

# TEST REPORT

of

## AS/NZS CISPR 32:2015 AMD 1:2020

Product : **Lora module**  
Model(s): **Fanstel**  
Brand: **LR62E**  
Model Difference: **N/A**  
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-20LR171A32**

Issue Date : **2022/01/05**



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.

## VERIFICATION OF COMPLIANCE

**Applicant:** Fanstel Corporation, Taipei  
**Equipment Under Test:** Lora module  
**Brand Name:** Fanstel  
**Model Number:** LR62E  
**Model Different:** N/A  
**Date of Test:** 2021/12/2 ~2021/12/3  
**Date of EUT Received:** 2021/12/1

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
AS/NZS CISPR 32:2015 AMD 1:2020	Complied

### We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

**Test By:**



**Date:**

2022/01/05

*Jason Chao / Senior Engineer*

**Prepared By:**

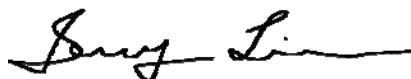


**Date:**

2022/01/05

*Elisa Chen / Senior Engineer*

**Approved By:**



**Date:**

2022/01/05

*Jerry Liu / Assistant Manager*

## Version

Version No.	Date	Description
00	2022/01/05	Initial creation of document

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## 1. Description of Equipment under Test (EUT)

### 1.1 Product Description

Product Name	Lora module
Brand Name	Fanstel
Model Name	LR62E
Model Difference	N/A
Power Supply:	5Vdc by USB port
RF function	Lora

**Remark:** The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

### 1.2 General Description of Applied Standards

The EUT According to the Specifications, it must comply with the requirements of the following standards:

AS/NZS CISPR 32:2015 AMD 1:2020

Electromagnetic compatibility of multimedia equipment - Emission requirements

### 1.3 Description of Test Modes:

#### Radiators function exercise:

The transmitter shall be operated at its maximum rated RF output power as specified for that type of equipment. The manufacturer may provide a suitable companion receiver that can be used to set up a communications link and/or to receive messages.

#### 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 Test Facility:**

The 10m anechoic chamber radiated emission measurement facilities used to collect the data are located at <LT Lab.> Address: No. 120, Lane 180, Hsin Ho Rd. Lung-Tan Dist., Tao Yuan City 325, Taiwan, The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 32.

The 966 anechoic chamber radiated emission measurement (Above 1GHz) facilities used to collect the data are located at <LT Lab.> Address: No. 120, Lane 180, Hsin Ho Rd. Lung-Tan Dist., Tao Yuan City 325, Taiwan, The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 32.

The AC power line conducted emission, flicker and all of immunity measurement facilities used to collect the data are located at <LT Lab.> Address: No. 120, Lane 180, Hsin Ho Rd. Lung-Tan Dist., Tao Yuan City 325, Taiwan, The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 32.

#### **1.5 Modification List:**

No modification by International Standards Laboratory Corp.

#### **1.6 Test Condition:**

Refer to AS/NZS CISPR 32:2015 AMD 1:2020

## 1.7 Equipment List:

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber02						
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 Conducted	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 19	Spectrum analyzer	R&S	FSV40	101919	08/18/2021	08/18/2022
Chamber 19	EMI Receiver	R&S	ESR3	102461	05/05/2021	05/05/2022
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	02/22/2021	02/22/2022
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&37421/2	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



