

# 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.: DLOS8

Trade Mark: Dragino

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

**Date of sample receipt:** Oct. 12, 2020

**Date of Test:** Oct. 12 – Nov. 03, 2020

**Date of report issued:** Nov. 04, 2020

**Test Result :** PASS \*

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

Authorized Signature:

**Robinson Luo**

**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	Nov. 04, 2020	Original

**Prepared By:**



**Date:**

Nov. 04, 2020

**Project Engineer**

**Check By:**



**Date:**

Nov. 04, 2020

**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.:	DLOS8
Test sample(s) ID:	GTS20201000055-1
Sample(s) Status:	Normal sample
Power Supply:	AC/DC Adapter Model: TP02-120100E Input:AC100-240V, 50/60Hz Output: DC 12V, 1A

### 5.2 Test mode and Test voltage

<b>Test mode:</b>	
LAN mode	Keep the EUT ping with PC via LAN port.
<b>Test voltage</b>	
AC 120V 60Hz	

### 5.3 Description of Support Units

Manufacturer	Description	Model	Serial Number
DELL	PC Host	OPTIPLEX745	GTS312
DELL	MONITOR	N/A	N/A
DELL	KEYBOARD	SK-8115	N/A
DELL	MOUSE	N/A	N/A

### 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.	Inventory 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. 02 2020	July. 01 2025
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. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

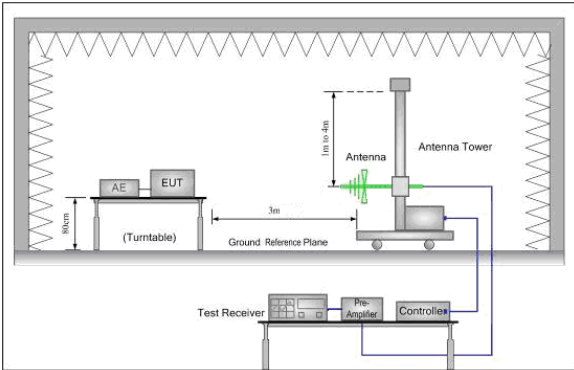
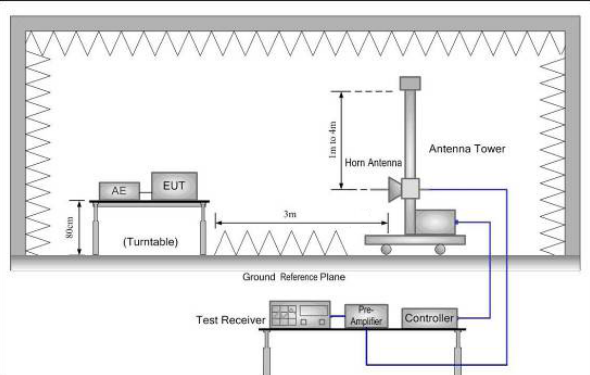
<b>Conducted Emission</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal.Date (mm-dd-yy)</b>	<b>Cal.Due date (mm-dd-yy)</b>
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.15 2019	May.14 2022
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June. 25 2020	June. 24 2021
4	ENV216 2-L-V- NETZNACHB.DE	ROHDE&SCHWARZ	ENV216	GTS226	June. 25 2020	June. 24 2021
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. 25 2020	June. 24 2021
8	Absorbing clamp	Elektronik- Feinmechanik	MDS21	GTS229	June. 25 2020	June. 24 2021
9	ISN	SCHWARZBECK	NTFM 8158	GTD565	June. 25 2020	June. 24 2021

<b>General used equipment:</b>						
<b>Item</b>	<b>Test Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Inventory No.</b>	<b>Cal.Date (mm-dd-yy)</b>	<b>Cal.Due date (mm-dd-yy)</b>
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021



