

TEST REPORT

Applicant: Mingbo Education Technology Co.,Ltd.

Address of Applicant: Room 801,802,803,Tower C,No.9,Shangdi 3rd Street,Haidian District,Beijing,China

Manufacturer: Mingbo Education Technology Co.,Ltd.

Address of Manufacturer: Room 801,802,803,Tower C,No.9,Shangdi 3rd Street,Haidian District,Beijing,China

Equipment Under Test (EUT)

Product Name: GATEWAY

Model No.: ZWG8100XX, ZWG2000AG, ZWG2100XX, ZWG3000XX, ZWG3100XX, ZWG4000XX, ZWG4100XX, ZWG5000XX, ZWG5100XX, ZWG6000XX, ZWG6100XX, ZWG7000XX, ZWG7100XX, ZWG8000XX

Applicable standards: FCC CFR Title 47 Part 15 Subpart B:2017

Date of sample receipt: July 08, 2017

Date of Test: July 08-12, 2017

Date of report issued: July 12, 2017

Test Result : PASS *

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

Authorized Signature:

A circular blue stamp with the text "GLOBAL UNITED TECHNOLOGY SERVICES CO." around the perimeter and "GTS" in the center. Overlaid on the stamp is a handwritten signature in black ink.

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
01	July 12, 2017	Original

Prepared by:

Tiger Chen

Date:

July 12, 2017

Project Engineer

Reviewed by:

Andy Wu

Date:

July 12, 2017

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Conducted Emission	Part15.107	Pass
Radiated Emissions	Part15.109	Pass

Pass: The EUT comply with the essential requirements in the standard.

Test according to ANSI C 63.4-2014

5 General Information

5.1 General Description of EUT

Product Name:	GATEWAY
Model No.:	ZWG8100XX, ZWG2000AG, ZWG2100XX, ZWG3000XX, ZWG3100XX, ZWG4000XX, ZWG4100XX, ZWG5000XX, ZWG5100XX, ZWG6000XX, ZWG6100XX, ZWG7000XX, ZWG7100XX, ZWG8000XX
Test Model No:	ZWG8100XX
Remark:	<i>All above models are identical in the same PCB layout, interior structure and electrical circuits. The differences are color and model name for commercial purpose.</i>
Power supply:	Power Supply Model:SAW12-050-2000CD Input: AC 100-240V, 50/60Hz, 0.3A Output: DC 5V/2000mA

5.2 Test mode and Test voltage

Test mode:	
Lan mode	Keep the EUT in ping IP with PC status.

5.3 Description of Support Units

Manufacturer	Description	Model	FCC Approval
Apple	PC	A1278	FCC DOC
DELL	KEYBOARD	SK-8115	FCC DOC
DELL	MOUSE	N/A	FCC DOC

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.: 600491**

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 600491, June 22, 2016.

- **Industry Canada (IC) —Registration No.: 9079A-2**

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-2, August 15, 2016

5.7 Test Location

The test was performed at:

Global United Technology Services Co., Ltd.

Address: No. 301-309, 3/F., 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

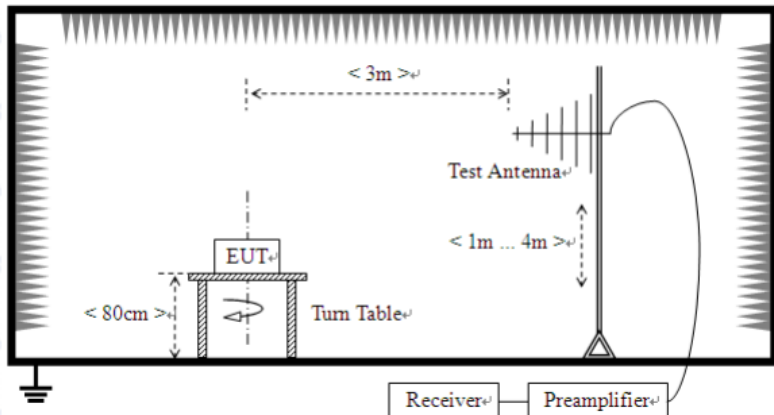
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	ESU EMI Test Receiver	R&S	ESU26	GTS203	June.28 2017	June.27 2018
4	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	June.28 2017	June.27 2018
5	Double-ridged horn antenna	SCHWARZBECK	9120D	GTS208	June.28 2017	June.27 2018
6	Horn Antenna	ETS-LINDGREN	3160-09	GTS218	June.28 2017	June.27 2018
7	RF Amplifier	HP	8347A	GTS204	June.28 2017	June.27 2018
8	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	June.28 2017	June.27 2018
9	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
10	Coaxial Cable	GTS	N/A	GTS211	June.28 2017	June.27 2018
11	Coaxial Cable	GTS	N/A	GTS210	June.28 2017	June.27 2018
12	Coaxial Cable	GTS	N/A	GTS212	June.28 2017	June.27 2018
13	Thermo meter	N/A	N/A	GTS256	June.28 2017	June.27 2018