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

## 1.8 Configuration of Tested System

Fig. 1-1 Configuration 1

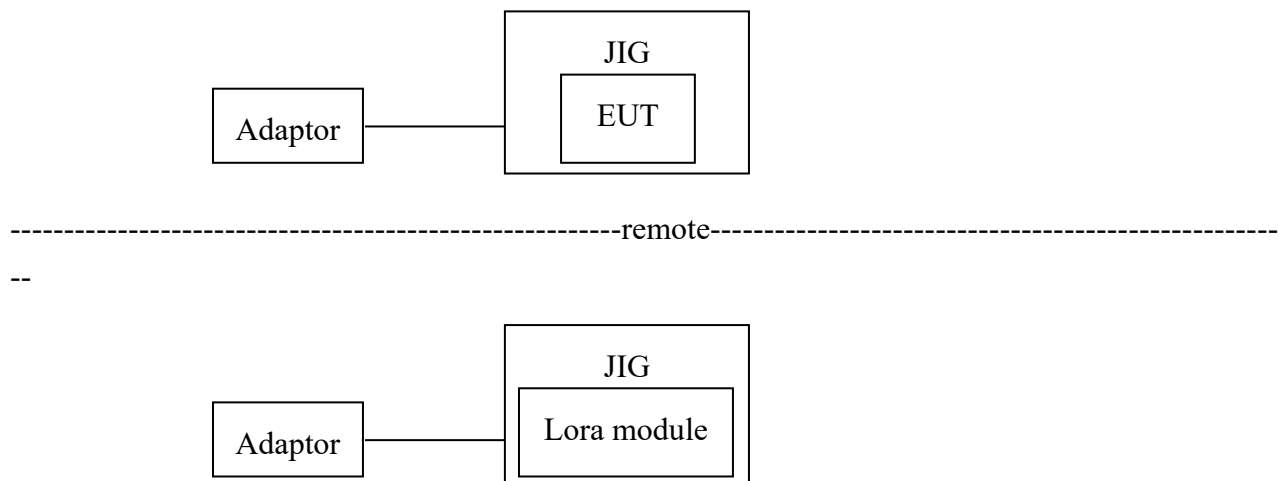


Table 1-1 Support Equipment Used in Tested System

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. Radio Disturbance

### 2.1 Test Configuration:

Refer to AS/NZS CISPR 32:2015 AMD 1:2020

### 2.2 Summary of Test Results

Test Items	Reference section	Result
Enclosure of ancillary equipment measured on a stand alone basis, CISPR 32, Class B	AS/NZS CISPR 32:2015 AMD 1:2020	PASS
AC mains power input/output ports CISPR 32, Class B	AS/NZS CISPR 32:2015 AMD 1:2020	PASS
Telecommunication Port	AS/NZS CISPR 32:2015 AMD 1:2020	N/A

### 2.3 Enclosure of ancillary equipment measured on a stand alone basis.

#### 2.3.1 Test Method:

Standard	Description
AS/NZS CISPR 32:2015 AMD 1:2020	Electromagnetic compatibility of multimedia equipment - Emission requirements

### 2.3.2 Limit:

Table clause	Frequency range MHz	Measurement		Class B limits dB(μV/m)
		Distance m	Detector type/ bandwidth	OATS/SAC (see Table A.1)
A4.1	30 – 230	10	Quasi Peak / 120 kHz	30
	230 – 1 000			37
A4.2	30 – 230	3		40
	230 – 1 000			47
Apply only table clause A4.1 or A4.2 across the entire frequency range.				

Table clause	Frequency range MHz	Measurement		Class B limits dB(μV/m)
		Distance m	Detector type/ bandwidth	FSOATS (see Table A.1)
A5.1	1 000 – 3 000	3	Average/ 1 MHz	50
	3 000 – 6 000			54
A5.2	1 000 – 3 000		Peak/ 1 MHz	70
	3 000 – 6 000			74
Apply A5.1 and A5.2 across the frequency range from 1 000 MHz to the highest required frequency of measurement derived from Table 1.				

Highest internal frequency ( $F_x$ )	Highest measured frequency
$F_x \leq 108$ MHz	1 GHz
$108 \text{ MHz} < F_x \leq 500$ MHz	2 GHz
$500 \text{ MHz} < F_x \leq 1$ GHz	5 GHz
$F_x > 1$ GHz	$5 \times F_x$ up to a maximum of 6 GHz
NOTE 1 For FM and TV broadcast receivers, $F_x$ is determined from the highest frequency generated or used excluding the local oscillator and tuned frequencies.	
NOTE 2 $F_x$ is defined in 3.1.19.	

The highest internal source of EUT is above 1GHz.

### 2.3.3 Test Procedure:

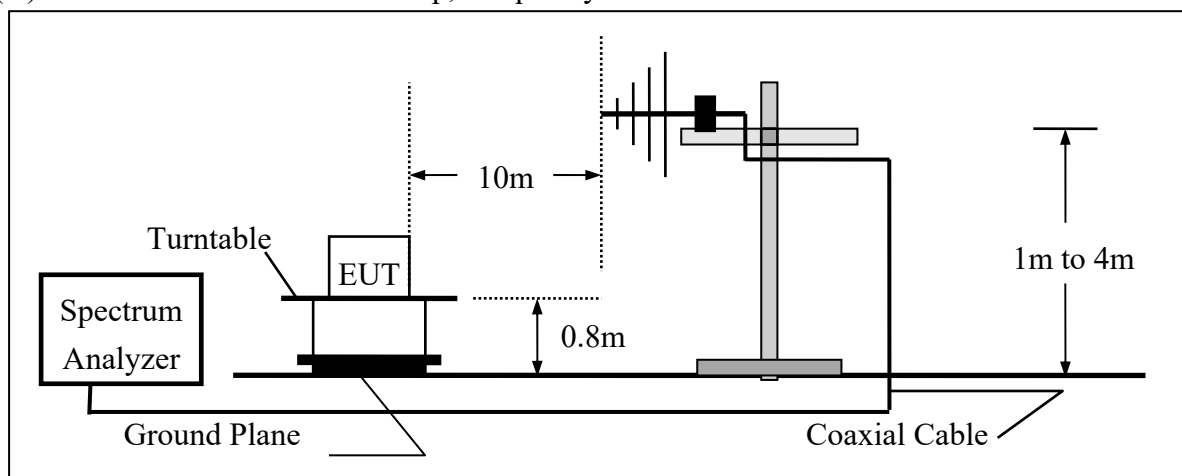
1. EUT was placed on an 0.8m wooden table.
2. Set up EUT with support units and turn on the power of all equipment.
3. Push the bottom of EUT to control the LED light.
4. The receive antenna is placed at 10m(3m for above 1GHz) distance from the EUT and search height from 1-4m.
5. The turntable was slowly rotated to locate the direction of maximum emission. Once maximum direction is determined, the search antenna was raised and lowered in both vertical and horizontal polarizations.

