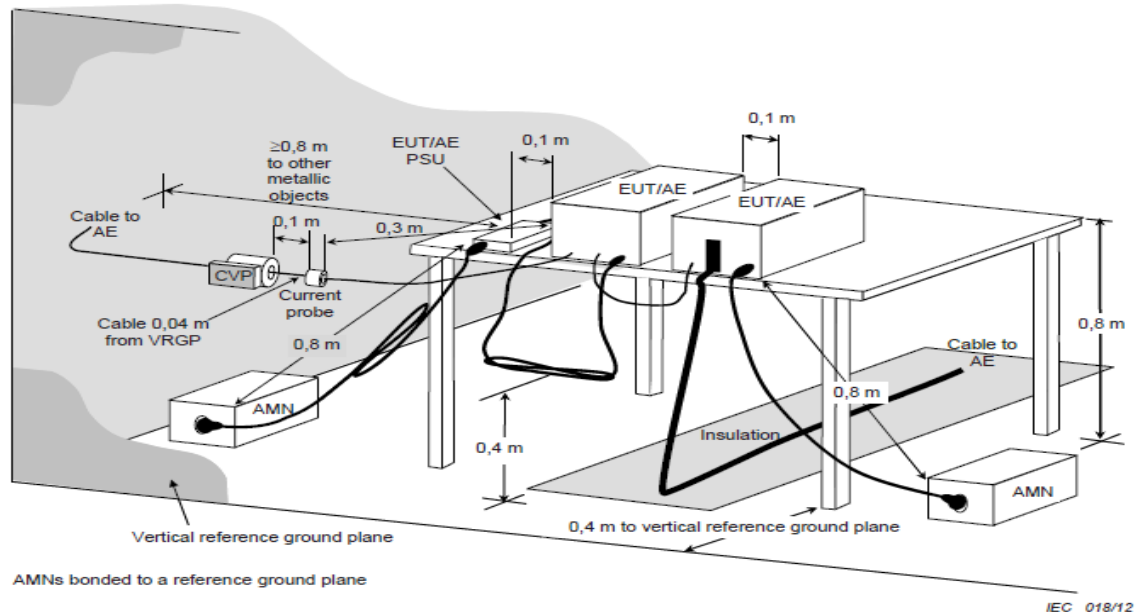
**Note:** All the above equipment/cables were placed in worse case positions to maximize emission signals during emission test.

**Grounding:** Grounding was in accordance with the manufacturer's requirements and conditions for the intended use.

## 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 LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs 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 LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

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 & AS/NZS CISPR 32 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

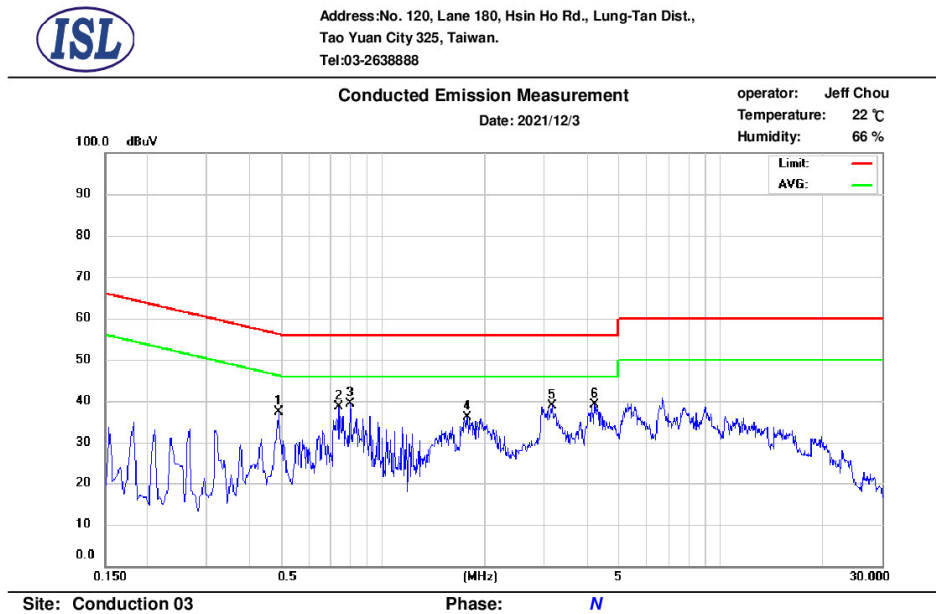
#### Conducted emissions from the AC mains power ports of Class A equipment:

Frequency	QP	AV
MHz	dB( $\mu$ V)	dB( $\mu$ V)
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( $\mu$ V)	dB( $\mu$ V)
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		

- 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	0.490	24.06	10.61	9.68	33.74	56.17	-22.43	20.29	46.17	-25.88
2	0.742	22.72	14.66	9.69	32.41	56.00	-23.59	24.35	46.00	-21.65
3	0.798	24.25	15.43	9.69	33.94	56.00	-22.06	25.12	46.00	-20.88
4	1.778	22.28	13.23	9.72	32.00	56.00	-24.00	22.95	46.00	-23.05
5	3.170	22.45	14.59	9.76	32.21	56.00	-23.79	24.35	46.00	-21.65
6	4.238	23.81	14.63	9.78	33.59	56.00	-22.41	24.41	46.00	-21.59

Note:

Margin = QP/AVG Emission - Limit

QP/AVG Emission = QP\_R/AVG\_R + Correct Factor

Correct Factor = LISN Loss + Cable Loss

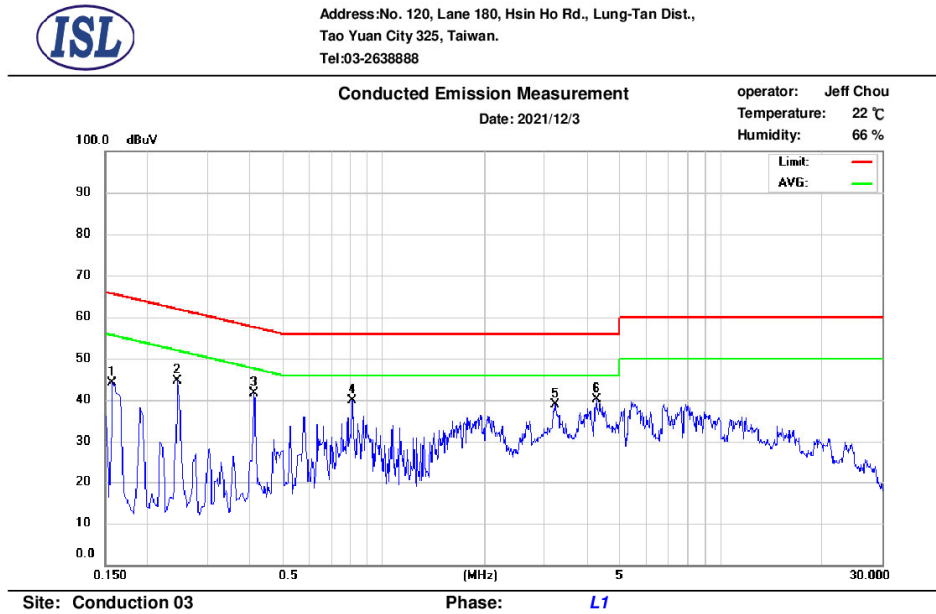
A margin of -8dB means that the emission is 8dB below the limit

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.