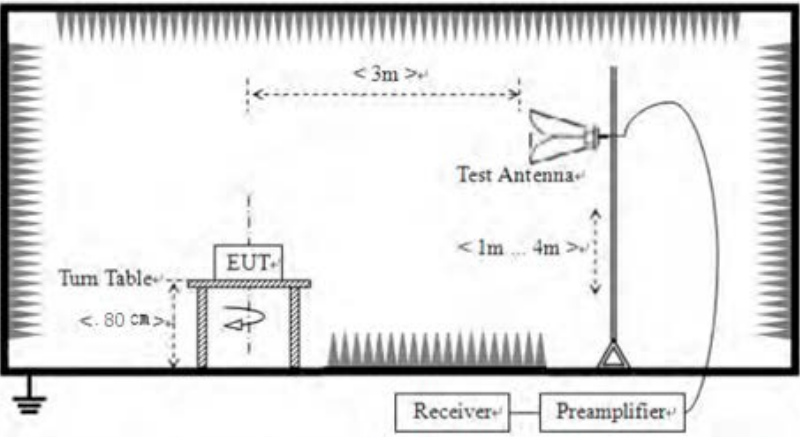
Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	May.16 2014	May.15 2019
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June.28 2017	June.27 2018
3	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	June.28 2017	June.27 2018
4	Artificial Mains Network	SCHWARZBECK MESS	NSLK8127	GTS226	June.28 2017	June.27 2018
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.28 2017	June.27 2018

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (dd-mm-yy)	Cal.Due date (dd-mm-yy)
1	Barometer	ChangChun	DYM3	GTS257	June.28 2017	June.27 2018

7 Test Results and Measurement Data

7.1 Radiated Emission

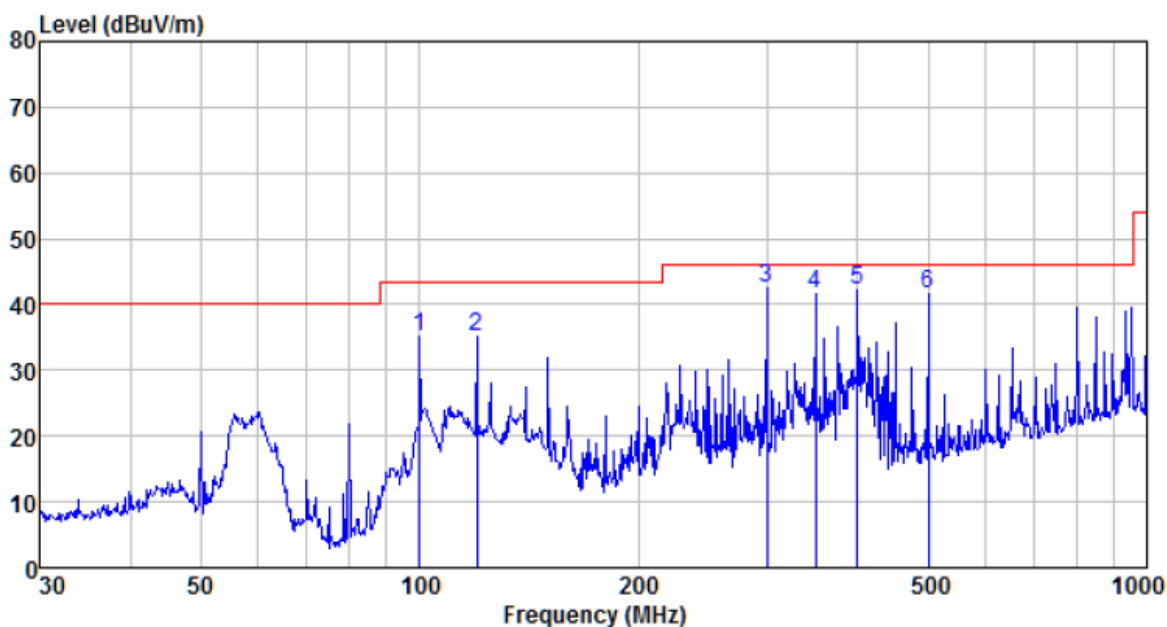
Test Requirement:	FCC Part15 B Section 15.109				
Test Method:	ANSI C63.4:2014				
Test Frequency Range:	30MHz to 10GHz				
Test site:	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		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:	Below 1GHz				
	<div></div>				
	Above 1GHz				