## 7 Test Results and Measurement Data

### 7.1 Radiated Emission

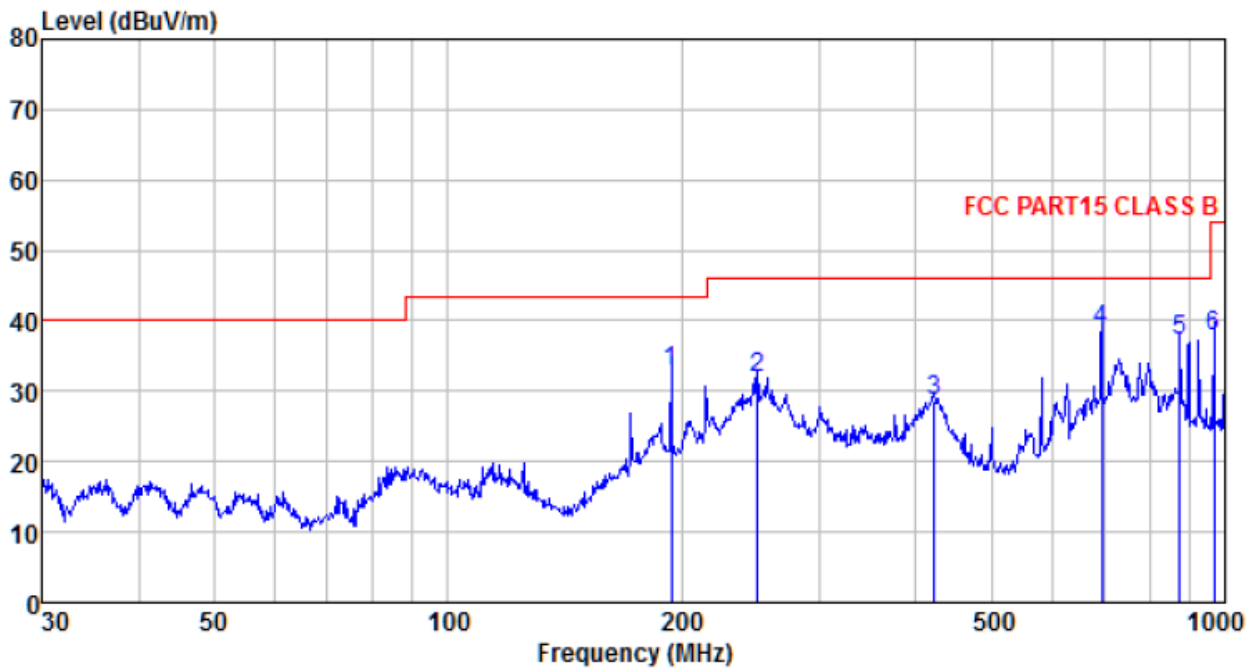
Test Requirement:	FCC Part15 B Section 15.109			
Test Method:	ANSI C63.4:2014			
Test Frequency Range:	30MHz to 6000MHz			
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)			
Receiver setup:	Frequency	Detector	RBW	VBW
	30MHz-1GHz	Quasi-peak	120kHz	300kHz
	Above 1GHz	Peak	1MHz	3MHz
Peak		1MHz	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 and only show the worst case.
Test results:	Pass