## 2.2 Conduction Test Data: Configuration 1

### -Live



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	0.158	34.54	10.44	9.64	44.18	65.57	-21.39	20.08	55.57	-35.49
2	0.246	30.94	8.94	9.65	40.59	61.89	-21.30	18.59	51.89	-33.30
3	0.414	25.21	6.54	9.66	34.87	57.57	-22.70	16.20	47.57	-31.37
4	0.810	26.13	14.61	9.68	35.81	56.00	-20.19	24.29	46.00	-21.71
5	3.230	22.96	14.94	9.74	32.70	56.00	-23.30	24.68	46.00	-21.32
6	4.286	21.20	14.22	9.76	30.96	56.00	-25.04	23.98	46.00	-22.02

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.

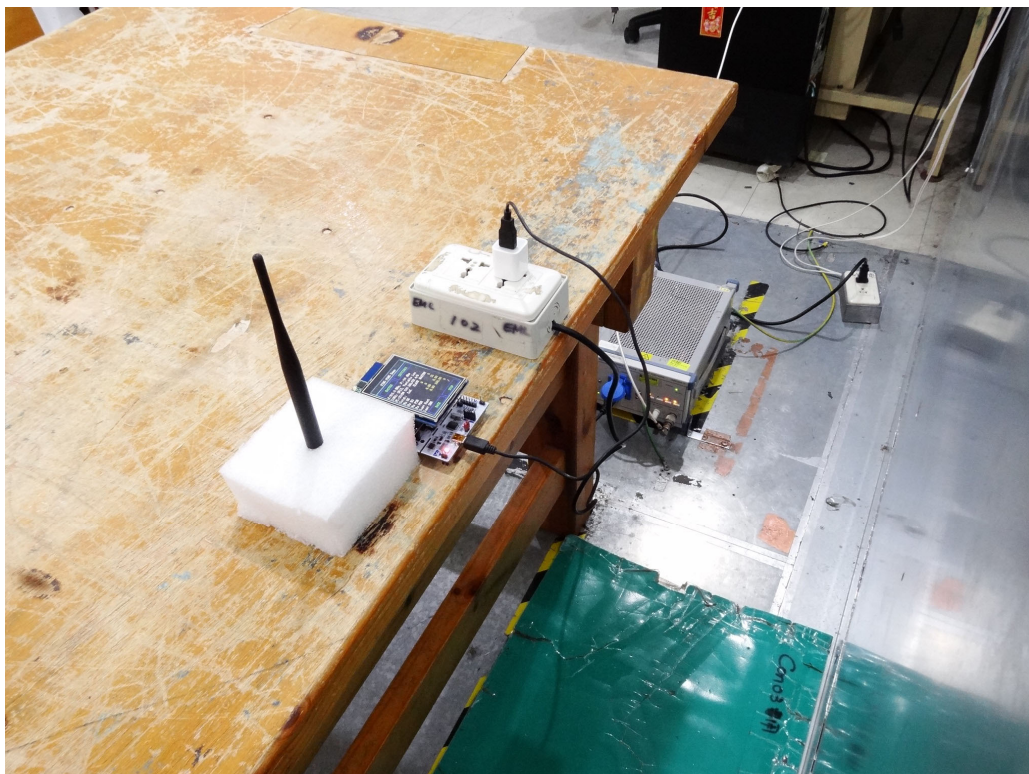
If peak data can pass, it will be shown in "QP/AVG Correct" column, if not, QP/AVG data will instead.

## 2.3 Test Setup Photo

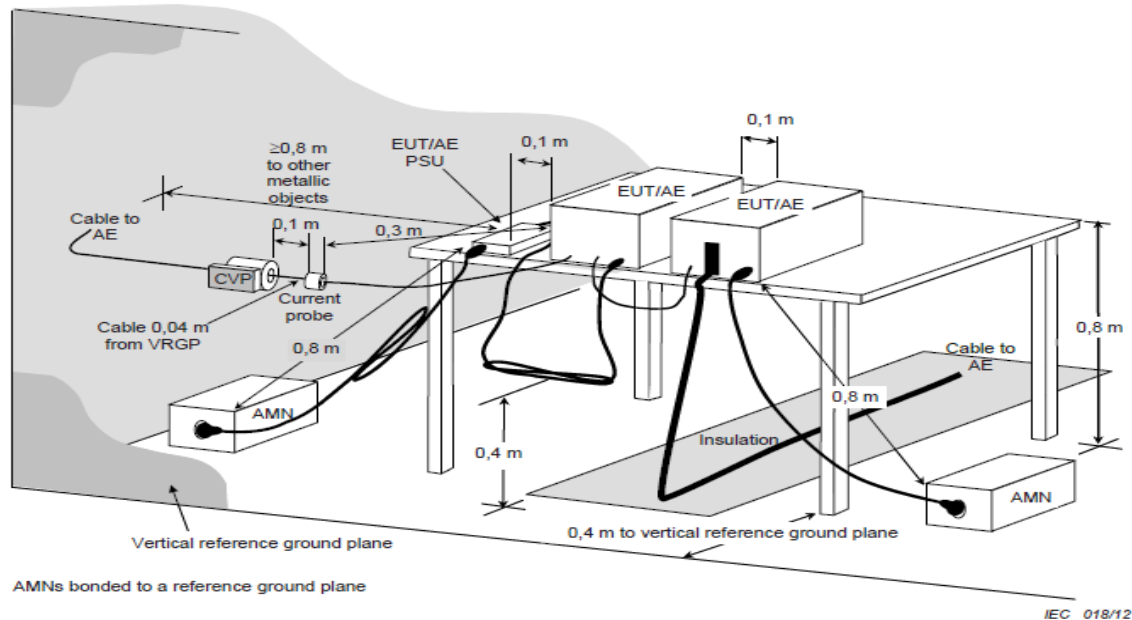
Front View



Back View



### 3.1.1 Test Setup



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 fibre 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 fibre 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

