


TEST REPORT

Report No.:	E201512235184-1	Application No.:	E201512235184
Client:	Radio Thermostat Company of America, Inc		
Address:	Unit A 18/F Winner Commercial Building 401-403 Lockhart Road, Wanchai, Hong Kong		
Sample Description:	Thermostat		
Model:	CT200		
FCC ID:	QO8-CT200R1		
Test Specification:	FCC Part 15, Subpart C:2015(15.249)		
Test Date:	2015-12-29 to 2015-12-29		
Issue Date:	2015-12-29		
Test Result:	Pass.		
Prepared By:	Reviewed By:	Approved By:	
Brian Xiao / Test Engineer	Lynn Xiao / Technical Manager	Yong Dai / Manager	
			
Date:2015-12-29	Date:2015-12-29	Date:2015-12-29	
Other Aspects:			
None			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			

GRG Metrology and Test Technology Co., Ltd.

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Ver.: 2.0 / 01. Jan. 2011

DIRECTIONS OF TEST

- 1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

TABLE OF CONTENTS

1. TEST RESULT SUMMARY	4
2. GENERAL DESCRIPTION OF EUT	5
2.1 APPLICANT	5
2.2 MANUFACTURER	5
2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST	5
2.4 TEST OPERATION MODES	5
2.5 LOCAL SUPPORTIVE INSTRUMENTS	5
3. LABORATORY AND ACCREDITATIONS.....	6
3.1 LABORATORY	6
3.2 ACCREDITATIONS	6
3.3 MEASUREMENT UNCERTAINTY.....	6
3.4 LIST OF USED TEST EQUIPMENT AT GRGT	7
4. ANTENNA REQUIREMENT	8
5. EMISSION TEST.....	9
5.1 INTENTIONAL RADIATORS FIELD STRENGTH	9
5.1.1 LIMITS.....	9
5.1.2 TEST PROCEDURE.....	9
5.1.3 TEST SETUP	10
5.1.4 TEST RESULTS	11
5.2 RADIATED ELECTROMAGNETIC DISTURBANCE.....	14
5.2.1 LIMITS.....	14
5.2.2 TEST PROCEDURES.....	14
5.2.3 TEST SETUP	16
5.2.4 TEST RESULTS	17
5.3 OUT OF BAND EMISSIONS	29
5.3.1 LIMITS.....	29
5.3.2 TEST PROCEDURES.....	29
5.3.3 TEST SETUP	30
5.3.4 TEST RESULTS	31
5.4 CONDUCTED EMISSION MEASUREMENT	33
5.4.1 LIMITS.....	33
5.4.2 TEST PROCEDURES.....	33
5.4.3 TEST SETUP	34
5.4.4 TEST RESULTS	34
APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT.....	42
APPENDIX B: PHOTOGRAPH OF EUT	44

1. TEST RESULT SUMMARY

FCC Part 15,Subpart C:2015(15.249)			
Standard	Item	Limit / Severity	Result
FCC Part 15,Subpart C:2015(15.249)	Antenna Requirement	FCC Part 15.203	PASS
	Intentional radiators Field Strength	FCC Part 15.249(a)	PASS
	Radiated Electromagnetic Disturbance	FCC Part 15.249 (e)	PASS
	Conduction Emissions	FCC Part 15.249 (f)	PASS
	Out of Band Emissions	FCC Part 15.249(d)	PASS
	20dB Bandwidth	FCC Part 15.215(c)	PASS

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: Radio Thermostat Company of America, Inc
Address: Unit A 18/F Winner Commercial Building 401-403 Lockhart Road,
Wanchai, Hong Kong

2.2 MANUFACTURER

Name: ZhuHai Herald Datanetics Limited
Address: No.1 PingXi Road 6. Nanping Science and Technology Industrial Park,
Zhuhai, Guangdong, China

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Thermostat
Model No.: CT200
Trade Name: Radio Thermostat
Power Supply: DC 3.0V(battery); DC 24V; AC 24V
Frequency 908.42MHz
Channel number /
Note: For DC 3V, The Thermostat power supply by battery.
For AC/DC 24V, The Thermostat power supply by Wire Terminals
which connected to Thermostat load.

2.4 TEST OPERATION MODES

Test mode: Mode 1:continuous transmission

2.5 LOCAL SUPPORTIVE INSTRUMENTS

Name of Equipment	Manufacturer	Model	Serial Number
Thermostat load	Radio Thermostat	/	/

3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests and measurements refer to this report were performed by EMC Laboratory of Guangzhou GRG Metrology and Test Co., Ltd.