### 2.3.4 Test Instruments:

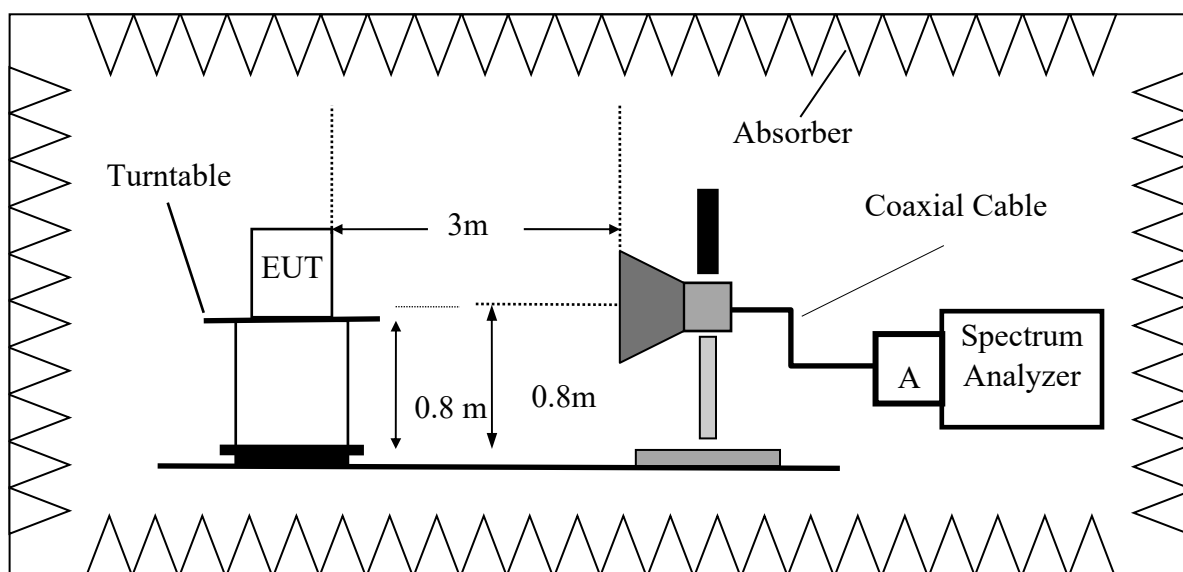
Refer to section 1.7 in this report

### 2.3.5 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency below 1GHz



(B) Radiated Emission Test Set-Up Frequency above 1 GHz



## Radiated Emission Measurement Data

Operation Mode	Config 1
----------------	----------



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### 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	46.20	-22.10	24.10	30.00	-5.90	200	120	peak
2	109.54	43.43	-19.23	24.20	30.00	-5.80	100	199	peak
3	130.10	43.09	-17.51	25.58	30.00	-4.42	100	357	QP
4	229.82	44.84	-17.98	26.86	30.00	-3.14	100	124	peak
5	249.89	48.50	-15.99	32.51	37.00	-4.49	100	117	QP
6	269.59	40.90	-15.20	25.70	37.00	-11.30	313	275	peak
7	915.61	58.78	-2.02	56.76	37.00	19.76	200	49	peak



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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 : LR62E

