

## Test Report

**Applicant:** Dragino Technology Co., Limited.

**Address of Applicant:** Room 202,BaoChengTai industrial park,No.8 CaiYun  
LongCheng Street,LongGang District, Shenzhen 518116,  
China

**Manufacturer/Factory:** Dragino Technology Co., Limited.

**Address of  
Manufacturer/Factory:** Room 202,BaoChengTai industrial park,No.8 CaiYun  
LongCheng Street,LongGang District, Shenzhen 518116,  
China

**Equipment Under Test (EUT)**

Product Name: LoRaWAN Gateway

Model No.: LPS8

Trade Mark: Dragino

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart B

**Date of sample receipt:** December 20, 2019

**Date of Test:** December 20-31, 2019

**Date of report issued:** December 31, 2019

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



**Robinson Lo**

**Laboratory Manager**

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

## 2 Version

Version No.	Date	Description
00	December 31, 2019	Original

Prepared By:



Date:

December 31, 2019

Project Engineer

Check By:



Date:

December 31, 2019

Reviewer

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## 4 Test Summary

Test Item	Test Requirement	Test Method	Class / Severity	Result
Conducted Emission	FCC Part15.107	ANSI C63.4	Class B	PASS
Radiated Emissions #	FCC Part15.109 &15.31	ANSI C63.4	Class B	PASS

*Remarks:*

1. Pass: The EUT complies with the essential requirements in the standard.
2. # Refer to FCC Part 15.33 (b)(1) conditional testing procedure :

The highest frequency generated or used in the EUT	Test frequency range of Radiated emission
<108MHz	30MHz ~ 1GHz
108MHz ~ 500MHz	30MHz ~ 2GHz
500MHz ~ 1GHz	30MHz ~ 5GHz
>1GHz	30MHz ~ 5th harmonic of the highest frequency or 40 GHz, whichever is lower.

*Note: the EUT Internal clock frequency above 108MHz.*

### Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

## 5 General Information

### 5.1 General Description of EUT

Product Name:	LoRaWAN Gateway
Model No.:	LPS8
Test sample(s) ID:	GTS201912000229-1
Sample(s) Status:	Normal sample
Power Supply:	DC 5.0V From Adapter

### 5.2 Test mode and Test voltage

<b>Test mode:</b>	
Operation mode	Keep the EUT in operation mode.
<b>Test voltage</b>	
AC 120V 60Hz	

### 5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
Apple	PC	A1278	C1MN99ERDTY3

### 5.4 Deviation from Standards

None.

### 5.5 Abnormalities from Standard Conditions

None.

### 5.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

### 5.7 Test Location

The test was performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventor y No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

<b>Conducted Emission</b>						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 26 2019	June. 25 2020
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June. 26 2019	June. 25 2020
5	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Thermo meter	KTJ	TA328	GTS233	June. 26 2019	June. 25 2020
8	Absorbing clamp	Elektronik- Feinmechanik	MDS21	GTS229	June. 26 2019	June. 25 2020
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 26 2019	June. 25 2020

<b>General used equipment:</b>						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020