	
Test Procedure:	<ol style="list-style-type: none"> 1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
Test environment:	Temp.: 25 °C Humid.: 52% Press.: 1 012mbar
Measurement Record:	Uncertainty: $\pm 4.50\text{dB}$
Test Instruments:	Refer to section 6 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

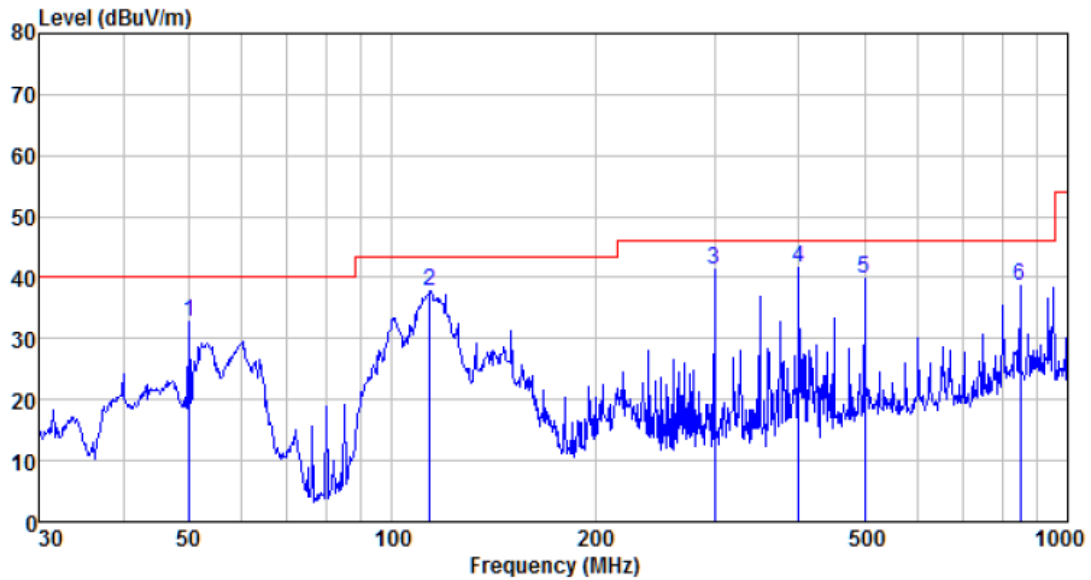
Below 1GHz

Test mode:	Communication with PC 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
99.878	51.62	12.10	1.19	29.70	35.21	43.50	-8.29	QP
119.856	53.97	9.40	1.36	29.57	35.16	43.50	-8.34	QP
300.367	56.58	13.50	2.36	29.99	42.45	46.00	-3.55	QP
350.477	54.23	14.50	2.62	29.73	41.62	46.00	-4.38	QP
400.432	53.46	15.50	2.85	29.50	42.31	46.00	-3.69	QP
501.179	49.94	17.55	3.31	29.30	41.50	46.00	-4.50	QP