Add. : 163 Pingyun Rd, West of Huangpu Ave, Guangzhou, 510656, P. R. China

Telephone: +86-20-38699959, 38699960, 38699961

Fax : +86-20-38695185

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab No. 688188
Canada	Registration No.:8355A-1

3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Electromagnetic disturbance	Horizontal	30MHz~1000MHz	4.2dB
	Horizontal	1GHz~10GHz	4.2dB
	Vertical	30MHz~1000MHz	4.4dB
	Vertical	1GHz~10GHz	4.4dB
Intentional Radiator Field	Horizontal	30MHz~1000MHz	4.2dB
	Vertical	30MHz~1000MHz	4.4dB
Out of Band Emission	Horizontal	30MHz~1000MHz	4.2dB
	Vertical	30MHz~1000MHz	4.4dB
Conducted Emission Measurement		9kHz~30MHz	3.1dB
20dB Bandwidth		30MHz~1000MHz	6.4Hz

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

3.4 LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Radiated Emission				
Bi-Log Antenna	ETS-LINDGREN	3142C	75971	2016-04-17
EMI Receiver	Rohde & Schwarz	ESU40	100106	2016-12-27
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120E3 18	2017-03-03
Intentional radiators Field Strength				
EMI Receiver	Rohde & Schwarz	ESU40	100106	2016-12-27
Bi-Log Antenna	ETS-LINDGREN	3142C	75971	2016-04-17
Out of Band Emissions				
EMI Receiver	Rohde & Schwarz	ESU40	100106	2016-12-27
Bi-Log Antenna	ETS-LINDGREN	3142C	75971	2016-04-17
CE				
L.I.S.N	SCHWARZBECK	NSLK 8127	8127450	2016-07-20
EMI Receiver	R&S	ESCI	100527	2016-03-24

4. ANTENNA REQUIREMENT

The EUT antenna is Linear antenna. Antenna gain is -0.5dBi which accordance 15.203 is considered sufficient to comply with the provisions of this section.



Antenna

5. EMISSION TEST

5.1 INTENTIONAL RADIATORS FIELD STRENGTH

5.1.1 LIMITS

Frequency (MHz)	Field Strength
908.42	50(millivolts/meter)
Field Strength of Harmonics	500(microvolts/meter)

5.1.2 TEST PROCEDURE

Procedure of Preliminary Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

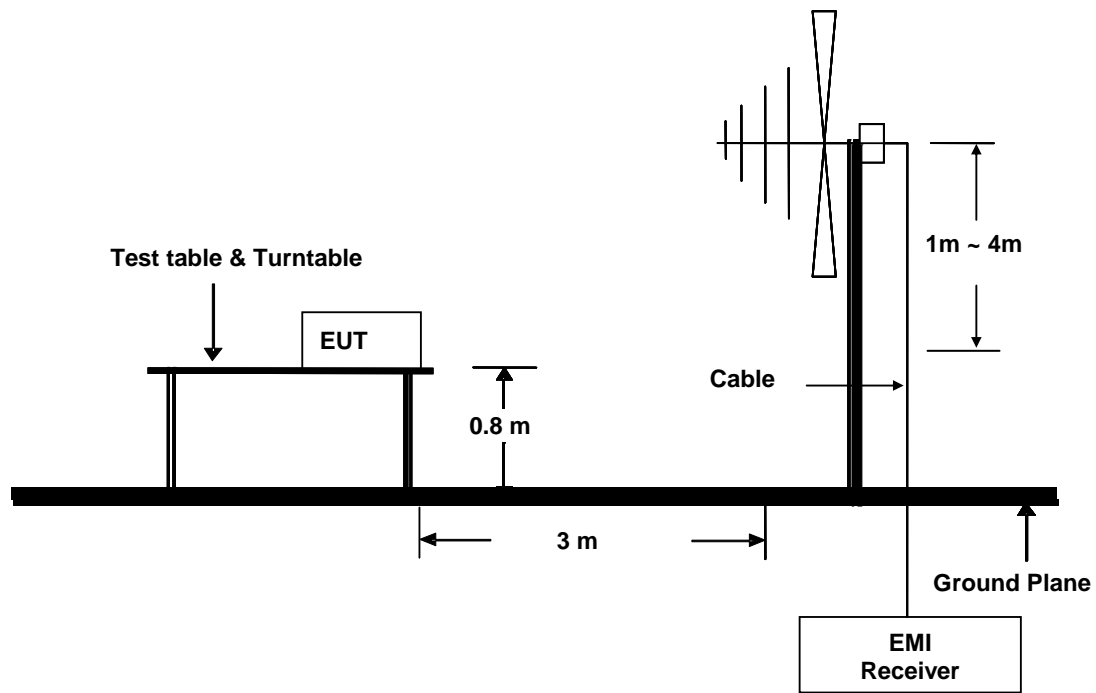
The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height $0,8\text{ m} \pm 0,01\text{ m}$ for emission measurement below 1GHz and for emission measurements above 1 GHz, the EUT shall be placed at height 1.5m, ANSI C63.10:2013 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

5.1.3 TEST SETUP



Duty Cycle:



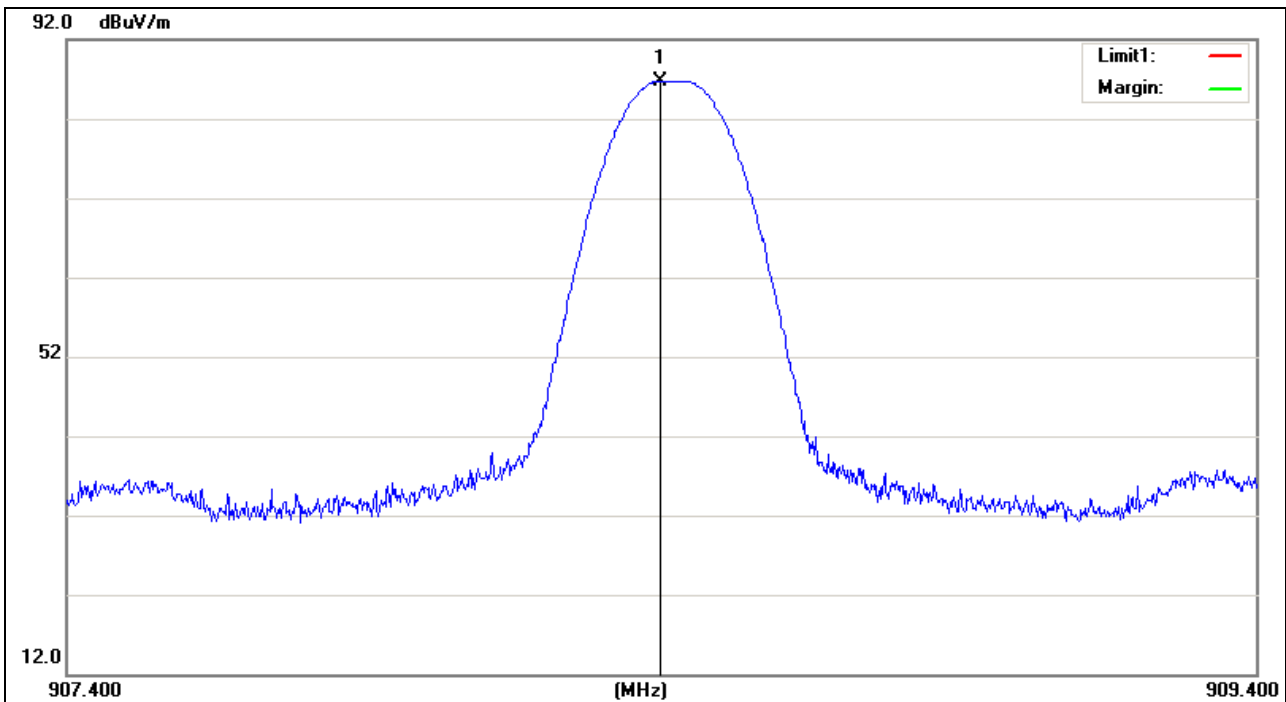
The field strength was measured with an EMI measuring receiver.

Set 100kHz RBW/VBW for Peak detector at a distance of 3m.

Set 120kHz RBW/VBW for QP detector at a distance of 3m.

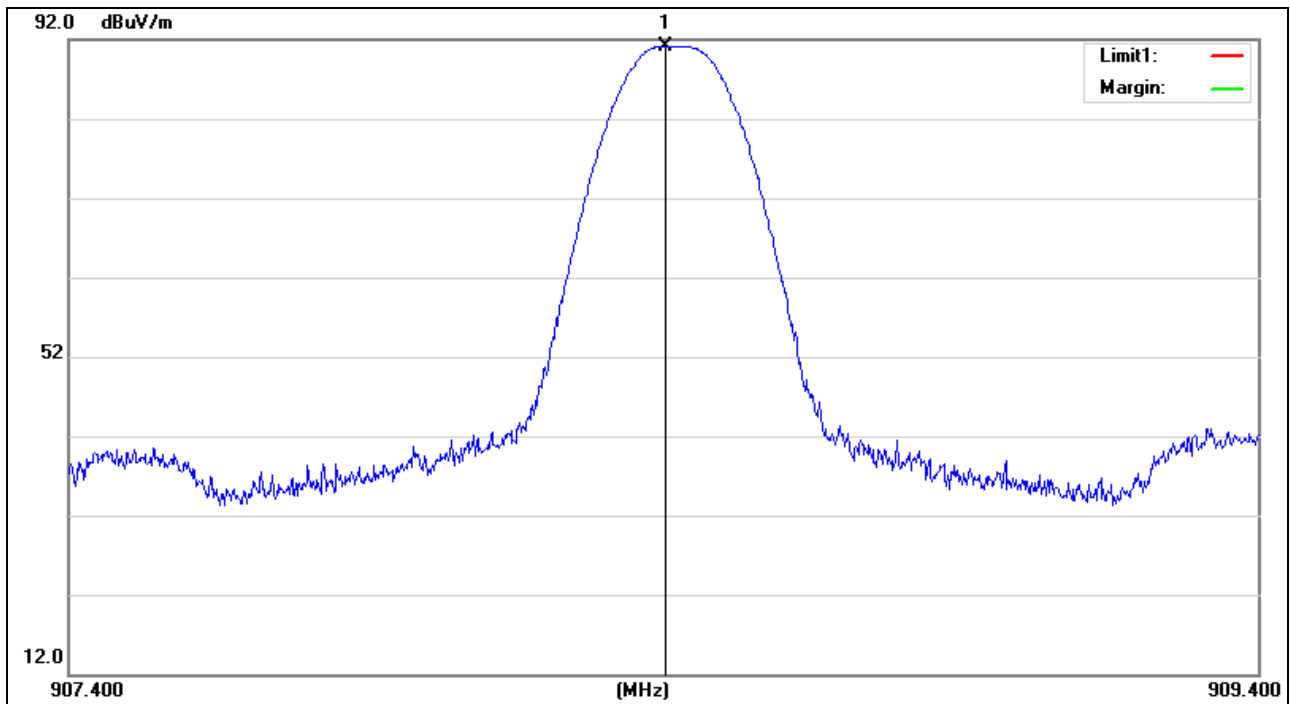
Pre-scan DC 3V, DC 24V and AC 24V power supply, found that DC 24V is the worst case.