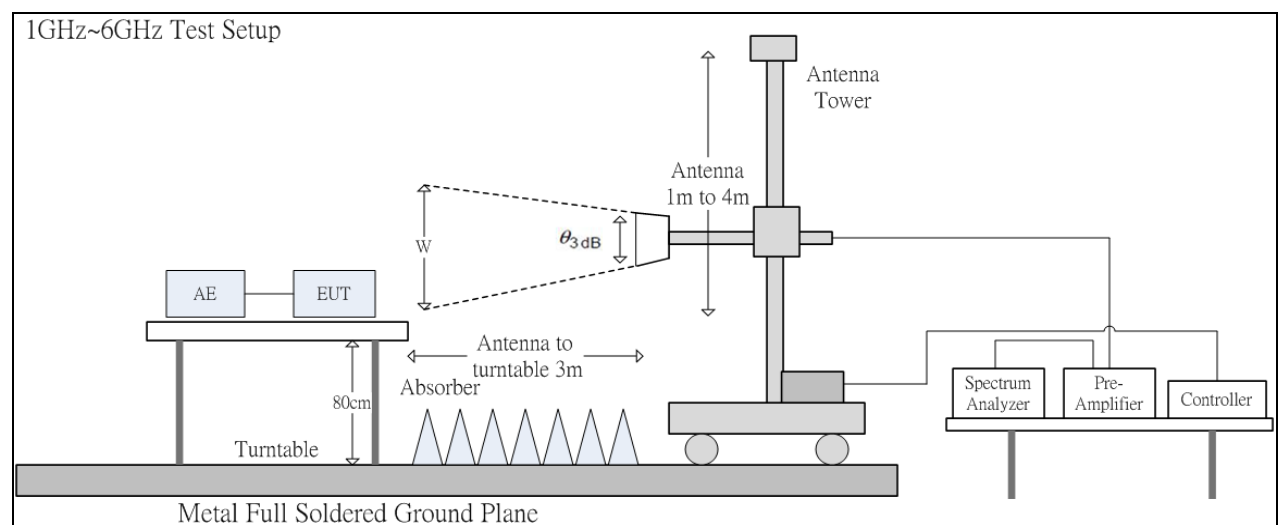
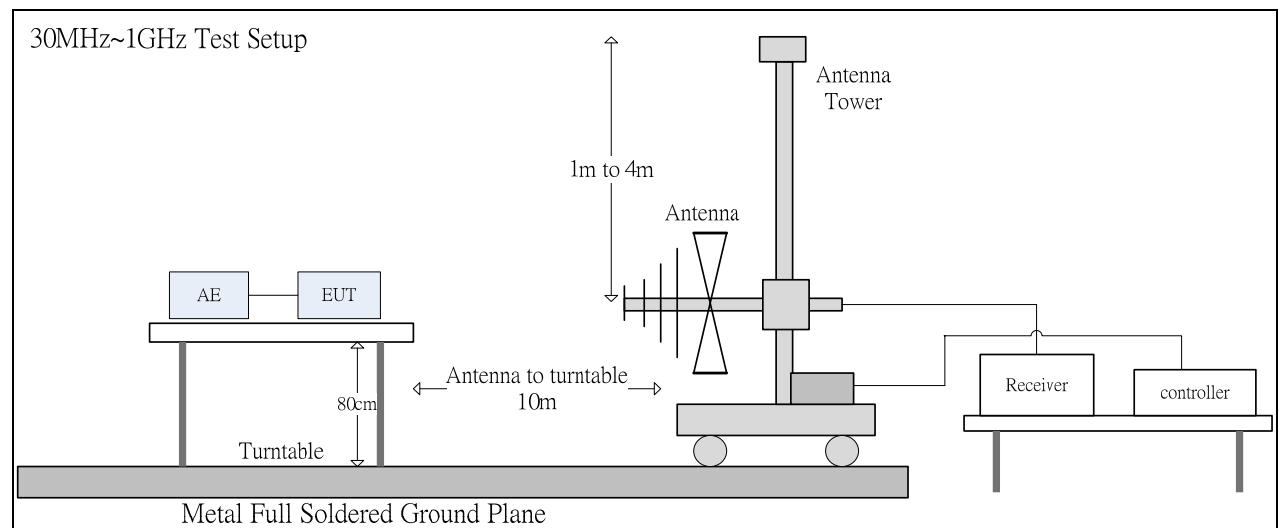
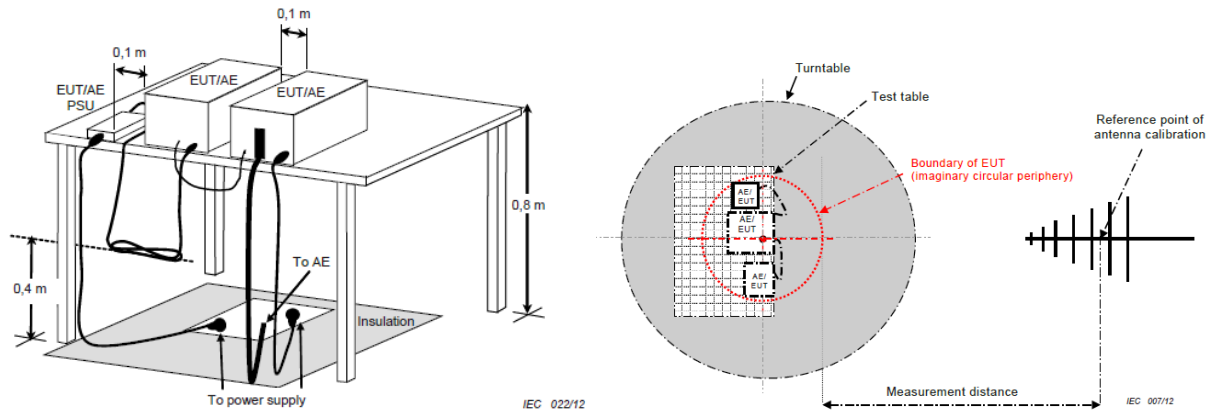
### 3.2 Test Result

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

## 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	$\theta_{3dB}(\text{min})$	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 & AS/NZS CISPR 32 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:

Frequency range MHz	Measurement		Class _A limits dB( $\mu$ V/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 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:**

Frequency range MHz	Measurement		Class_B limits dB( $\mu$ V/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 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

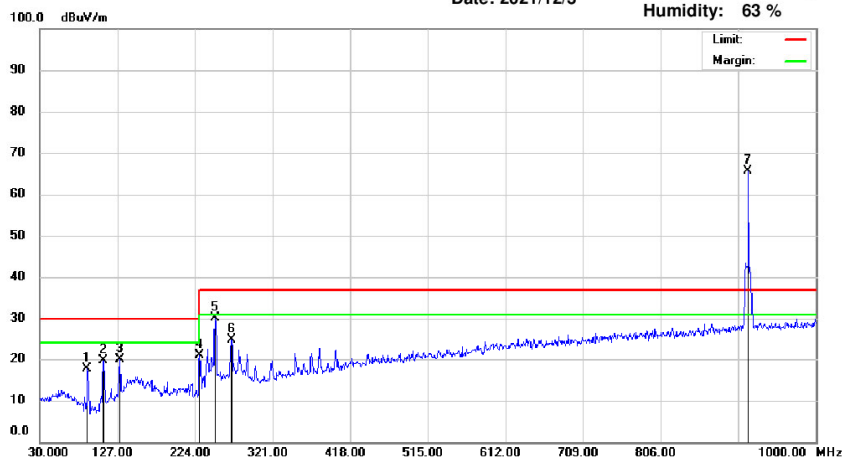
### 4.3 Radiation Test Data: Configuration 1 - Radiated Emissions (Horizontal)