## 7 Test Results and Measurement Data

### 7.1 Radiated Emission

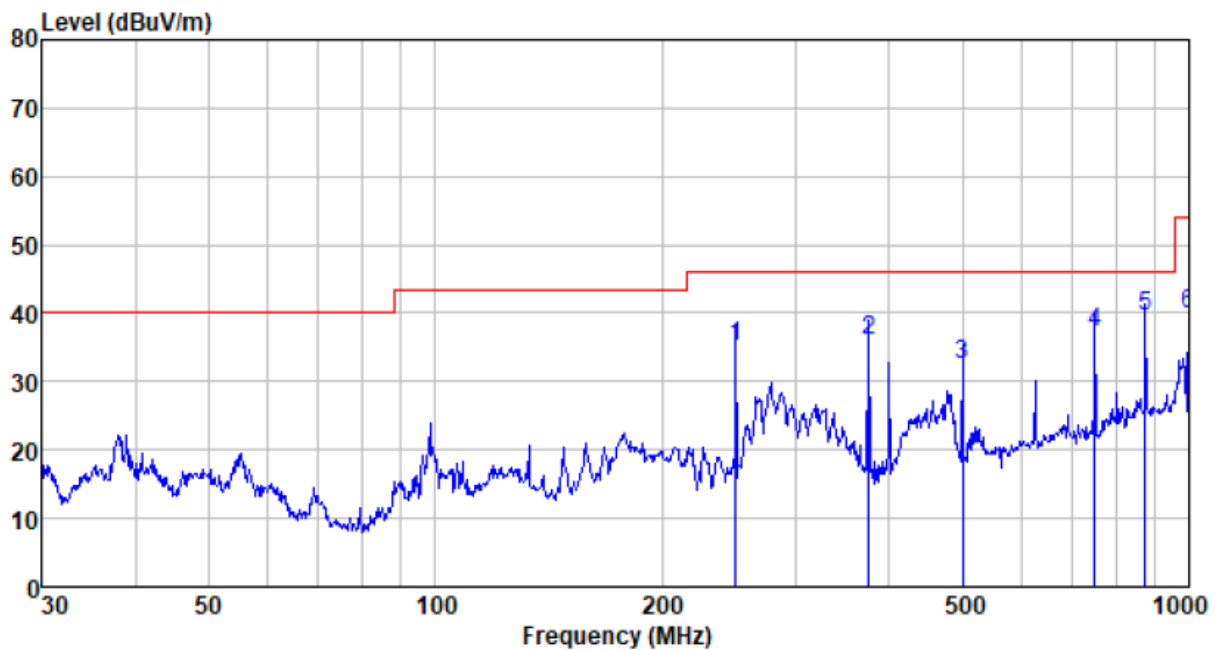
Test Requirement:	FCC Part15 B Section 15.109			
Test Method:	ANSI C63.4:2014			
Test Frequency Range:	30MHz to 6000MHz			
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)			
Receiver setup:	Frequency	Detector	RBW	VBW
	30MHz-1GHz	Quasi-peak	120kHz	300kHz
	Above 1GHz	Peak	1MHz	3MHz
Peak		1MHz	10Hz	Average Value
Limit:	Frequency	Limit (dBuV/m @3m)		Remark
	30MHz-88MHz	40.00		Quasi-peak Value
	88MHz-216MHz	43.50		Quasi-peak Value
	216MHz-960MHz	46.00		Quasi-peak Value
	960MHz-1GHz	54.00		Quasi-peak Value
	Above 1GHz	54.00		Average Value
74.00		Peak Value		
Test setup:	For radiated emissions from 30MHz to1GHz			
Test setup:	For radiated emissions above 1GHz			
Test environment:	Temp.:	25 °C	Humid.:	52%
	Press.:	1 012mbar		

Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

## Measurement Data

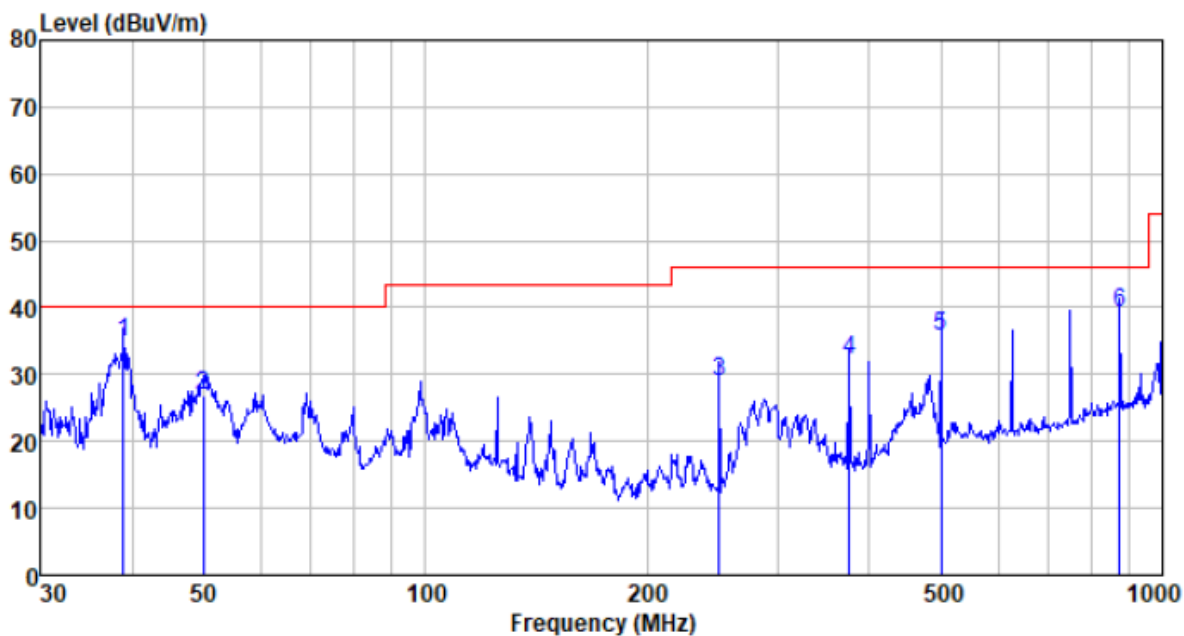
### Below 1GHz

Test mode:	Operation mode	Antenna Polarity:	Horizontal
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
250.301	58.10	12.18	2.12	37.38	35.02	46.00	-10.98	QP
375.939	55.87	14.94	2.75	37.50	36.06	46.00	-9.94	QP
501.179	49.39	17.30	3.31	37.51	32.49	46.00	-13.51	QP
750.108	49.98	20.53	4.28	37.62	37.17	46.00	-8.83	QP
875.247	50.18	22.09	4.76	37.60	39.43	46.00	-6.57	QP
1000.000	49.46	22.70	5.22	37.51	39.87	54.00	-14.13	QP

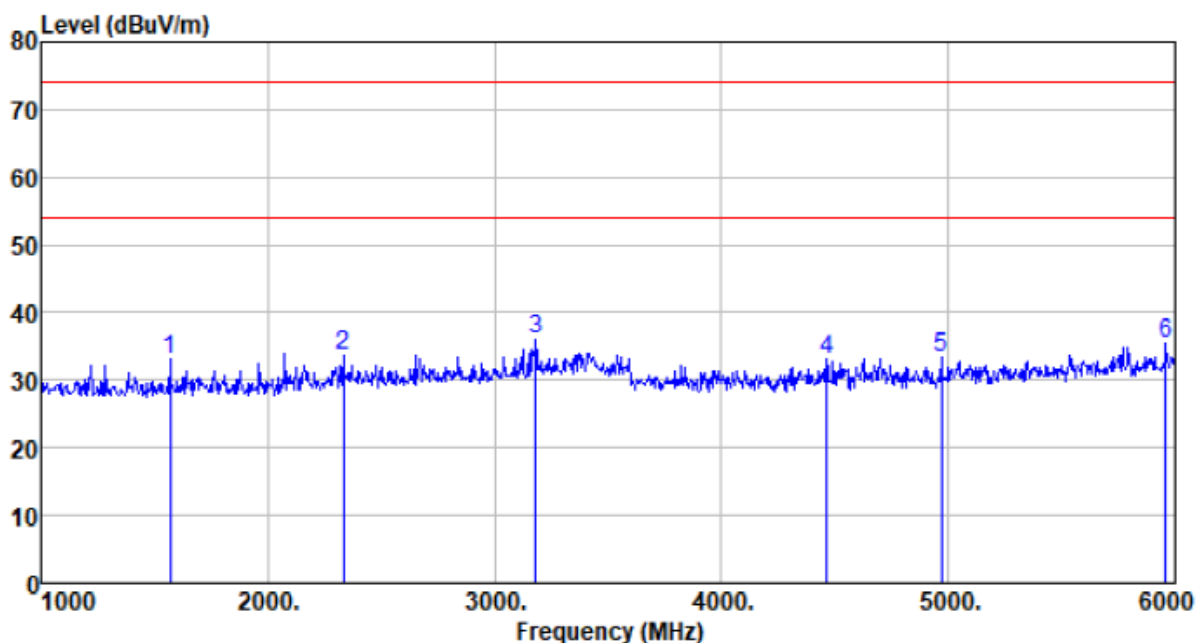
Test mode:	Operation mode	Antenna Polarity:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
38.888	57.86	12.01	0.65	35.60	34.92	40.00	-5.08	QP
49.881	49.95	12.30	0.77	36.17	26.85	40.00	-13.15	QP
250.301	52.05	12.18	2.12	37.38	28.97	46.00	-17.03	QP
375.939	51.85	14.94	2.75	37.50	32.04	46.00	-13.96	QP
501.179	52.74	17.30	3.31	37.51	35.84	46.00	-10.16	QP
875.247	50.09	22.09	4.76	37.60	39.34	46.00	-6.66	QP