Project No.:	E201512235184	Polarziation:	Vertical
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	8:48:43
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:	Brian Xiao		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	908.3980	59.80	26.97	86.77	94.00	-7.23	QP

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	8:50:07
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by: Brian Xiao			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	908.4040	64.19	26.97	91.16	94.00	-2.84	QP

5.2 RADIATED ELECTROMAGNETIC DISTURBANCE

5.2.1 LIMITS

Frequency (MHz)	Quasi-peak(dB μ V/m)
30 ~ 88	40
88~216	43.5
216 ~ 960	46
Above 960	54

NOTE: (1) The lower limit shall apply at the transition frequencies.

Frequency (GHz)	PEAK and AVG(dB μ V/m)
Above 1G	74 PEAK
Above 1G	54 AVG

5.2.2 TEST PROCEDURES

Procedure of Preliminary Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height 0,8 m \pm 0,01 m for emission measurement below 1GHz and for emission measurements above 1 GHz, the EUT shall be placed at height 1.5m, ANSI C63.10:2013 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test. The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level. Record at least six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only QP reading is presented. The test data of the worst-case condition(s) was recorded.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.2.3 TEST SETUP

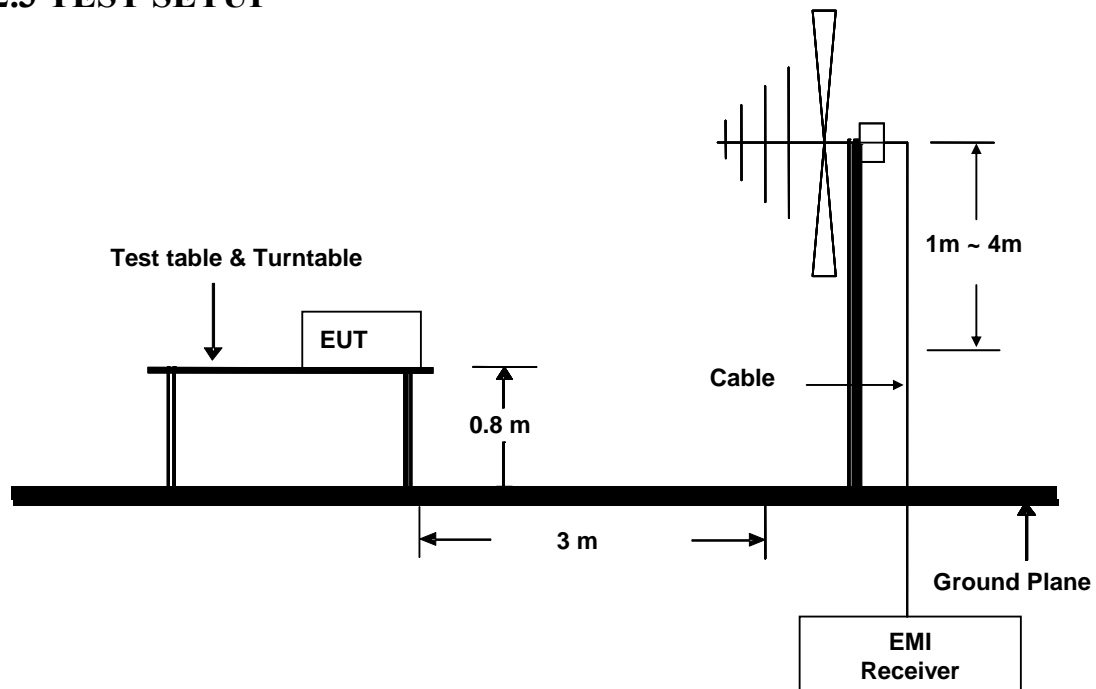


Figure 1. 30MHz to 1GHz radiated emissions test configuration

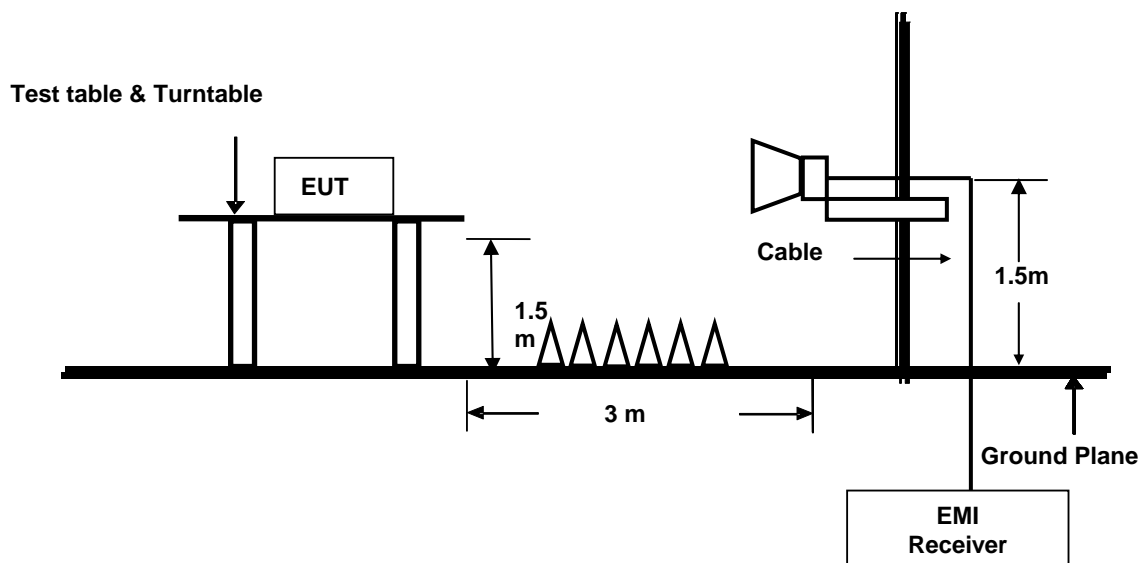


Figure 2 Above 1GHz radiated emissions test configuration

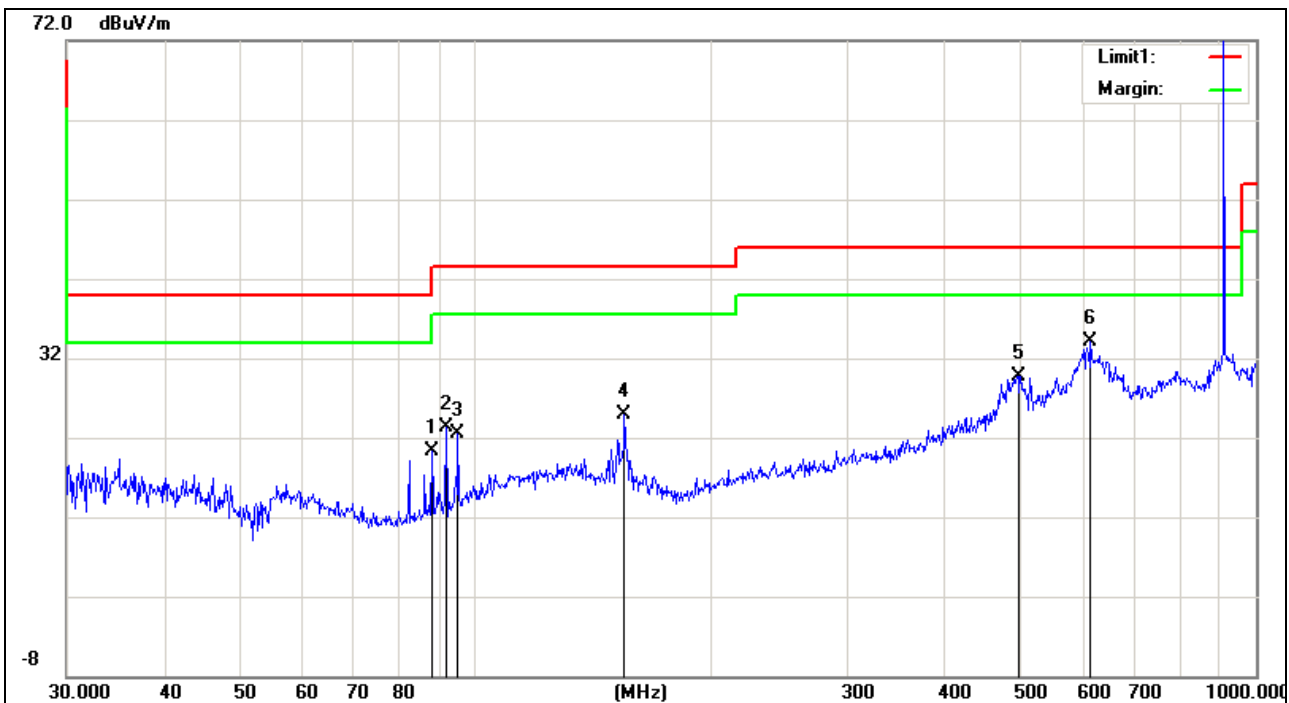
5.2.4 TEST RESULTS

The field strength was measured with an EMI measuring receiver.