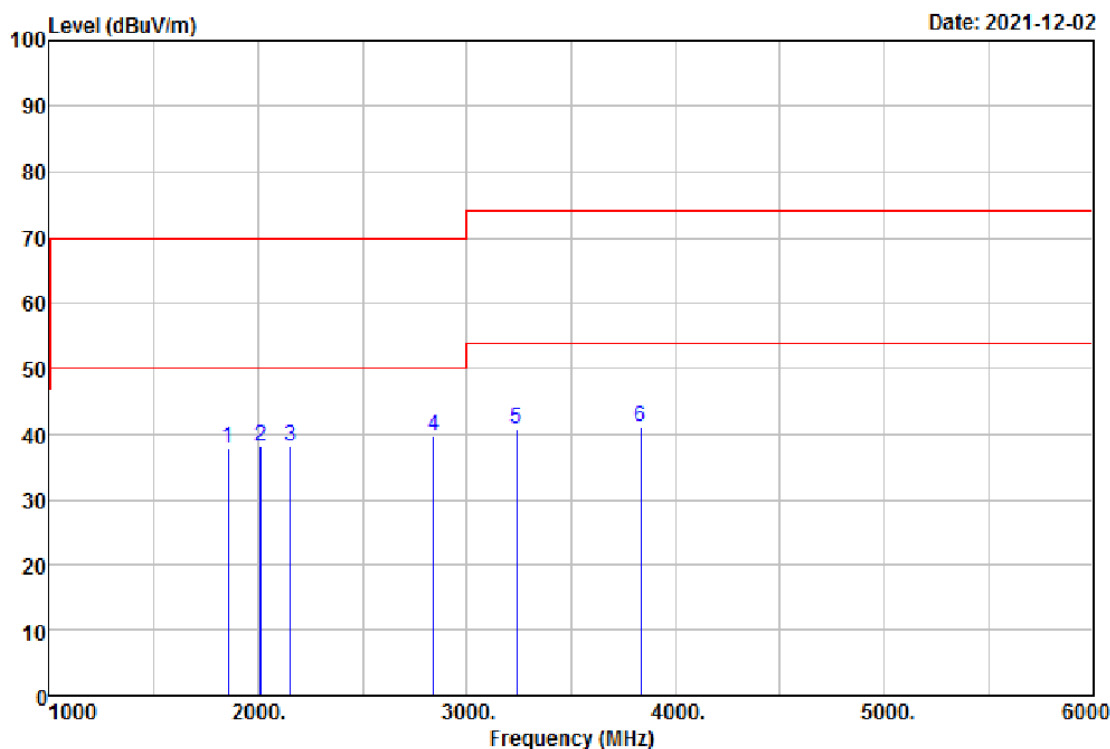
Mode :

Note : Config01

Frequency (MHz)	Emission (dBuV/m)	Margin (dB)	Note
915.6100	56.76	19.76	Main frequency



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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 Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	1855.00	50.74	-12.88	37.86	70.00	-32.14	Peak	VERTICAL
2	2010.00	51.06	-13.00	38.06	70.00	-31.94	Peak	VERTICAL
3	2155.00	50.97	-12.87	38.10	70.00	-31.90	Peak	VERTICAL
4	2840.00	50.85	-11.21	39.64	70.00	-30.36	Peak	VERTICAL
5	3240.00	50.81	-10.12	40.69	74.00	-33.31	Peak	VERTICAL
6	3835.00	50.27	-9.28	40.99	74.00	-33.01	Peak	VERTICAL



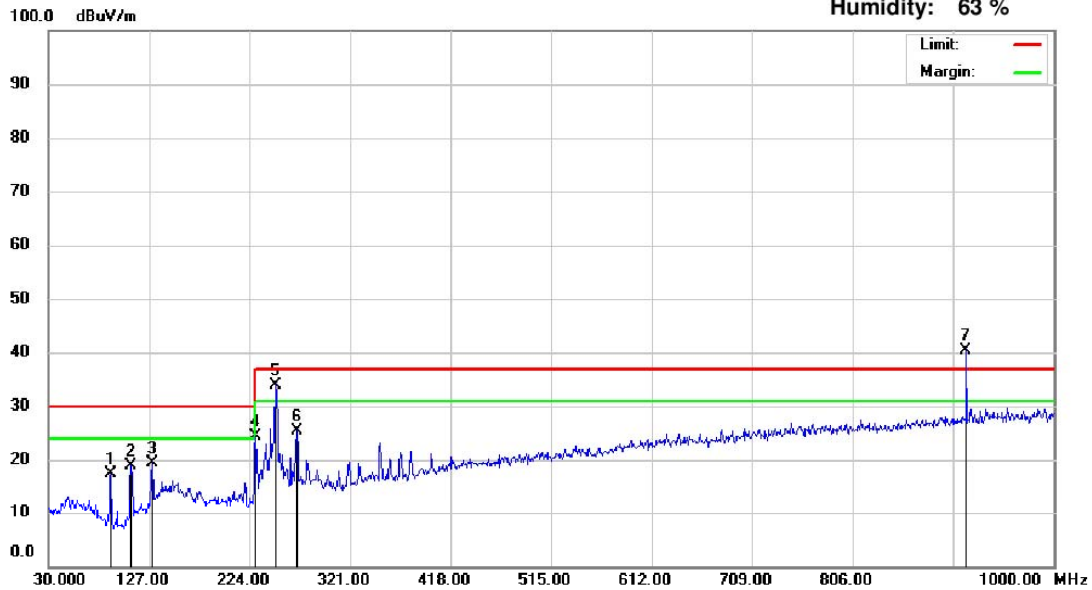
Operation Mode	Config 1
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Tel: 03-2638888