## Measurement Data

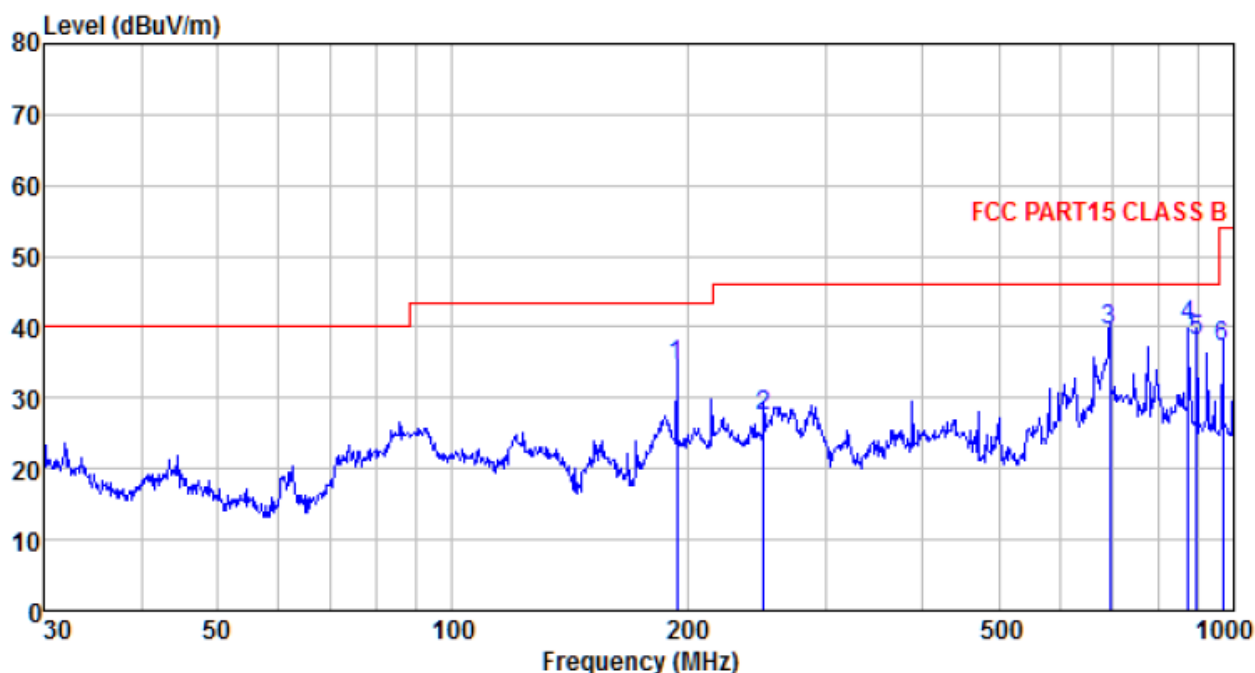
### Below 1GHz

Test mode:	LAN 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
193.773	58.26	10.08	1.81	37.30	32.85	43.50	-10.65	QP
250.301	55.11	12.18	2.12	37.38	32.03	46.00	-13.97	QP
422.058	47.52	15.79	2.96	37.52	28.75	46.00	-17.25	QP
694.417	52.61	19.59	4.07	37.63	38.64	46.00	-7.36	QP
875.247	48.06	22.09	4.76	37.60	37.31	46.00	-8.69	QP
968.934	47.63	22.59	5.11	37.54	37.79	54.00	-16.21	QP

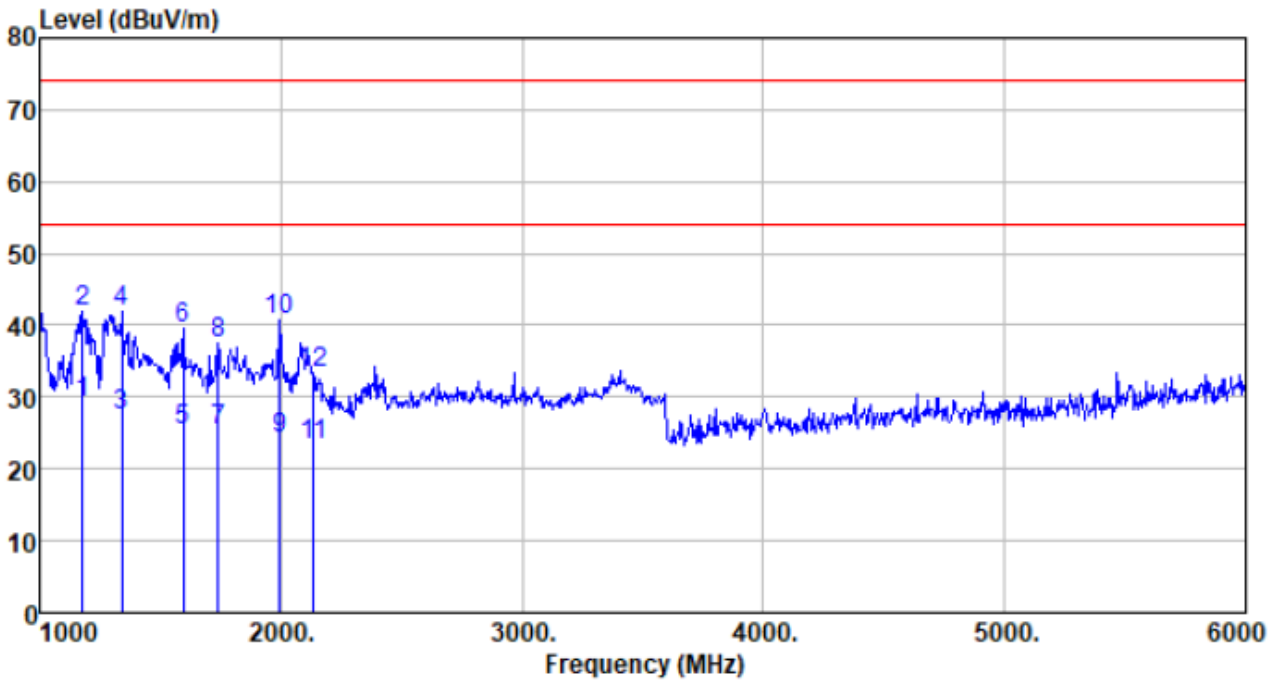
Test mode:	LAN mode	Antenna Polarity:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
193.773	59.83	10.08	1.81	37.30	34.42	43.50	-9.08	QP
250.301	50.52	12.18	2.12	37.38	27.44	46.00	-18.56	QP
694.417	53.64	19.59	4.07	37.63	39.67	46.00	-6.33	QP
875.247	50.91	22.09	4.76	37.60	40.16	46.00	-5.84	QP
896.997	48.44	22.27	4.83	37.60	37.94	46.00	-8.06	QP
968.934	47.16	22.59	5.11	37.54	37.32	54.00	-16.68	QP