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,  
Tao Yuan City 325, Taiwan.  
Tel: 03-2638888

Radiated Emission Measurement  
Date: 2021/12/3

Operator: Mamie Chen  
Temperature: 22 °C  
Humidity: 63 %



Site : Chamber 02

Polarization: *Horizontal*

Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	89.17	39.84	-22.18	17.66	30.00	-12.34	400	199	peak
2	109.54	38.87	-19.23	19.64	30.00	-10.36	400	334	peak
3	129.91	37.31	-17.52	19.79	30.00	-10.21	400	334	peak
4	229.82	38.88	-17.98	20.90	30.00	-9.10	308	78	peak
5	249.22	46.10	-16.02	30.08	37.00	-6.92	300	321	peak
6	269.59	39.73	-15.20	24.53	37.00	-12.47	300	321	peak
7	915.61	67.53	-2.02	65.51	37.00	28.51	400	232	peak



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,  
Tao Yuan City 325, Taiwan.  
Tel: 03-2638888

Radiated Emission Measurement

Date: 2021/12/3

Operator: Mamie Chen

Temperature: 22 °C

Humidity: 63 %

Site : Chamber 02

Polarization: *Horizontal*

EUT :

Model Name : LR62XE

Mode :

Note : Config01

Frequency (MHz)	Emission (dBuV/m)	Margin (dB)	Note
915.6100	65.51	28.51	Fundamental frequency

\* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

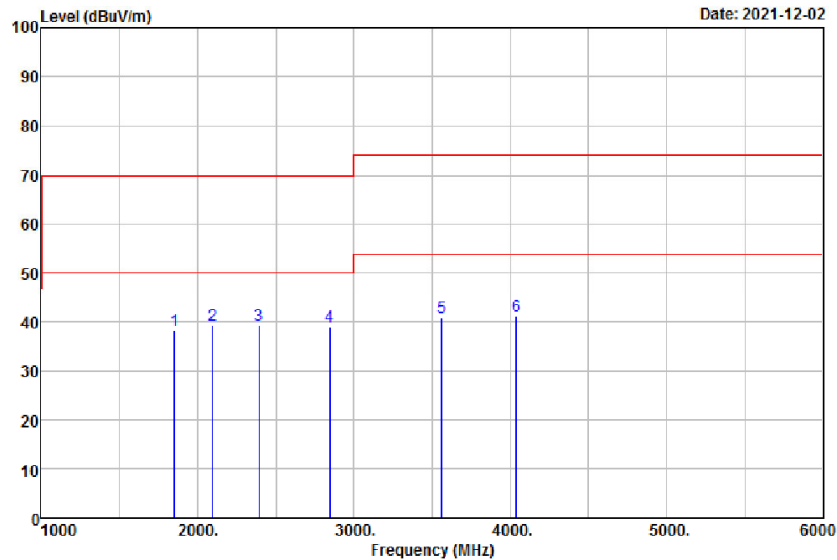
A margin of -8dB means that the emission is 8dB below the limit

Antenna Distance: 10 meters

Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.



International Standard Laboratory Corp.  
Company Address: No. 120, Lane 180, Hsin Ho Rd.  
Lung-Tan Dist., Tao Yuan City 325, Taiwan  
Tel: (03) 4071718 ; Fax: (03) 4071738  
Web: www.isl.com.tw



Condition: 55032 CLASS B PK 3m HORIZONTAL  
Site : Chamber 19

Operator : Jason

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	1850.00	50.98	-12.86	38.12	70.00	-31.88	Peak	HORIZONTAL
2	2095.00	51.96	-12.84	39.12	70.00	-30.88	Peak	HORIZONTAL
3	2390.00	50.99	-11.80	39.19	70.00	-30.81	Peak	HORIZONTAL
4	2845.00	50.22	-11.23	38.99	70.00	-31.01	Peak	HORIZONTAL
5	3560.00	50.09	-9.39	40.70	74.00	-33.30	Peak	HORIZONTAL
6	4040.00	50.01	-9.05	40.96	74.00	-33.04	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

Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

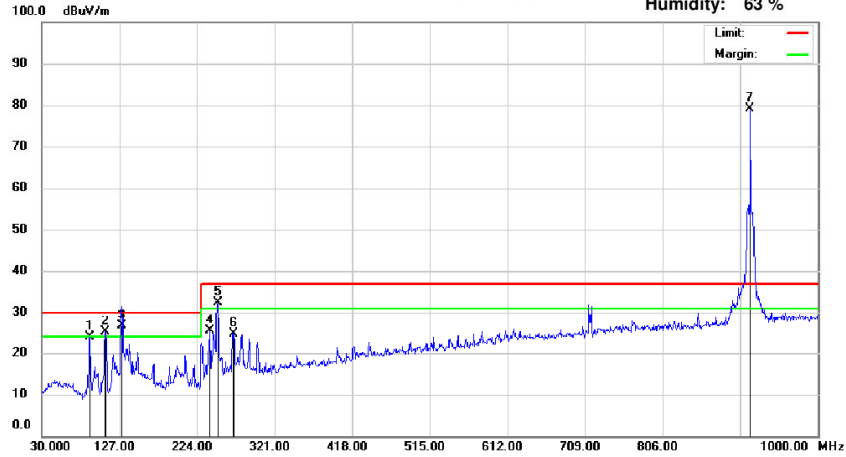
# -Radiated Emissions (Vertical)



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,  
Tao Yuan City 325, Taiwan.  
Tel: 03-2638888

Radiated Emission Measurement  
Date: 2021/12/3

Operator: Mamie\_Chen  
Temperature: 22 °C  
Humidity: 63 %



Site : Chamber 02

Polarization: Vertical

Mk.	Frequency (MHz)	RX_R (dBuV)	Correct Factor(dB/m)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	90.14	45.93	-22.10	23.83	30.00	-6.17	100	169	peak
2	109.54	44.48	-19.23	25.25	30.00	-4.75	100	242	peak
3	130.19	44.24	-17.51	26.73	30.00	-3.27	100	232	QP
4	240.49	41.83	-16.38	25.45	37.00	-11.55	100	82	peak
5	250.19	48.41	-15.98	32.43	37.00	-4.57	100	156	peak
6	269.59	39.85	-15.20	24.65	37.00	-12.35	100	156	peak
7	915.61	81.05	-2.02	79.03	37.00	42.03	100	233	peak