**Radiated Emission Measurement**

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	90.14	39.36	-22.10	17.26	30.00	-12.74	300	270	peak
2	109.54	38.00	-19.23	18.77	30.00	-11.23	400	360	peak
3	129.91	36.85	-17.52	19.33	30.00	-10.67	400	337	peak
4	229.82	42.43	-17.98	24.45	30.00	-5.55	300	146	peak
5	249.22	49.82	-16.02	33.80	37.00	-3.20	300	146	peak
6	269.59	40.70	-15.20	25.50	37.00	-11.50	300	146	peak
7	915.61	42.42	-2.02	40.40	37.00	3.40	300	187	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 : LR62E

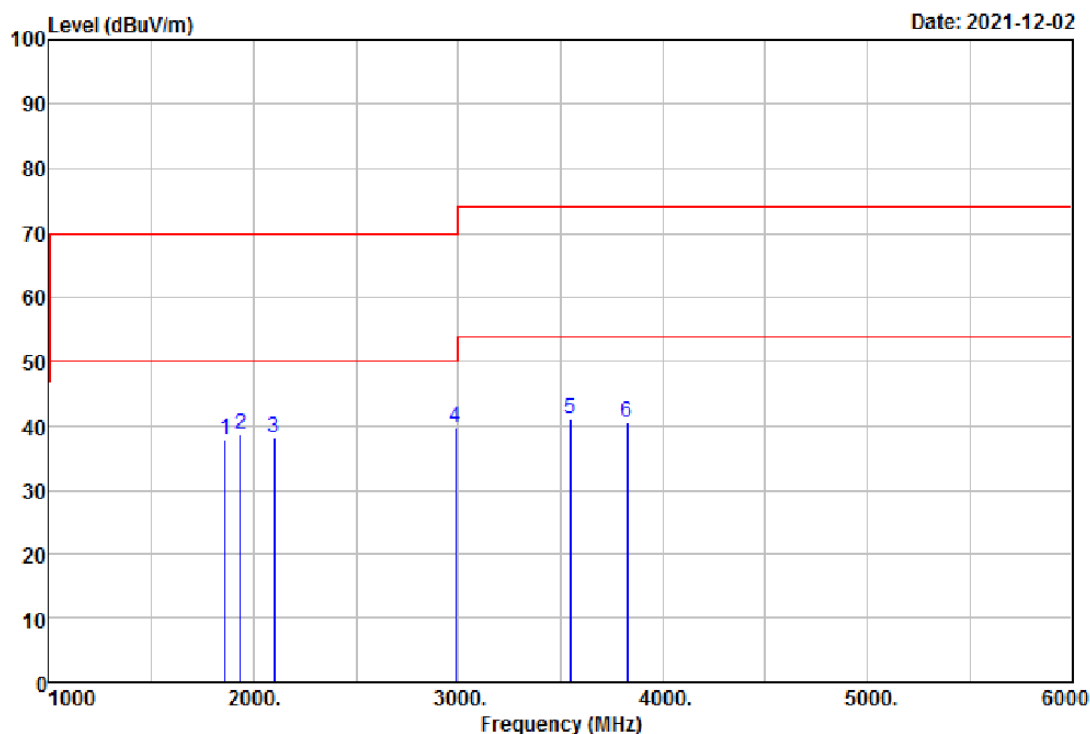
Mode :

Note : Config01

Frequency (MHz)	Emission (dBuV/m)	Margin (dB)	Note
915.6100	40.40	3.40	Main frequency



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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	1860.00	50.81	-12.89	37.92	70.00	-32.08	Peak	HORIZONTAL
2	1935.00	51.71	-13.09	38.62	70.00	-31.38	Peak	HORIZONTAL
3	2100.00	50.85	-12.81	38.04	70.00	-31.96	Peak	HORIZONTAL
4	2985.00	50.35	-10.75	39.60	70.00	-30.40	Peak	HORIZONTAL
5	3550.00	50.54	-9.36	41.18	74.00	-32.82	Peak	HORIZONTAL
6	3825.00	49.71	-9.29	40.42	74.00	-33.58	Peak	HORIZONTAL

## 2.4 AC Mains power input/output ports measurement.

### 2.4.1 Test Method:

Standard	Description
AS/NZS CISPR 32:2015 AMD 1:2020	Electromagnetic compatibility of multimedia equipment - Emission requirements