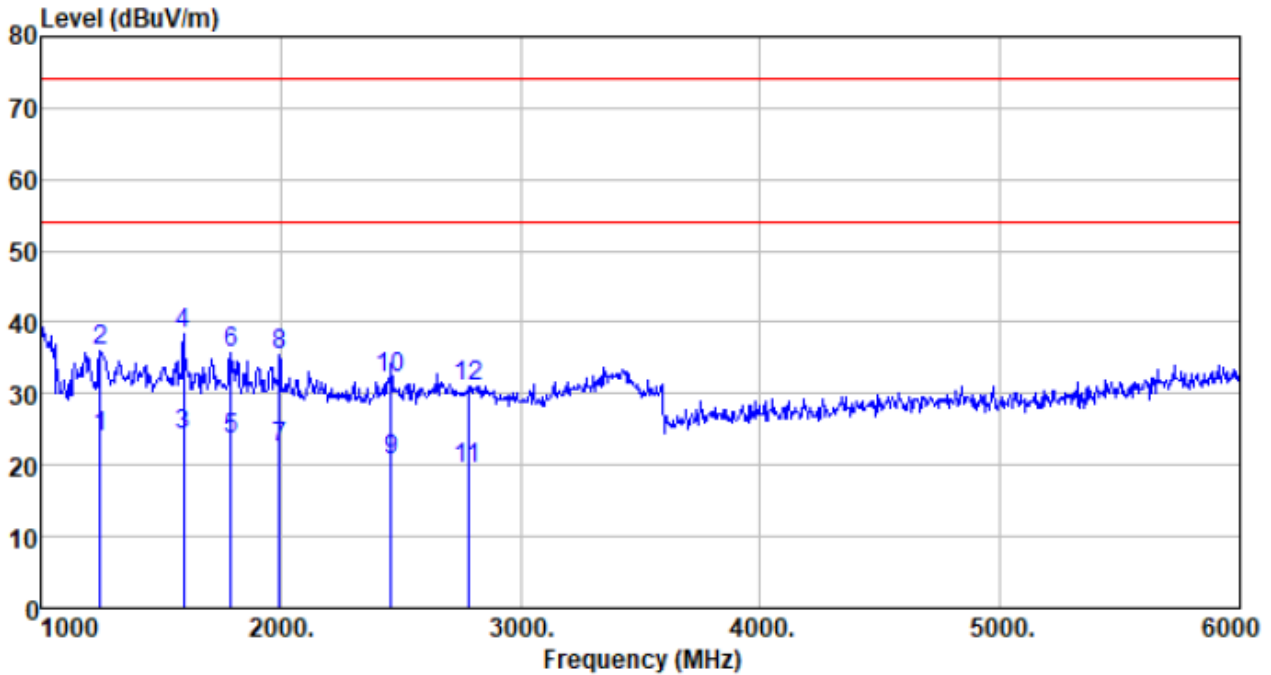
Above 1GHz

Test mode:	LAN 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
1180.000	35.44	25.25	4.45	35.89	29.25	54.00	-24.75	Average
1180.000	48.02	25.25	4.45	35.89	41.83	74.00	-32.17	Peak
1340.000	33.25	25.69	4.57	36.04	27.47	54.00	-26.53	Average
1340.000	47.58	25.69	4.57	36.04	41.80	74.00	-32.20	Peak
1595.000	31.97	24.99	4.74	36.24	25.46	54.00	-28.54	Average
1595.000	46.12	24.99	4.74	36.24	39.61	74.00	-34.39	Peak
1740.000	31.82	25.05	4.83	36.34	25.36	54.00	-28.64	Average
1740.000	44.04	25.05	4.83	36.34	37.58	74.00	-36.42	Peak
1995.000	29.78	26.11	4.96	36.50	24.35	54.00	-29.65	Average
1995.000	46.13	26.11	4.96	36.50	40.70	74.00	-33.30	Peak
2135.000	27.40	27.39	5.11	36.63	23.27	54.00	-30.73	Average
2135.000	37.50	27.39	5.11	36.63	33.37	74.00	-40.63	Peak