Address: No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist.,  
Tao Yuan City 325, Taiwan.  
Tel: 03-2638888

Radiated Emission Measurement

Date: 2021/12/3

Operator: Mamie\_Chen

Temperature: 22 °C

Humidity: 63 %

Site : Chamber 02

Polarization: *Vertical*

EUT :

Model Name : LR62XE

Mode :

Note : Config01

Frequency (MHz)	Emission (dBuV/m)	Margin (dB)	Note
915.6100	79.03	42.03	Fundamental frequency

\* Note:

Margin = Emission – Limit

Emission = Radiated Amplitude + Correct Factor

Correct Factor = Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain

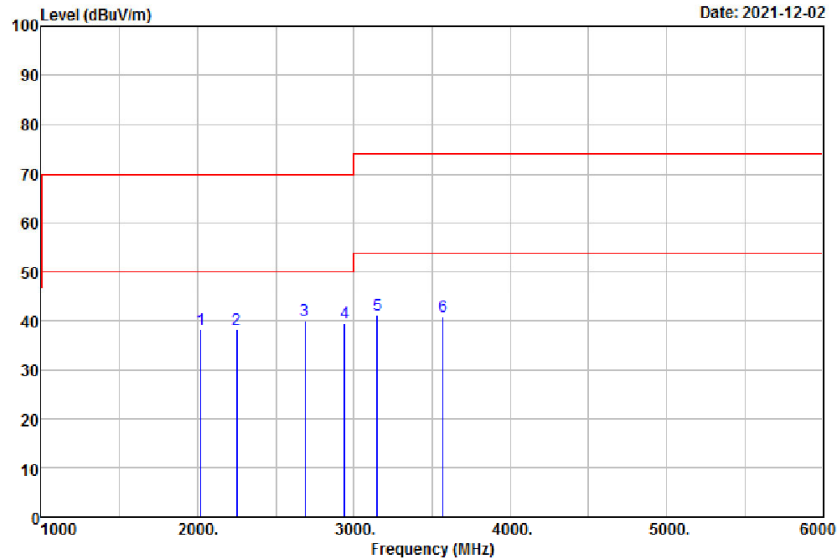
A margin of -8dB means that the emission is 8dB below the limit

Antenna Distance: 10 meters

Below 1GHz test, if the peak measured value meets the QP limit, it is unnecessary to perform the QP measurement.



International Standard Laboratory Corp.  
Company Address: No. 120, Lane 180, Hsin Ho Rd.  
Lung-Tan Dist., Tao Yuan City 325, Taiwan  
Tel: (03) 4071718 ; Fax: (03) 4071738  
Web: www.isl.com.tw



Condition: 55032 CLASS B PK 3m VERTICAL  
Site : Chamber 19

Operator : Jason

	Freq	Read	Factor	Level	Limit	Over	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	2020.00	51.16	-13.02	38.14	70.00	-31.86	Peak	VERTICAL
2	2250.00	50.60	-12.50	38.10	70.00	-31.90	Peak	VERTICAL
3	2685.00	50.89	-10.97	39.92	70.00	-30.08	Peak	VERTICAL
4	2940.00	50.55	-11.13	39.42	70.00	-30.58	Peak	VERTICAL
5	3150.00	51.34	-10.23	41.11	74.00	-32.89	Peak	VERTICAL
6	3570.00	50.19	-9.42	40.77	74.00	-33.23	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

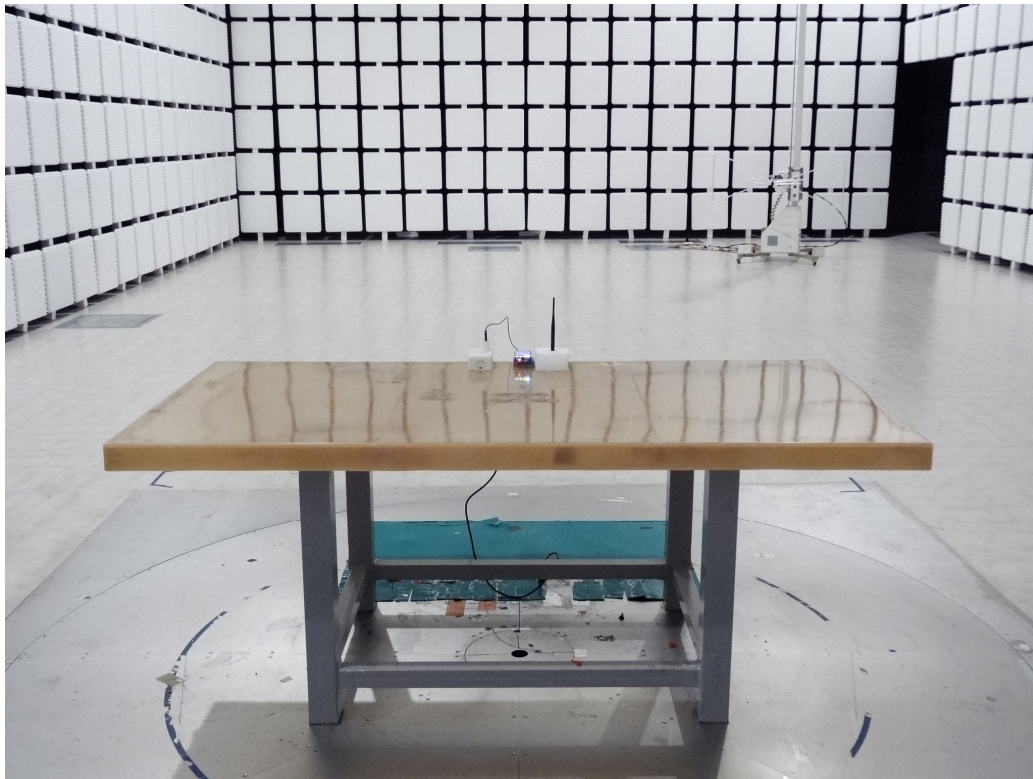
Antenna Distance: 3 meters

Above 1GHz test, if the peak measured value meets the average limit, it is unnecessary to perform the average measurement.