### 2.4.2 Limit:

Frequency range	Limit (quasi-peak) (dB $\mu$ V)	Limit (average) (dB $\mu$ V)
0,15 MHz to 0,5 MHz	66 to 56	56 to 46
> 0,5 MHz to 5 MHz	56	46
> 5 MHz to 30 MHz	60	50
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

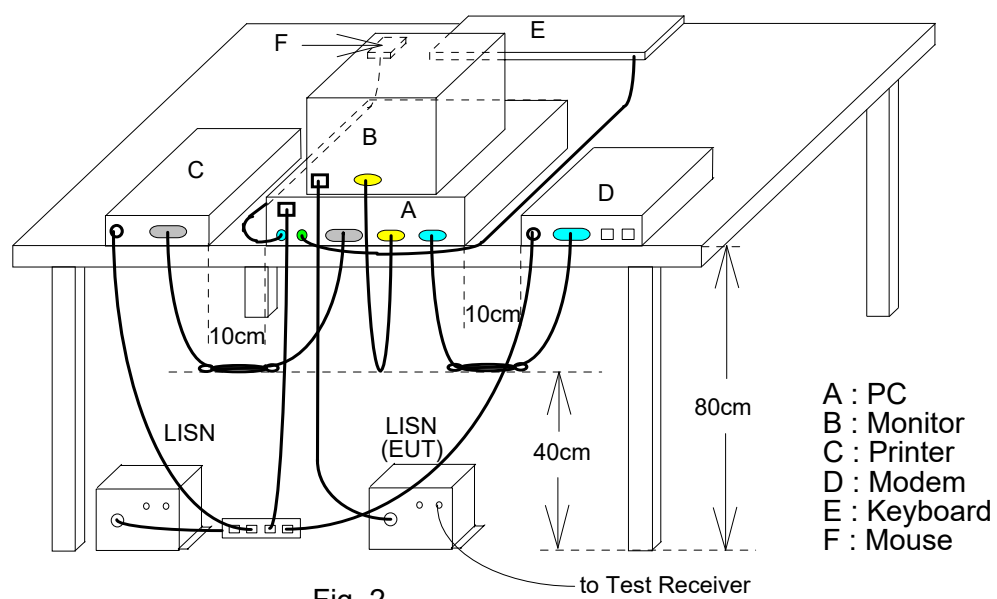
### 2.4.3 Test Procedure:

1. EUT was placed on an 0.8m wooden table above ground plane..
2. Set up EUT with support units and turn on the power of all equipment.
3. Link the EUT with Telecommunication tester, setup the test mode. The transmitter operating at continuously mode and max output rated power.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Repeat above procedures until all frequency measured were complete.

### 2.4.4 Test Instruments:

Refer to section 1.7 in this report

## 2.4.5 Test SET-UP (Block Diagram of Configuration)



## 2.4.6 Measurement Result:

Operation Mode:	Config 1
-----------------	----------



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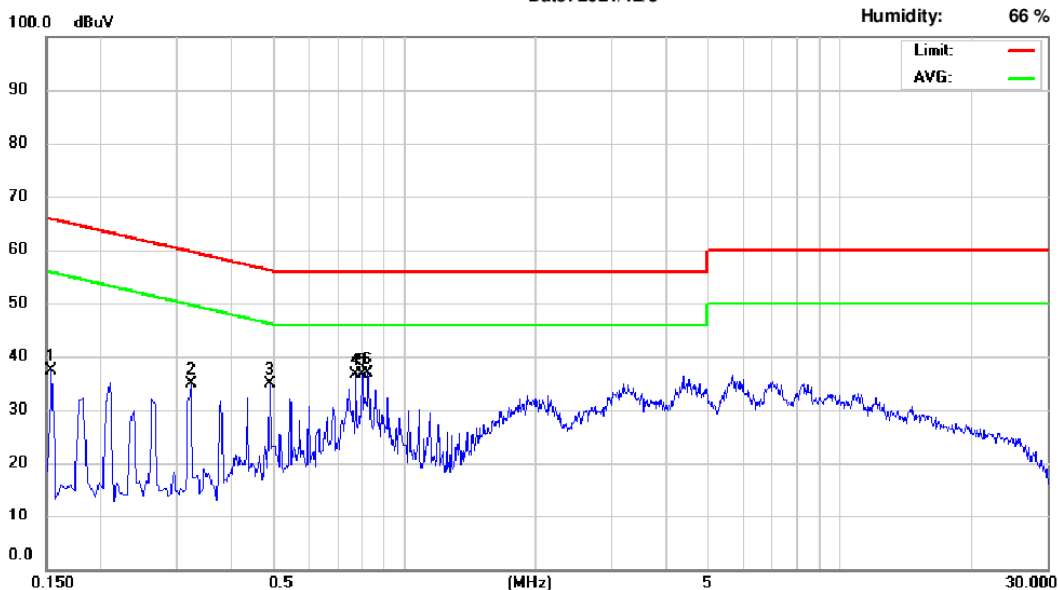
### Conducted Emission Measurement