Set 100 kHz RBW/VBW for Peak detector and Set 120 kHz RBW/VBW for QP detector at a distance of 3m when we test below 1GHz.

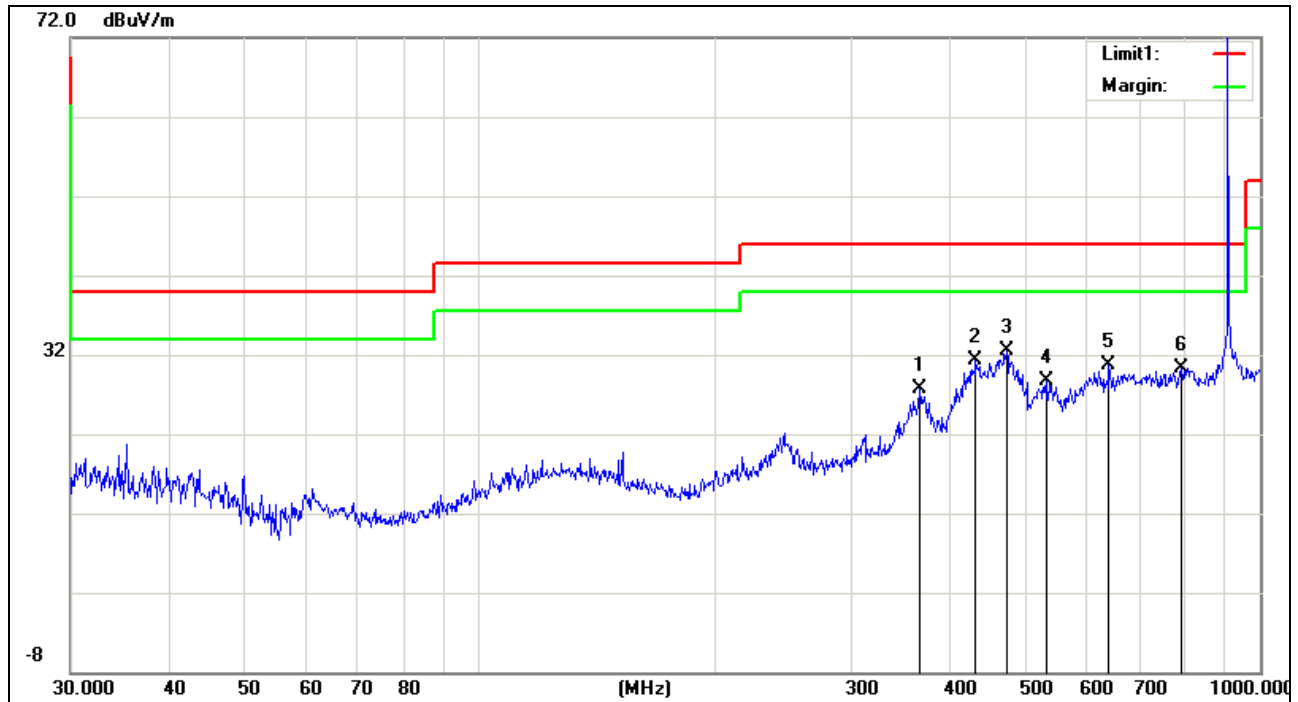
Set 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m when we test above 1GHz.

Project No.:	E201512235184	Polarization:	Vertical
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 3V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	8:54:35
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by: Brian Xiao			