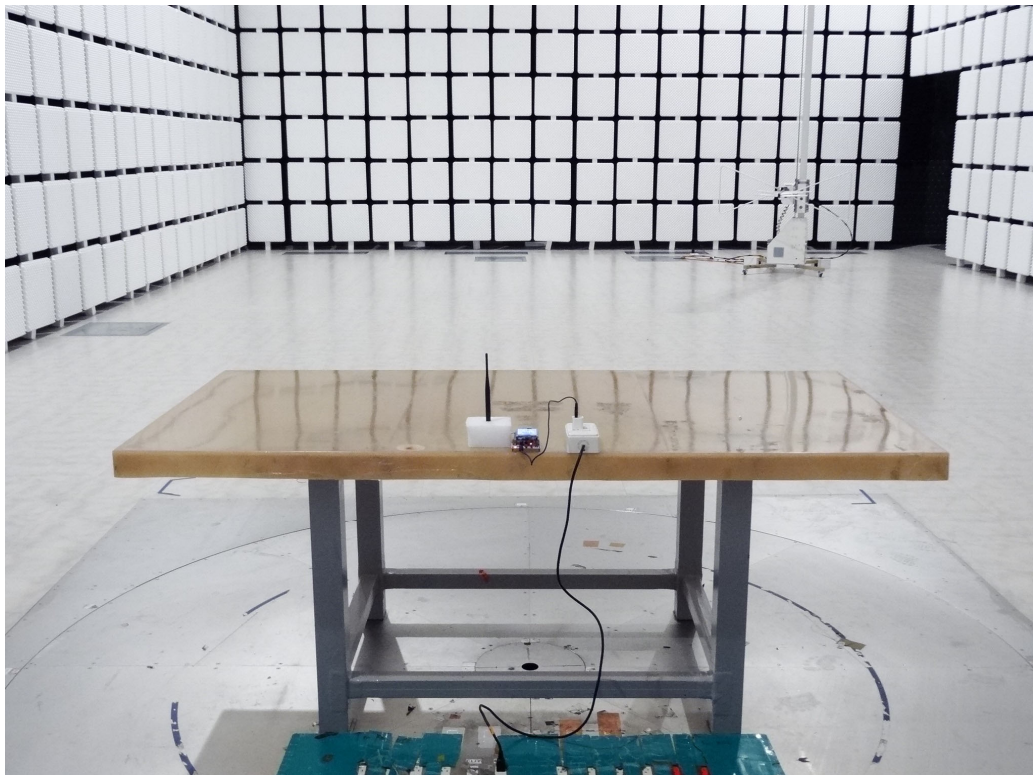


#### 4.4 Test Setup Photo

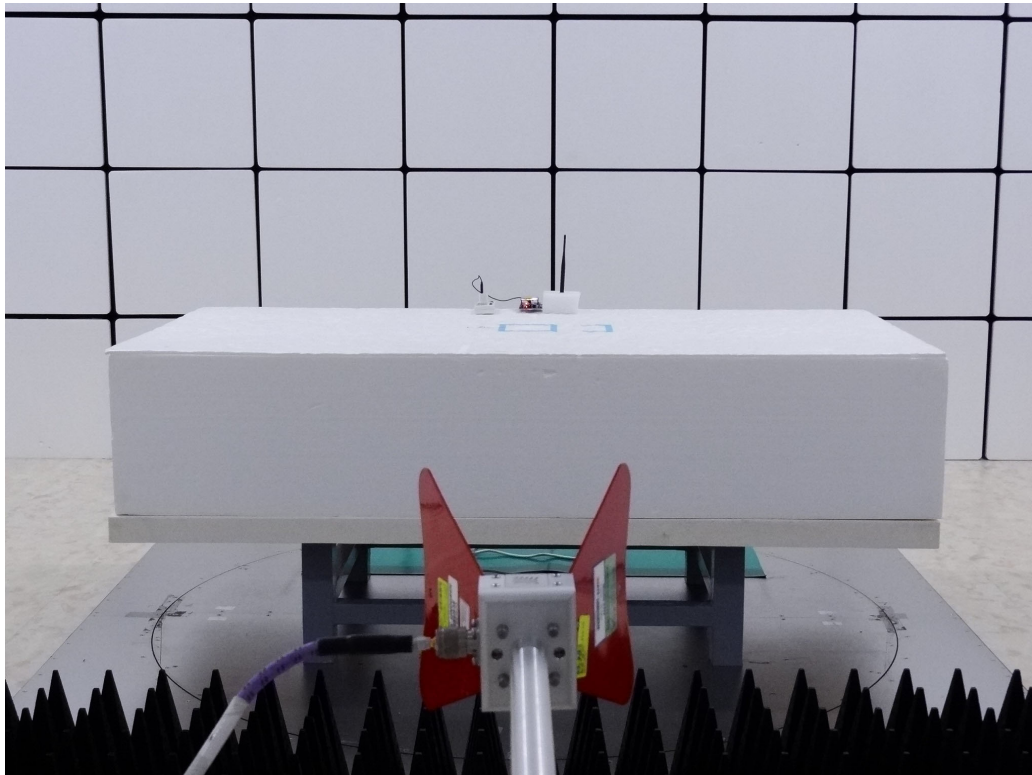
Front View (30MHz~1GHz)



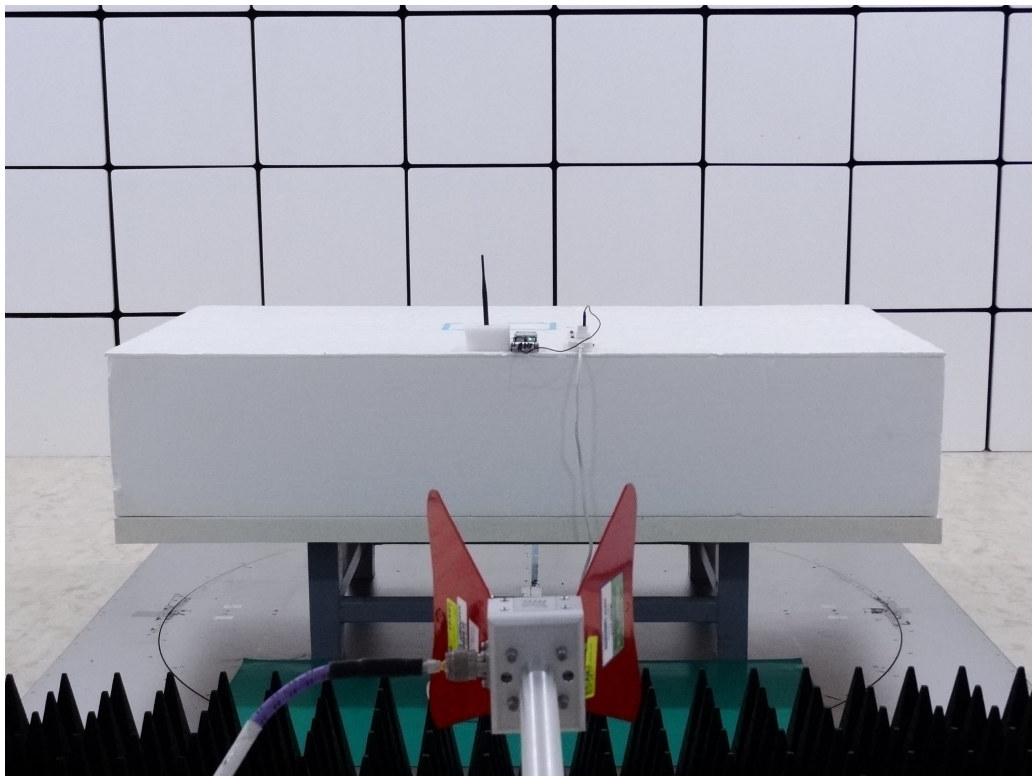
Back View (30MHz~1GHz)