Date: 2021/12/3

operator: Jeff Chou

Temperature: 22 °C

Humidity: 66 %



Site: Conduction 03

Phase: L1

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	0.154	22.12	3.59	9.64	31.76	65.78	-34.02	13.23	55.78	-42.55
2	0.322	17.34	1.39	9.65	26.99	59.66	-32.67	11.04	49.66	-38.62
3	0.490	20.68	7.12	9.66	30.34	56.17	-25.83	16.78	46.17	-29.39
4	0.774	20.42	11.33	9.68	30.10	56.00	-25.90	21.01	46.00	-24.99
5	0.798	24.03	15.73	9.68	33.71	56.00	-22.29	25.41	46.00	-20.59
6	0.826	21.65	13.09	9.68	31.33	56.00	-24.67	22.77	46.00	-23.23

Operation Mode:	Config 1
-----------------	----------



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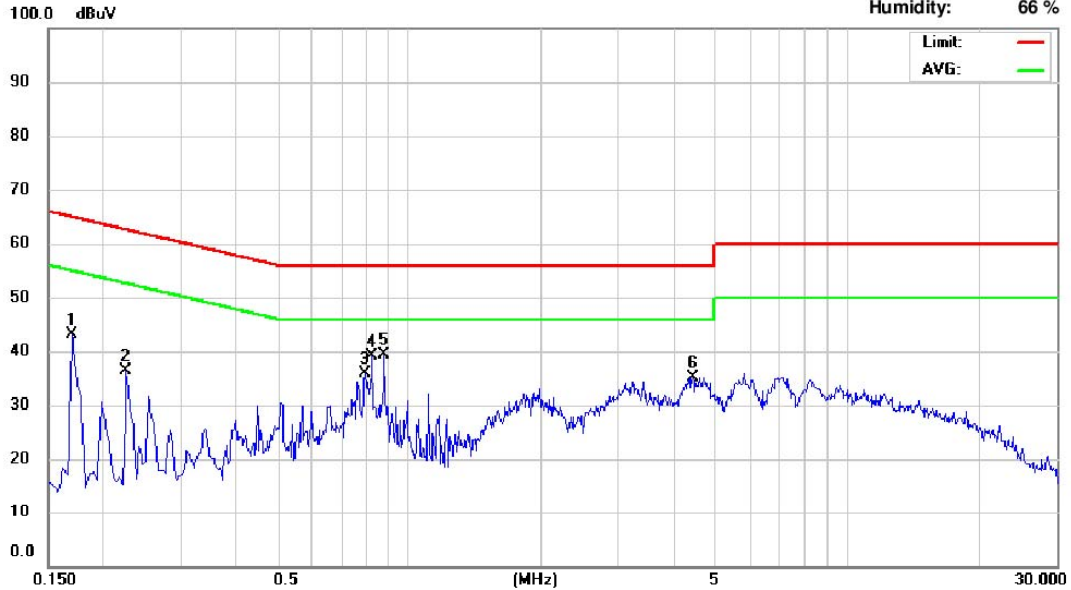
### Conducted Emission Measurement

Date: 2021/12/3

operator: Jeff Chou

Temperature: 22 °C

Humidity: 66 %



Site: Conduction 03

Phase: N

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	0.170	28.76	7.71	9.66	38.42	64.96	-26.54	17.37	54.96	-37.59
2	0.226	20.61	3.51	9.67	30.28	62.60	-32.32	13.18	52.60	-39.42
3	0.794	24.09	16.07	9.69	33.78	56.00	-22.22	25.76	46.00	-20.24
4	0.822	22.23	13.68	9.69	31.92	56.00	-24.08	23.37	46.00	-22.63
5	0.878	19.40	9.42	9.69	29.09	56.00	-26.91	19.11	46.00	-26.89
6	4.442	21.72	14.81	9.80	31.52	56.00	-24.48	24.61	46.00	-21.39