Test mode:	LAN 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
1250.000	29.92	25.52	4.50	35.96	23.98	54.00	-30.02	Average
1250.000	42.08	25.52	4.50	35.96	36.14	74.00	-37.86	Peak
1595.000	30.73	24.99	4.74	36.24	24.22	54.00	-29.78	Average
1595.000	44.76	24.99	4.74	36.24	38.25	74.00	-35.75	Peak
1795.000	29.99	25.25	4.85	36.37	23.72	54.00	-30.28	Average
1795.000	42.10	25.25	4.85	36.37	35.83	74.00	-38.17	Peak
1995.000	27.87	26.11	4.96	36.50	22.44	54.00	-31.56	Average
1995.000	40.73	26.11	4.96	36.50	35.30	74.00	-38.70	Peak
2460.000	24.73	27.49	5.45	36.91	20.76	54.00	-33.24	Average
2460.000	36.28	27.49	5.45	36.91	32.31	74.00	-41.69	Peak
2780.000	22.63	28.34	5.74	37.15	19.56	54.00	-34.44	Average
2780.000	34.19	28.34	5.74	37.15	31.12	74.00	-42.88	Peak

Note:

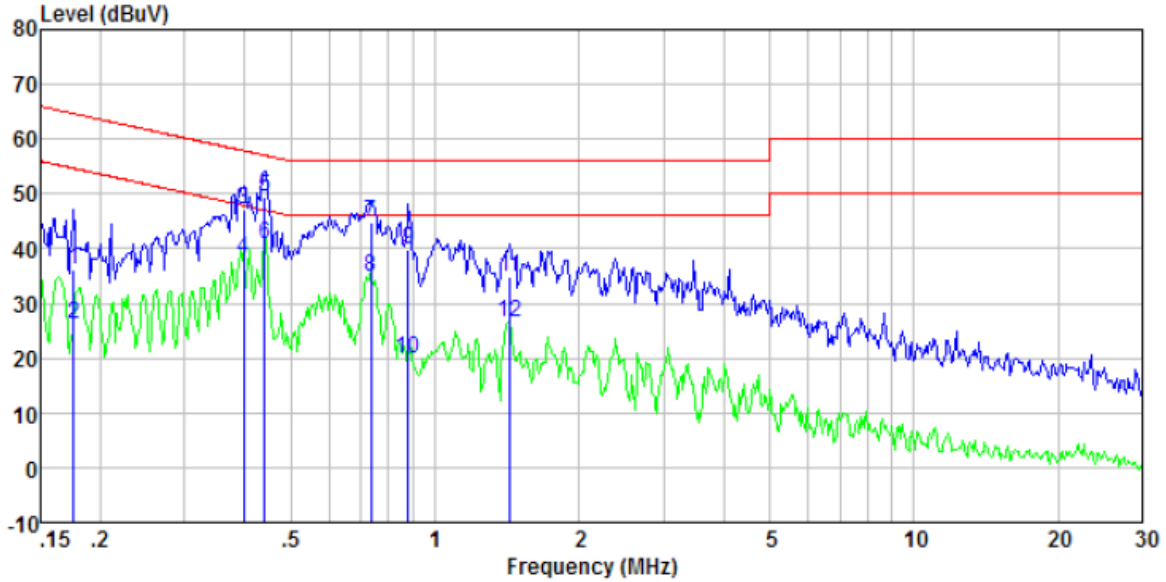
1. The field strength is calculated by adding the Antenna Factor, Cable Factor & Pre-amplifier. The basic equation with a sample calculation is as follows:
2. Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Pre-amplifier Factor

## 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>Reference Plane</p> <p>LISN</p> <p>40cm</p> <p>80cm</p> <p>LISN</p> <p>AUX Equipment</p> <p>E.U.T.</p> <p>Filter</p> <p>AC power</p> <p>EMI Receiver</p> <p>Test table/Insulation plane</p> <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 and only show the worst case.														
Test results:	Pass														