Front View (above 1GHz)



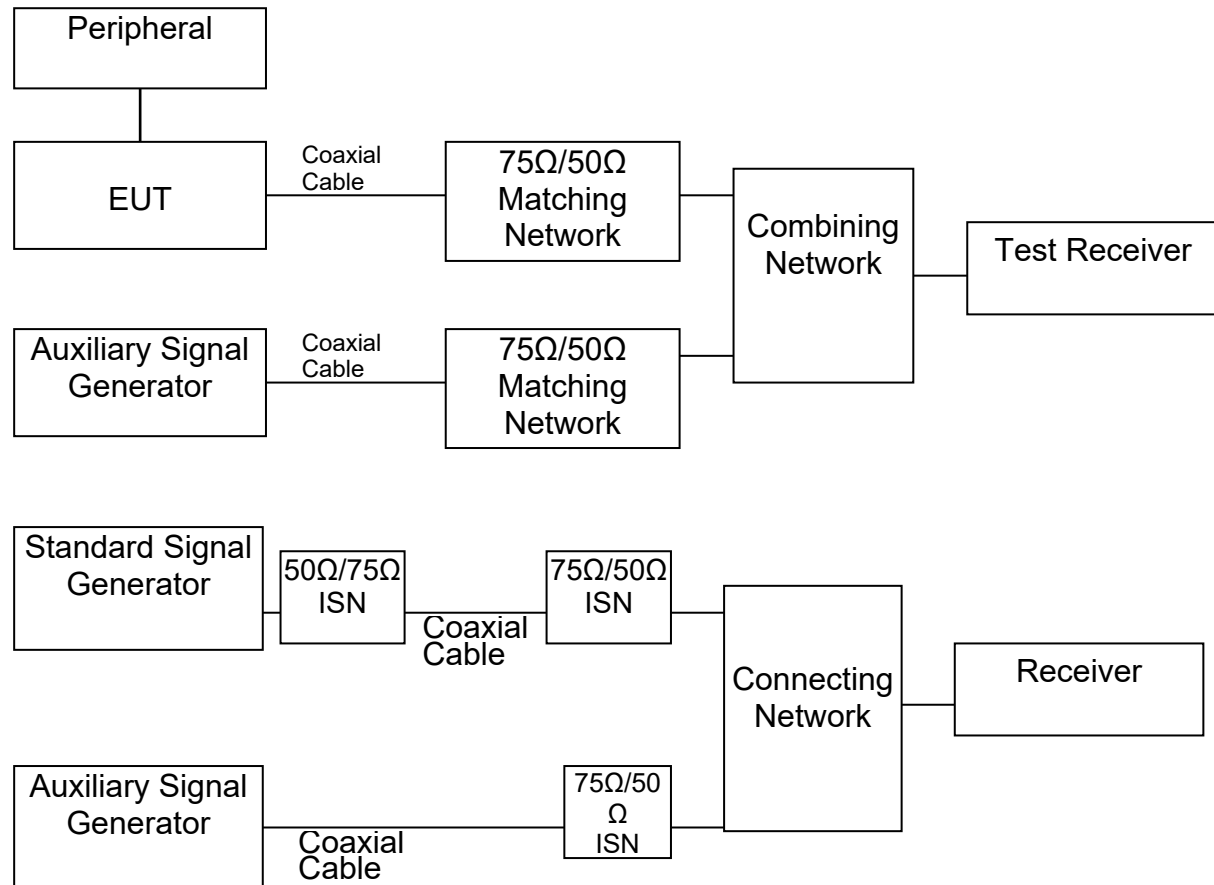
Back View (above 1GHz)



## 5. Voltage Disturbance Emissions at Antenna Terminals

### 5.1 Test Setup and Procedure

#### 5.1.1 Test Setup



#### 5.1.2 Test Procedure

The output level of the auxiliary signal generator was set to 70dBuV at the EUT antenna terminal with 75 ohms impedance with an un-modulated carrier.

The highest emissions 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 power of EUT was switched off to make sure the emission was not contributed by the auxiliary signal generator. While doing so, the interconnecting cables and major parts of the system were moved around to maximize the emission.

#### 5.1.3 EMI Receiver Configuration (for the frequencies tested)

Frequency Range:	30MHz-2150MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120kHz

#### 5.1.4 Limit

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector.
2. RF modulator output ports.
3. FM broadcast receiver tuner ports with an accessible connector.

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz	46	46	46	See a)
	950 – 2 150		46	54	54	
A12.2	950 – 2 150	Quasi Peak/ 120 kHz	46	54	54	See b)
A12.3	30 – 300		46	54	50	See c)
	300 – 1 000	52				
A12.4	30 – 300	For frequencies ≥1 GHz	46	66	59	See d)
	300 – 1 000				52	
A12.5	30 – 950	Peak/ 1 MHz	46	76	46	See e)
	950 – 2 150			n/a	54	
a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.						
b) Tuner units (not the LNB) for satellite signal reception.						
c) Frequency modulation audio receivers and PC tuner cards.						
d) Frequency modulation car radios.						
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.						

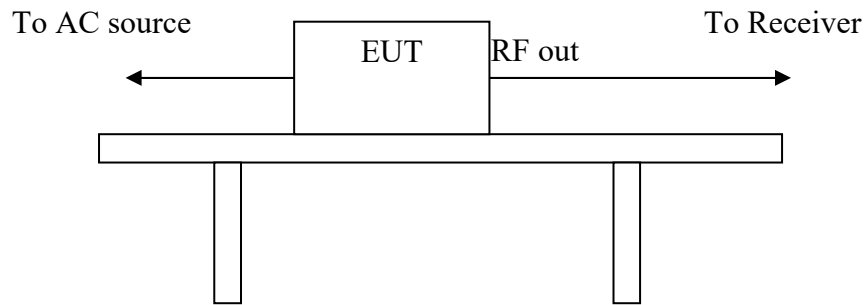
**\*\*Remarks: It is not necessary to be tested on this item.**



## 6. Differential Voltage Emissions

### 6.1 Test Setup and Procedure

#### 6.1.1 Test Setup



#### 6.1.2 Test Procedure

The output level of the auxiliary signal generator was set to 70dBuV at the EUT antenna terminal with 75 ohms impedance with an un-modulated carrier.