### 3. Appendix

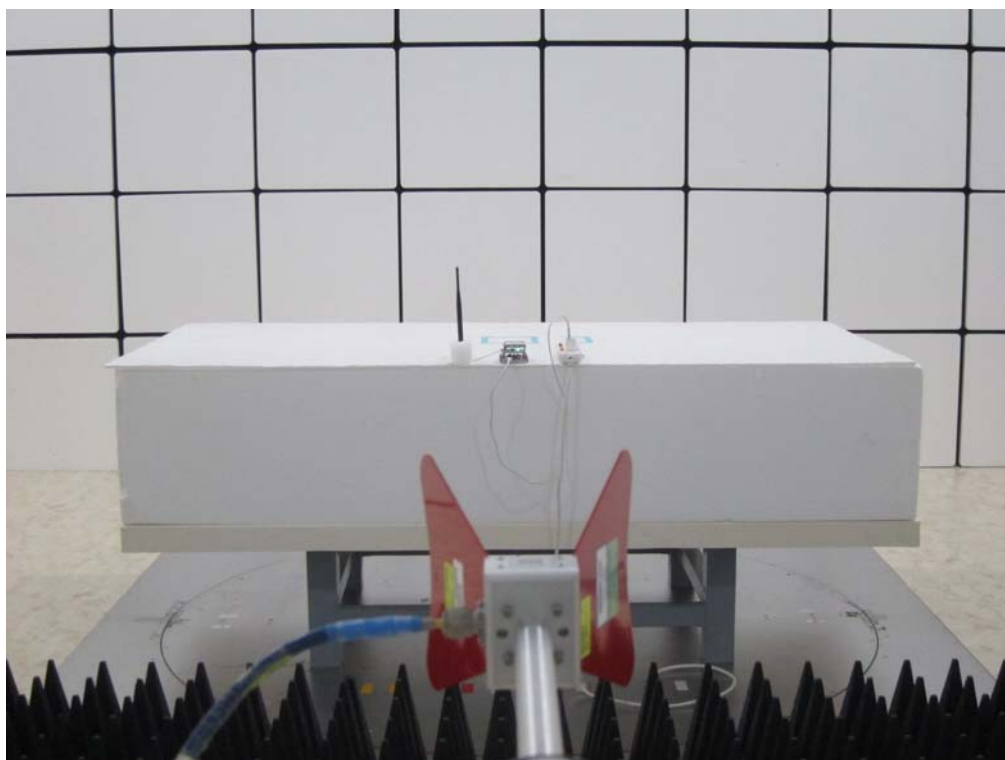
#### 3.1 Appendix 1: Photographs of Setup

##### **RADIATED EMISSION TEST**

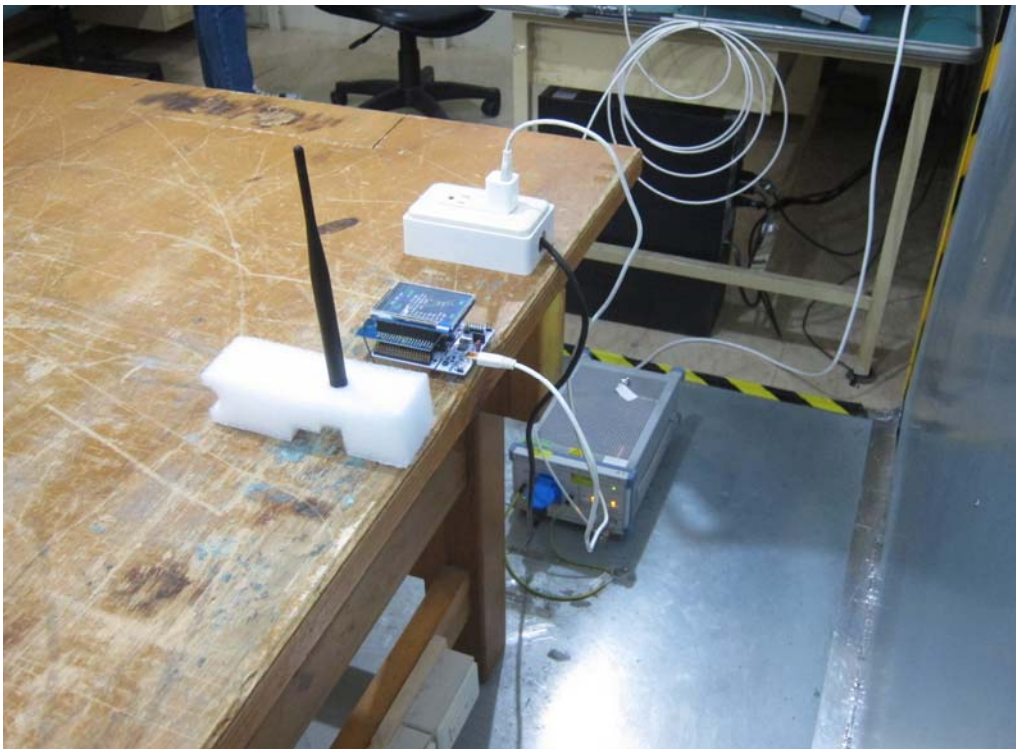




## RADIATED EMISSION TEST



### AC POWER LINE CONDUCTED EMISSION TEST



### **3.2 Appendix C: Photographs of EUT**

Please refer to the File of ISL-20LR171P

--- END ---