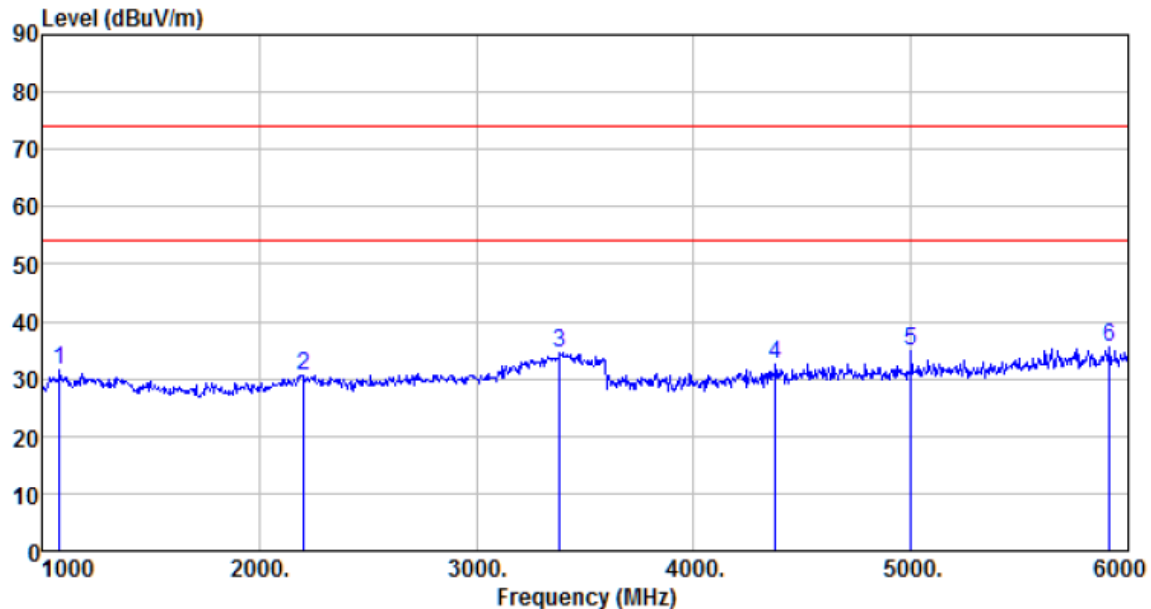
Test mode:	Communication with PC mode	Antenna Polarity:	Vertical
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Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
50.057	49.80	12.20	0.77	30.00	32.77	40.00	-7.23	QP
113.714	55.54	10.60	1.31	29.61	37.84	43.50	-5.66	QP
300.367	55.36	13.50	2.36	29.99	41.23	46.00	-4.77	QP
400.432	52.82	15.50	2.85	29.50	41.67	46.00	-4.33	QP
501.179	48.43	17.55	3.31	29.30	39.99	46.00	-6.01	QP
851.035	41.48	21.75	4.66	29.15	38.74	46.00	-7.26	QP

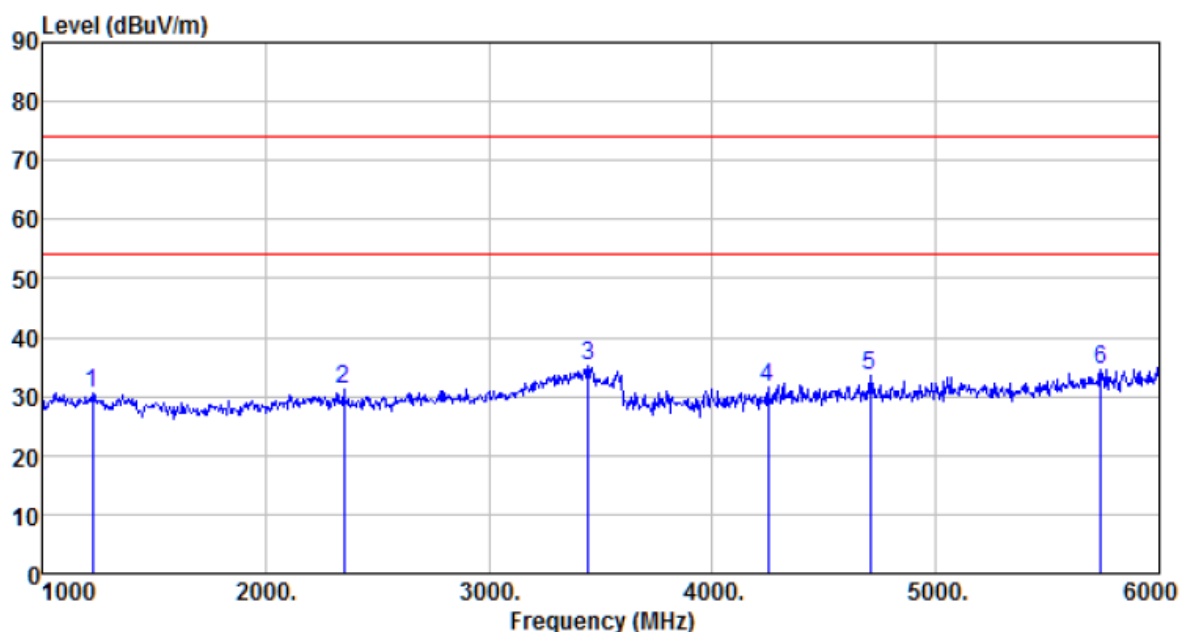
Above 1GHz:

Test mode:	Communication with PC 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
1080.000	38.42	24.70	4.37	35.85	31.64	74.00	-42.36	Peak
2205.000	33.98	27.96	5.19	36.56	30.57	74.00	-43.43	Peak
3385.000	36.59	28.57	6.74	37.31	34.59	74.00	-39.41	Peak
4375.000	31.05	31.01	8.23	37.58	32.71	74.00	-41.29	Peak
5000.000	31.89	31.96	8.76	37.70	34.91	74.00	-39.09	Peak
5915.000	29.09	32.78	10.09	36.42	35.54	74.00	-38.46	Peak

Test mode:	Communication with PC 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
1225.000	36.57	25.45	4.49	35.93	30.58	74.00	-43.42	Peak
2350.000	34.84	27.71	5.34	36.67	31.22	74.00	-42.78	Peak
3445.000	36.86	28.80	6.86	37.33	35.19	74.00	-38.81	Peak
4250.000	30.57	30.44	8.11	37.55	31.57	74.00	-42.43	Peak
4705.000	30.90	31.66	8.52	37.64	33.44	74.00	-40.56	Peak
5740.000	28.91	32.56	9.86	36.66	34.67	74.00	-39.33	Peak

Note:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

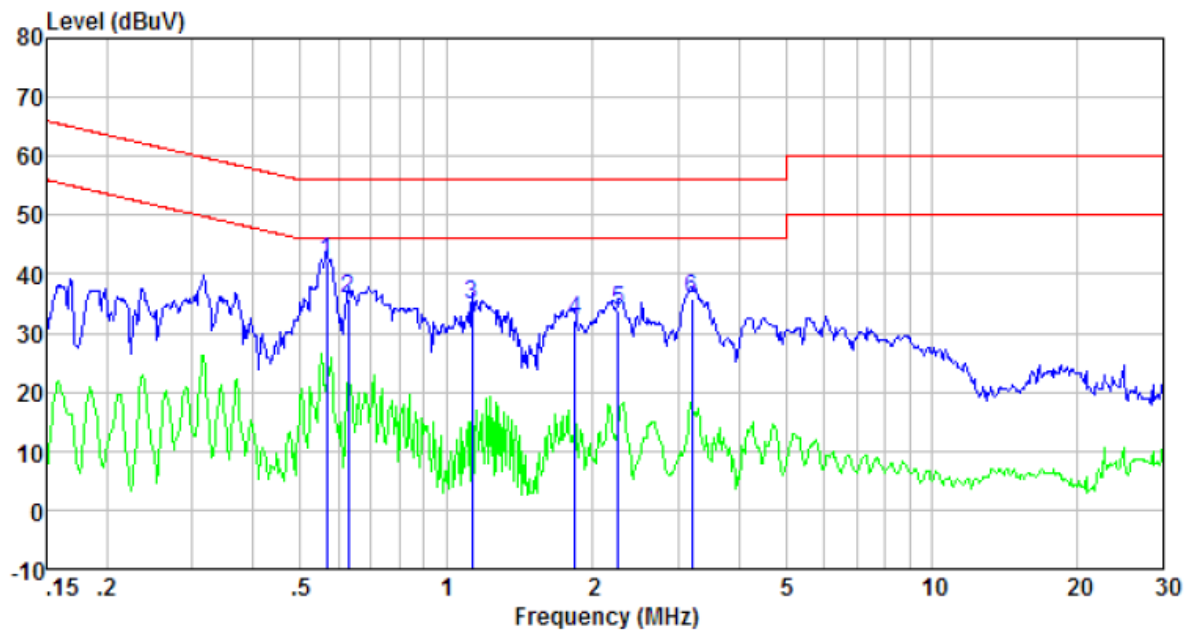
Only worse case is reported

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><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBμV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><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></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:	<div><p style="text-align: center;">Reference Plane</p><p style="text-align: center;">Test table/Insulation plane</p><p><i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i></p></div>																		
Test procedure	<div><div>1.</div><div>The E.U.T and simulators are connected to the main power through a line impedance stabilization network(L.I.S.N.). The provide a 50ohm/50uH coupling impedance for the measuring equipment.</div></div> <div><div>2.</div><div>The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs).</div></div> <div><div>3.</div><div>Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.</div></div>																		
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																		