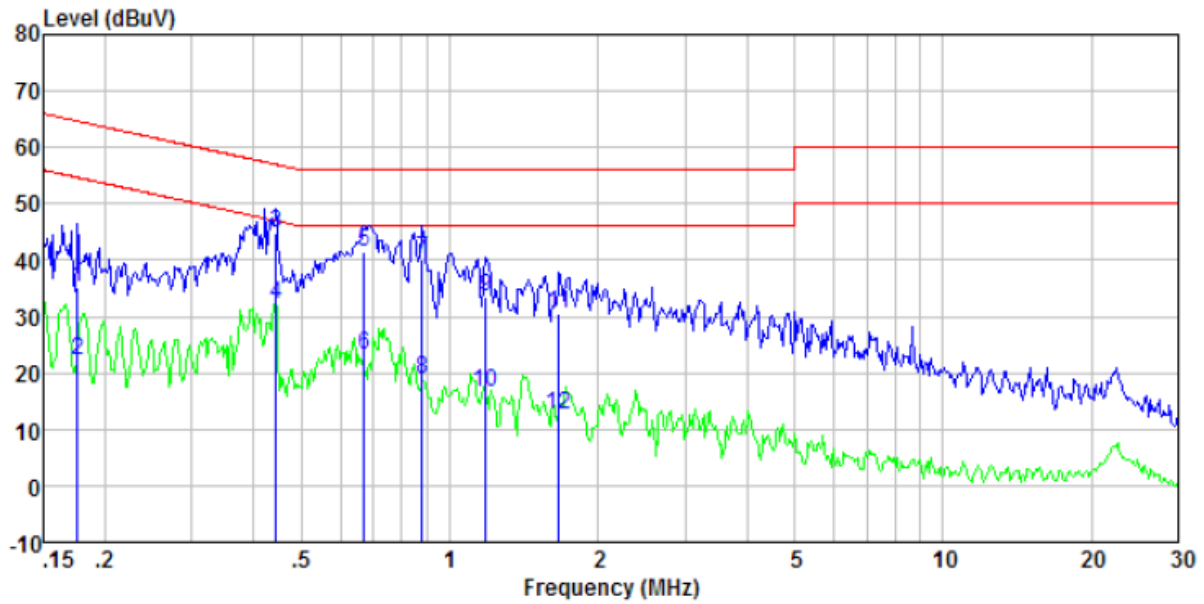
## Measurement Data

Test mode:	LAN mode	Phase Polarity:	Line
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Freq MHz	Reading level dBuV	IISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.176	35.71	0.40	0.09	36.20	64.68	-28.48	QP
0.176	25.78	0.40	0.09	26.27	54.68	-28.41	Average
0.398	46.60	0.35	0.11	47.06	57.90	-10.84	QP
0.398	37.72	0.35	0.11	38.18	47.90	-9.72	Average
0.440	49.06	0.34	0.11	49.51	57.07	-7.56	QP
0.440	40.38	0.34	0.11	40.83	47.07	-6.24	Average
0.735	44.34	0.25	0.13	44.72	56.00	-11.28	QP
0.735	34.62	0.25	0.13	35.00	46.00	-11.00	Average
0.880	39.46	0.22	0.14	39.82	56.00	-16.18	QP
0.880	19.47	0.22	0.14	19.83	46.00	-26.17	Average
1.433	34.61	0.20	0.16	34.97	56.00	-21.03	QP
1.433	26.17	0.20	0.16	26.53	46.00	-19.47	Average

Test mode:	Line in mode	Phase Polarity:	Neutral
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Freq MHz	Reading level dBuV	LISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.176	34.65	0.40	0.09	35.14	64.68	-29.54	QP
0.176	21.78	0.40	0.09	22.27	54.68	-32.41	Average
0.444	44.23	0.33	0.11	44.67	56.98	-12.31	QP
0.444	31.83	0.33	0.11	32.27	46.98	-14.71	Average
0.672	40.95	0.27	0.13	41.35	56.00	-14.65	QP
0.672	22.88	0.27	0.13	23.28	46.00	-22.72	Average
0.880	39.85	0.22	0.14	40.21	56.00	-15.79	QP
0.880	18.44	0.22	0.14	18.80	46.00	-27.20	Average
1.184	33.07	0.20	0.16	33.43	56.00	-22.57	QP
1.184	16.07	0.20	0.16	16.43	46.00	-29.57	Average
1.662	30.04	0.20	0.17	30.41	56.00	-25.59	QP
1.662	12.14	0.20	0.17	12.51	46.00	-33.49	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-----