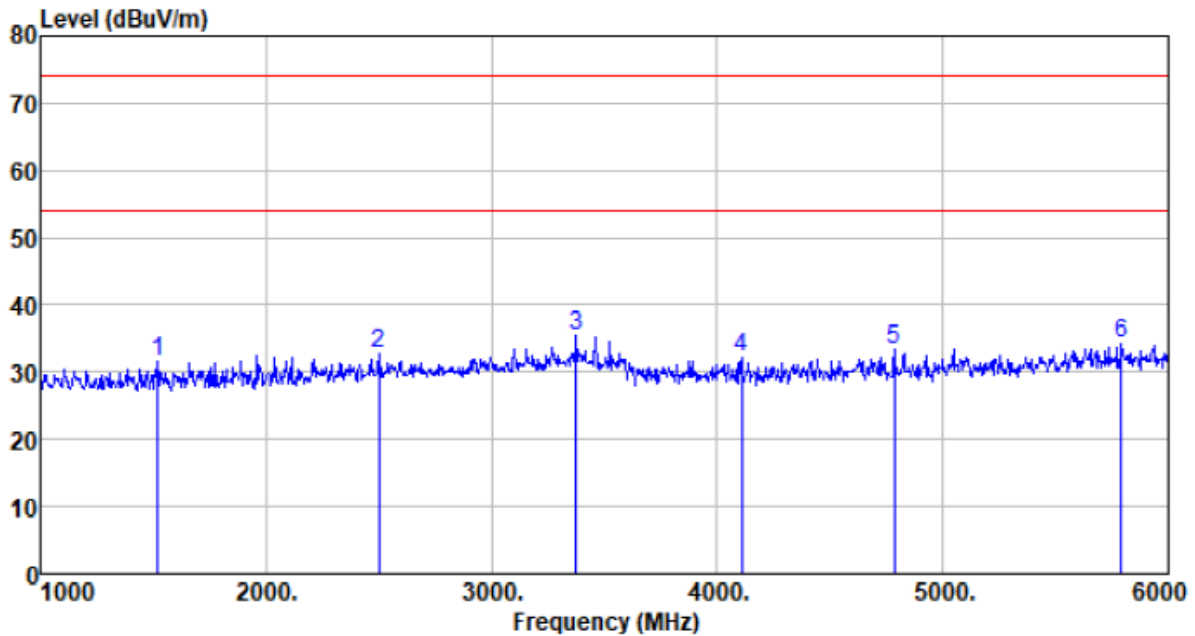
**Above 1GHz**

Test mode:	Operation mode	Antenna Polarity:	Horizontal
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
1570.000	41.42	25.43	2.32	36.22	32.95	74.00	-41.05	Peak
2335.000	40.26	27.20	2.85	36.80	33.51	74.00	-40.49	Peak
3180.000	41.35	28.40	3.59	37.32	36.02	74.00	-37.98	Peak
4465.000	35.70	30.66	4.40	37.60	33.16	74.00	-40.84	Peak
4970.000	34.83	31.46	4.81	37.79	33.31	74.00	-40.69	Peak
5960.000	33.79	32.54	5.58	36.44	35.47	74.00	-38.53	Peak