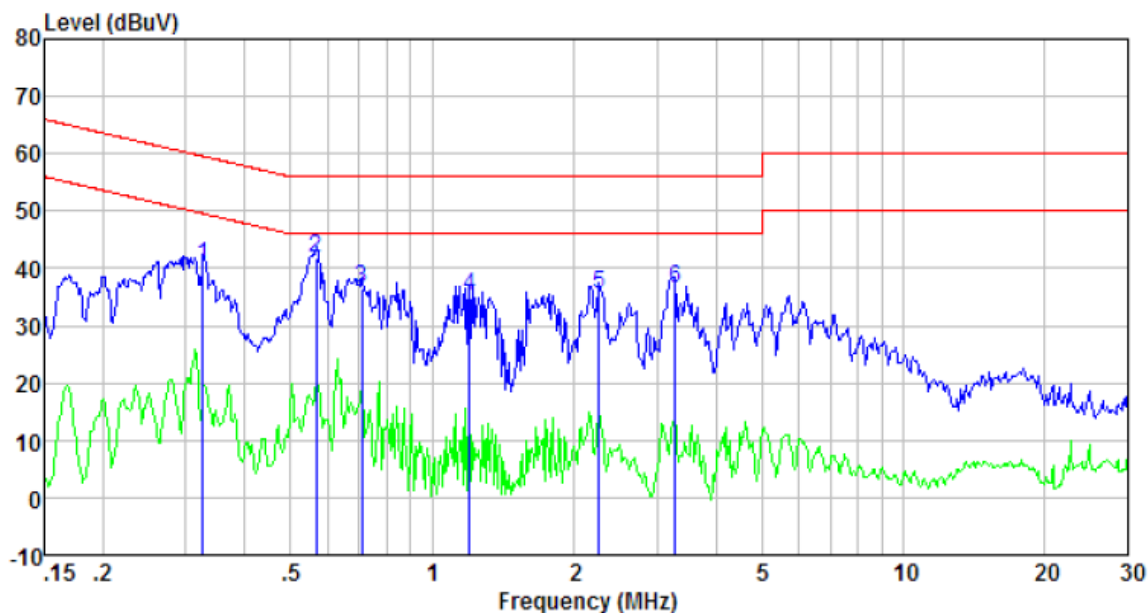
Measurement Data

Test mode:	Communication with PC mode	Phase Polarity:	Line
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Freq MHz	Reading level dBuV	LIISN/ISN factor dB	Cable loss dB	level dBuV	Limit level dBuV	Over limit dB	Remark
0.567	41.56	0.30	0.12	41.98	56.00	-14.02	QP
0.627	35.44	0.27	0.12	35.83	56.00	-20.17	QP
1.129	34.33	0.21	0.13	34.67	56.00	-21.33	QP
1.839	31.68	0.20	0.14	32.02	56.00	-23.98	QP
2.261	33.61	0.20	0.15	33.96	56.00	-22.04	QP
3.207	35.61	0.21	0.15	35.97	56.00	-20.03	QP

Test mode:	Communication with PC 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
0.325	39.88	0.43	0.10	40.41	59.57	-19.16	QP
0.567	41.50	0.33	0.12	41.95	56.00	-14.05	QP
0.708	36.21	0.28	0.13	36.62	56.00	-19.38	QP
1.197	34.68	0.24	0.13	35.05	56.00	-20.95	QP
2.261	35.15	0.20	0.15	35.50	56.00	-20.50	QP
3.276	36.25	0.21	0.15	36.61	56.00	-19.39	QP

Notes:

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

8 Test Setup Photo

Radiated Emission:



Conducted Emission



9 EUT Constructional Details

Reference to the test report No. : GTS201706000254F01

-----End-----