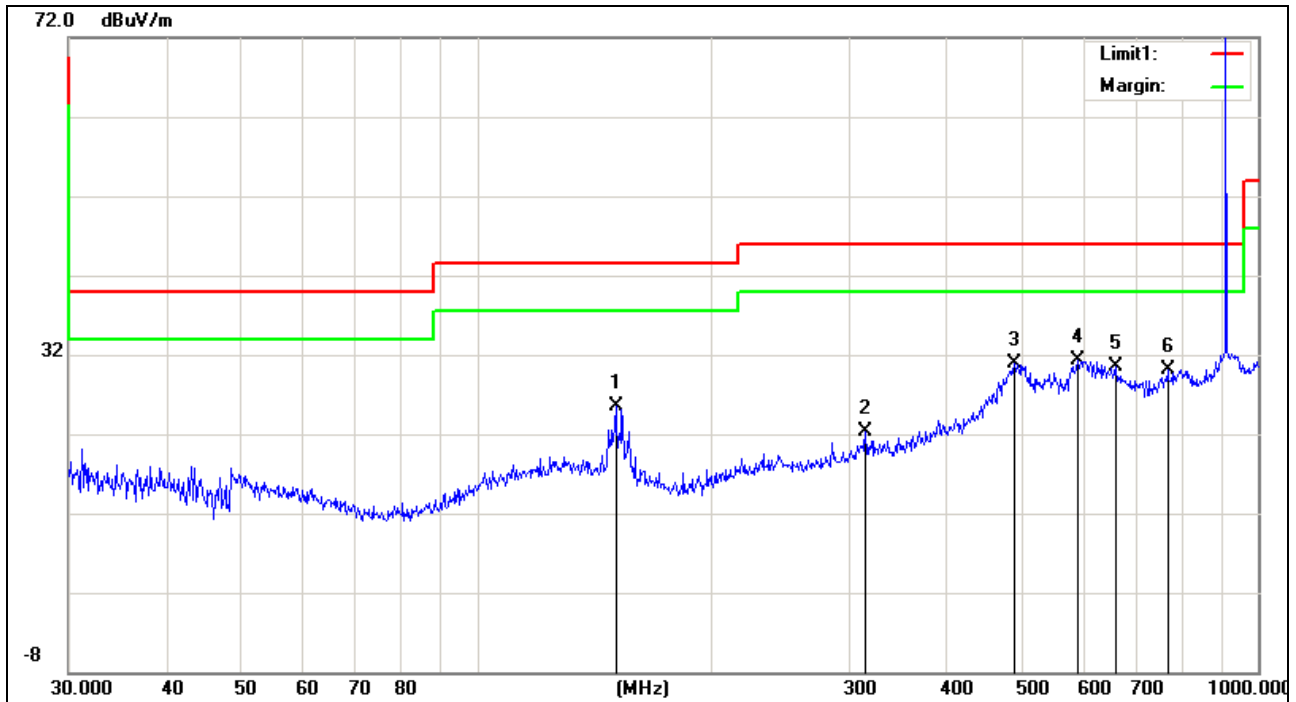
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	88.0329	11.95	8.34	20.29	43.50	-23.21	peak
2	91.8163	14.40	8.91	23.31	43.50	-20.19	peak
3	95.0930	12.94	9.47	22.41	43.50	-21.09	peak
4	155.3644	13.30	11.55	24.85	43.50	-18.65	peak
5	495.9344	10.73	19.00	29.73	46.00	-16.27	peak
6	614.2142	12.96	21.05	34.01	46.00	-11.99	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 3V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	8:56:04
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:		Brian Xiao	



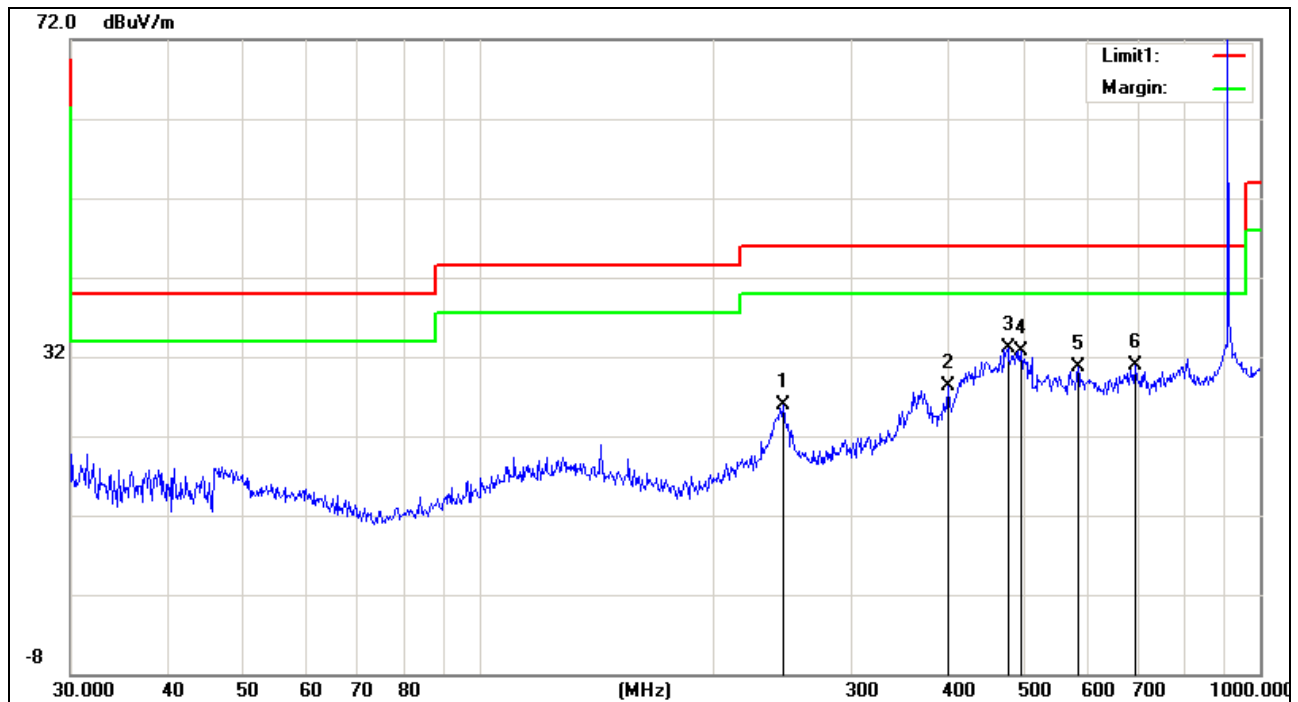
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	366.8231	11.29	16.43	27.72	46.00	-18.28	peak
2	432.5457	13.73	17.60	31.33	46.00	-14.67	peak
3	473.8347	13.83	18.66	32.49	46.00	-13.51	peak
4	533.8321	8.57	20.13	28.70	46.00	-17.30	peak
5	640.6110	9.64	21.16	30.80	46.00	-15.20	peak
6	793.3960	5.82	24.52	30.34	46.00	-15.66	peak