Test mode:	Operation mode	Antenna Polarity:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
1520.000	40.12	25.34	2.30	36.18	31.58	74.00	-42.42	Peak
2500.000	38.95	27.70	3.01	36.94	32.72	74.00	-41.28	Peak
3375.000	40.78	28.40	3.64	37.34	35.48	74.00	-38.52	Peak
4110.000	35.56	30.00	3.97	37.45	32.08	74.00	-41.92	Peak
4785.000	35.23	31.18	4.60	37.72	33.29	74.00	-40.71	Peak
5790.000	33.37	32.24	5.45	36.67	34.39	74.00	-39.61	Peak

**Note:**

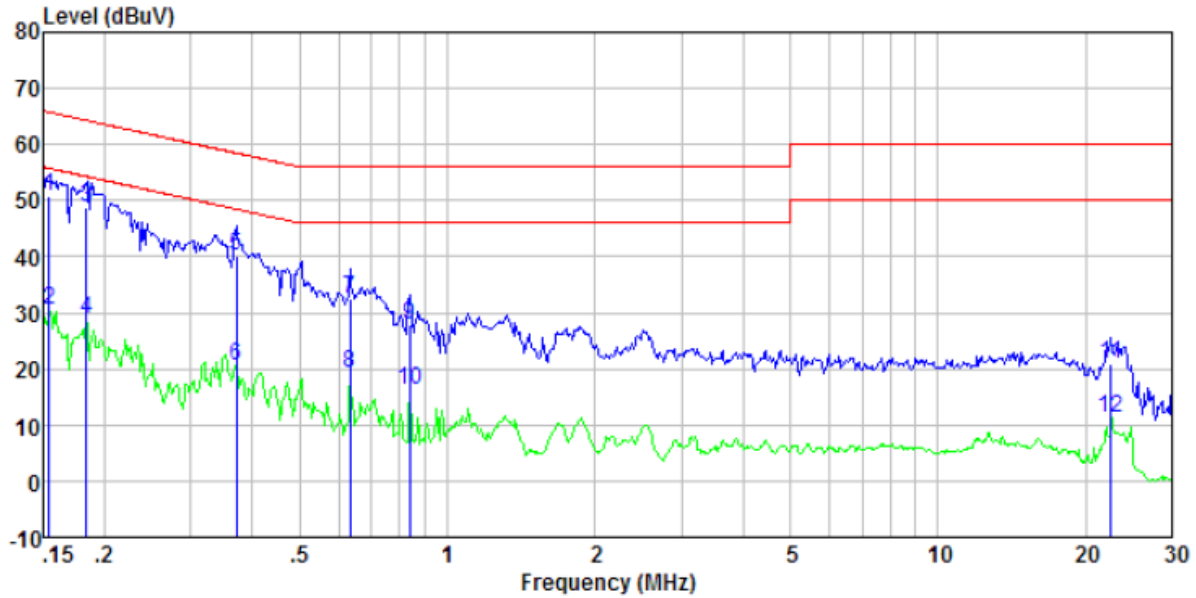
1. The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
2. Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 B Section 15.107														
Test Method:	ANSI C63.4:2014														
Test Frequency Range:	150kHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9kHz, VBW=30kHz														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBμV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>0.5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table>	Frequency range (MHz)	Limit (dBμV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	0.5-30	60	50
Frequency range (MHz)	Limit (dBμV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
0.5-30	60	50													
Test setup:	<p>Remark  E.U.T: Equipment Under Test  LISN: Line Impedance Stabilization Network  Test table height=0.8m</p>														
Test environment:	Temp.: 25 °C    Humid.: 52%    Press.: 1 012mbar														
Test Instruments:	Refer to section 6 for details														
Test mode:	Refer to section 5.2 for details,														
Test results:	Pass														