The highest emissions 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 power of EUT was switched off to make sure the emission was not contributed by the auxiliary signal generator. While doing so, the interconnecting cables and major parts of the system were moved around to maximize the emission.

#### 6.1.3 EMI Receiver Configuration (for the frequencies tested)

Frequency Range:	30MHz-2150MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120kHz

#### 6.1.4 Limit

Applicable to:

1. TV broadcast receiver tuner ports with an accessible connector.
2. RF modulator output ports.
3. FM broadcast receiver tuner ports with an accessible connector.

Table clause	Frequency range MHz	Detector type/ bandwidth	Class B limits dB(μV) 75 Ω			Applicability
			Other	Local Oscillator Fundamental	Local Oscillator Harmonics	
A12.1	30 – 950	For frequencies ≤1 GHz	46	46	46	See a)
	950 – 2 150		46	54	54	
A12.2	950 – 2 150	Quasi Peak/ 120 kHz	46	54	54	See b)
A12.3	30 – 300		46	54	50	See c)
	300 – 1 000	52				
A12.4	30 – 300	For frequencies ≥1 GHz	46	66	59	See d)
	300 – 1 000				52	
A12.5	30 – 950	Peak/ 1 MHz	46	76	46	See e)
	950 – 2 150			n/a	54	
a) Television receivers (analogue or digital), video recorders and PC TV broadcast receiver tuner cards working in channels between 30 MHz and 1 GHz, and digital audio receivers.						
b) Tuner units (not the LNB) for satellite signal reception.						
c) Frequency modulation audio receivers and PC tuner cards.						
d) Frequency modulation car radios.						
e) Applicable to EUTs with RF modulator output ports (for example DVD equipment, video recorders, camcorders and decoders etc.) designed to connect to TV broadcast receiver tuner ports.						

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

## 7. Appendix

### 7.1 Appendix A: Test Equipment

#### 7.1.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	EMI Receiver 15	ROHDE & SCHWARZ	ESCI	101166	07/07/2021	07/07/2022
Conduction 03	Chamber05 -1 Cable	WOKEN	CFD 300-NL	Chamber05 -1 Cable	08/30/2021	08/30/2022
Conduction 03	LISN 19	R&S	ENV216	101425	11/11/2021	11/11/2022
Conduction 03	LISN 22	R&S	ENV216	101478	10/28/2021	10/28/2022
Conduction 03	LISN 24	SCHWARZBECK	NNLK 8121	8121-829	07/26/2021	07/26/2022
Conduction 03	ISN T4 09	Teseq GmbH	ISN T400A	49914	08/02/2021	08/02/2022
Conduction 03	ISN T8 09	Teseq GmbH	ISN T800	36190	09/30/2021	09/30/2022
Conduction 03	ISN T8 CAT6A 01	SCHWARZBECK	NTFM 8158	8158 0123	01/17/2021	01/17/2022
Conduction 03	CDN ISN ST08A 1	Teseq GmbH	CDN ISN ST08A	43352	10/07/2021	10/07/2022
Conduction 03	Capacitive Voltage Probe 01	SCHAFFNER	CVP 2200A	18711	08/05/2021	08/05/2022
Conduction 03	Current Probe	SCHAFFNER	SMZ 11	18030	03/04/2021	03/04/2022

Location Chamber02	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation	BILOG Antenna 17 (30MHz~1GHz)	Schwarzbeck	Schwarzbeck VULB 9168+EMCI-N -6-05	645	04/13/2021	04/13/2022
Radiation	Preamplifier 25	EMCI	EMC9135	980295	04/03/2021	04/03/2022
Radiation	Coaxial Cable Chmb 02-10M-02	EMC	RG214U	Chmb 02-10M-02	10/13/2021	10/13/2022
Radiation	EMI Receiver 12	ROHDE & SCHWARZ	ESCI	100804	08/04/2021	08/04/2022

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 19	Signal analyzer	R&S	FSV40	101919	8/18/2021	8/18/2022
Chamber 19	EMI Receiver	R&S	ESR3	102461	5/05/2021	5/05/2022
Chamber 19	Loop Antenna	EM	EM-6879	271	09/29/2021	09/29/2022
Chamber 19	Bilog Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168 w 6dB Att.	9168-736	2/22/2021	2/22/2022
Chamber 19	Horn antenna (1GHz-18GHz)	ETS	3117	00218718	10/12/2021	10/12/2022
Chamber 19	Horn antenna (18GHz-26GHz)	Com-power	AH-826	081001	11/30/2021	11/30/2022
Chamber 19	Horn antenna (26GHz-40GHz)	Com-power	AH-640	100A	03/11/2021	03/11/2022
Chamber 19	Preamplifier (9kHz-1GHz)	HP	8447F	3113A04621	06/22/2021	06/22/2022
Chamber 19	Preamplifier (1GHz - 26GHz)	EM	EM01M26G	060681	05/07/2021	05/07/2022
Chamber 19	Preamplifier (26GHz-40GHz)	MITEQ	JS4-26004000- 27-5A	818471	05/07/2021	05/07/2022
Chamber 19	RF Cable (100kHz-26.5GHz)	Huber Suhner	Sucoflex 104A	MY1394/4A & 50886/4A	08/30/2021	08/30/2022
Chamber 19	RF Cable (18GHz-40GHz)	HUBER SUHNER	Sucoflex 102	27963/2&374 21/2	11/17/2021	11/17/2022
Chamber 19	Signal Generator	Anritsu	MG3692A	20311	12/28/2021	12/28/2022
Chamber 19	Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A

### 7.1.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

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



## 7.2 Appendix B: Uncertainty of Measurement

The laboratory measurement uncertainty accordance with refers to CISPR 16-4-2. If  $U_{lab}$  is less than or equal to  $U_{cisp}$  in Table 1, then the test report may either state the value of  $U_{lab}$  or state that  $U_{lab}$  is less than  $U_{cisp}$ .

The coverage factor  $k = 2$  yields approximately a 95 % level of confidence.

### <Conduction 03>

AMN:  $\pm 2.90\text{dB}$

ISN T4:  $\pm 3.05\text{dB}$

ISN T8:  $\pm 3.05\text{dB}$

CVP:  $\pm 3.62\text{dB}$

CP:  $\pm 2.88\text{dB}$

### <Chamber 02 (10m)>

Horizontal

30MHz~200MHz:  $\pm 4.52\text{dB}$

200MHz~1000MHz:  $\pm 4.42\text{dB}$

Vertical

30MHz~200MHz:  $\pm 4.51\text{dB}$

200MHz~1000MHz:  $\pm 4.70\text{dB}$

### <Chamber 19 (3M)>

30MHz~1000MHz:  $\pm 4.22\text{ dB}$

1GHz~40GHz:  $\pm 4.08\text{ dB}$

--- END ---