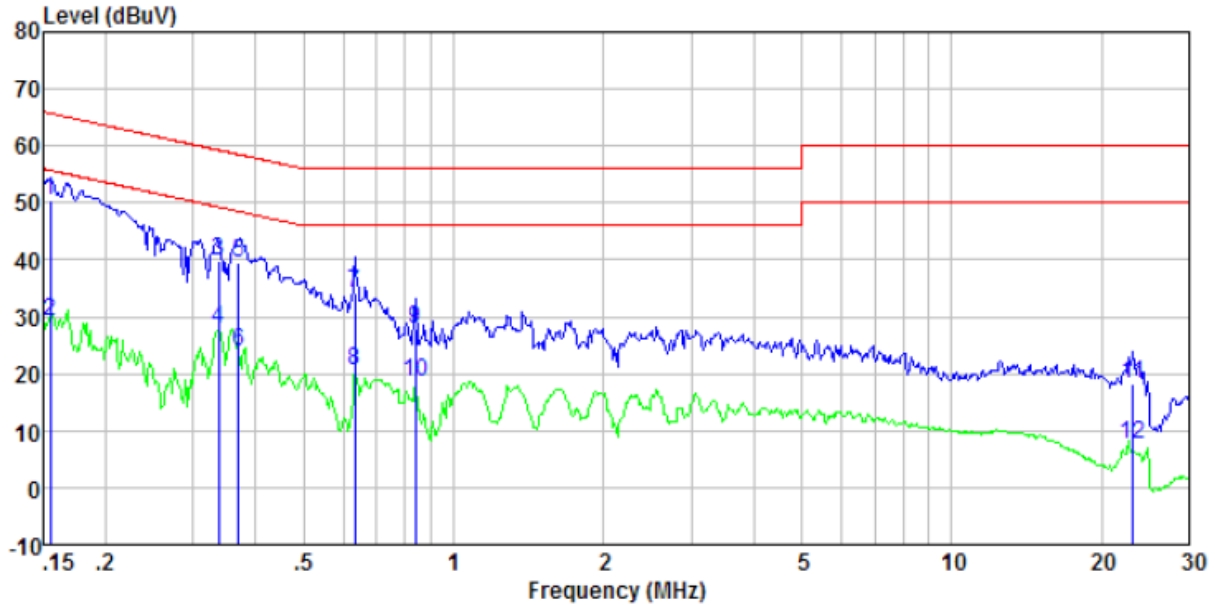
## Measurement Data

Test mode:	Operation mode	Phase Polarity:	Line
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Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	50.22	0.40	0.07	50.69	65.78	-15.09	QP
0.15	29.92	0.40	0.07	30.39	55.78	-25.39	Average
0.18	48.30	0.40	0.10	48.80	64.33	-15.53	QP
0.18	28.49	0.40	0.10	28.99	54.33	-25.34	Average
0.37	39.76	0.36	0.10	40.22	58.47	-18.25	QP
0.37	19.97	0.36	0.10	20.43	48.47	-28.04	Average
0.63	32.16	0.28	0.12	32.56	56.00	-23.44	QP
0.63	18.82	0.28	0.12	19.22	46.00	-26.78	Average
0.84	27.61	0.23	0.14	27.98	56.00	-28.02	QP
0.84	15.92	0.23	0.14	16.29	46.00	-29.71	Average
22.54	20.49	0.33	0.23	21.05	60.00	-38.95	QP
22.54	10.84	0.33	0.23	11.40	50.00	-38.60	Average

Test mode:	Operation mode	Phase Polarity:	Neutral
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Freq MHz	Reading level dBuV	LISN/ISN factor dB/m	Cable loss dB	Level dBuV	Limit level dBuV	Over limit dB	Remark
0.15	49.89	0.40	0.07	50.36	65.74	-15.38	QP
0.15	28.82	0.40	0.07	29.29	55.74	-26.45	Average
0.34	39.34	0.38	0.10	39.82	59.27	-19.45	QP
0.34	27.44	0.38	0.10	27.92	49.27	-21.35	Average
0.37	39.11	0.37	0.10	39.58	58.52	-18.94	QP
0.37	23.51	0.37	0.10	23.98	48.52	-24.54	Average
0.63	33.64	0.28	0.12	34.04	56.00	-21.96	QP
0.63	20.15	0.28	0.12	20.55	46.00	-25.45	Average
0.84	27.48	0.23	0.14	27.85	56.00	-28.15	QP
0.84	18.24	0.23	0.14	18.61	46.00	-27.39	Average
23.14	17.82	0.34	0.23	18.39	60.00	-41.61	QP
23.14	7.10	0.34	0.23	7.67	50.00	-42.33	Average

**Notes:**

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.



## 8 Test Setup Photo

Reference to the **appendix I** for details.

## 9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----