Project No.:	E201512235184	Polarziation:	Vertical
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	8:47:04
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:		Brian Xiao	



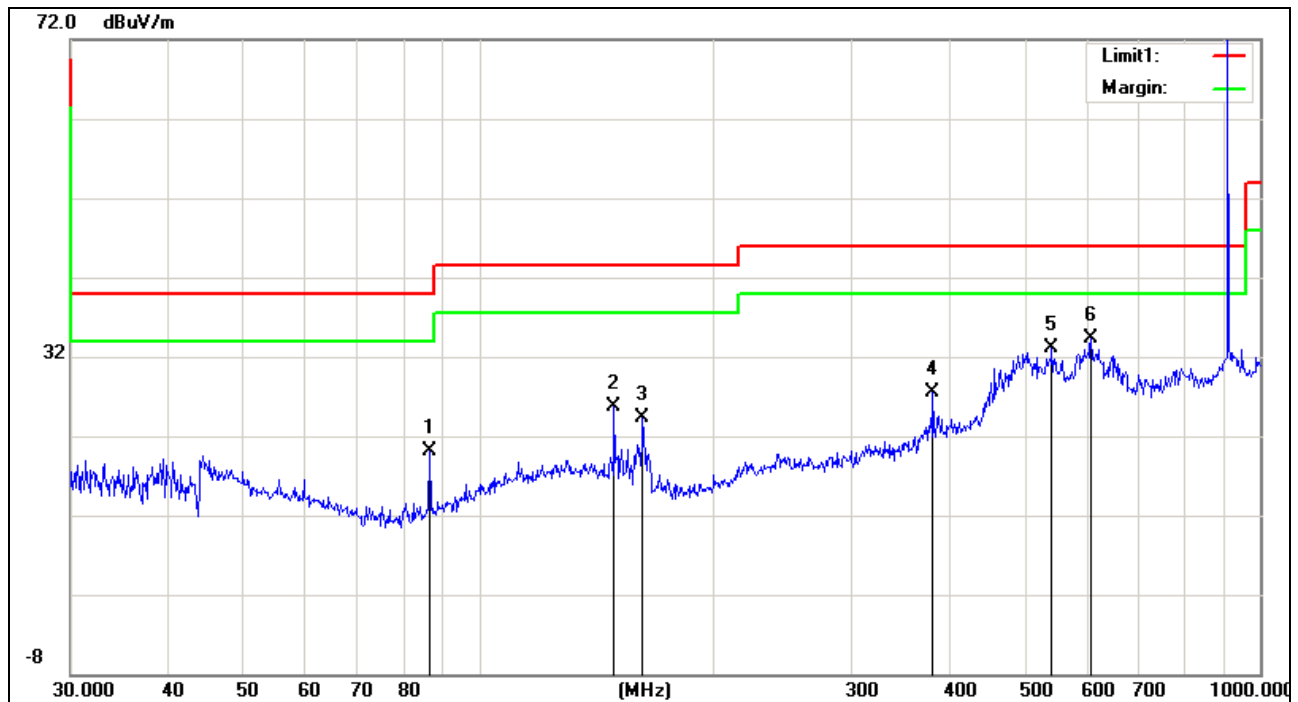
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	150.5378	13.64	11.81	25.45	43.50	-18.05	peak
2	314.3765	6.62	15.65	22.27	46.00	-23.73	peak
3	487.3151	11.93	18.89	30.82	46.00	-15.18	peak
4	588.9051	10.99	20.35	31.34	46.00	-14.66	peak
5	656.5300	8.58	21.87	30.45	46.00	-15.55	peak
6	766.0571	6.50	23.62	30.12	46.00	-15.88	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	8:51:55
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:		Brian Xiao	



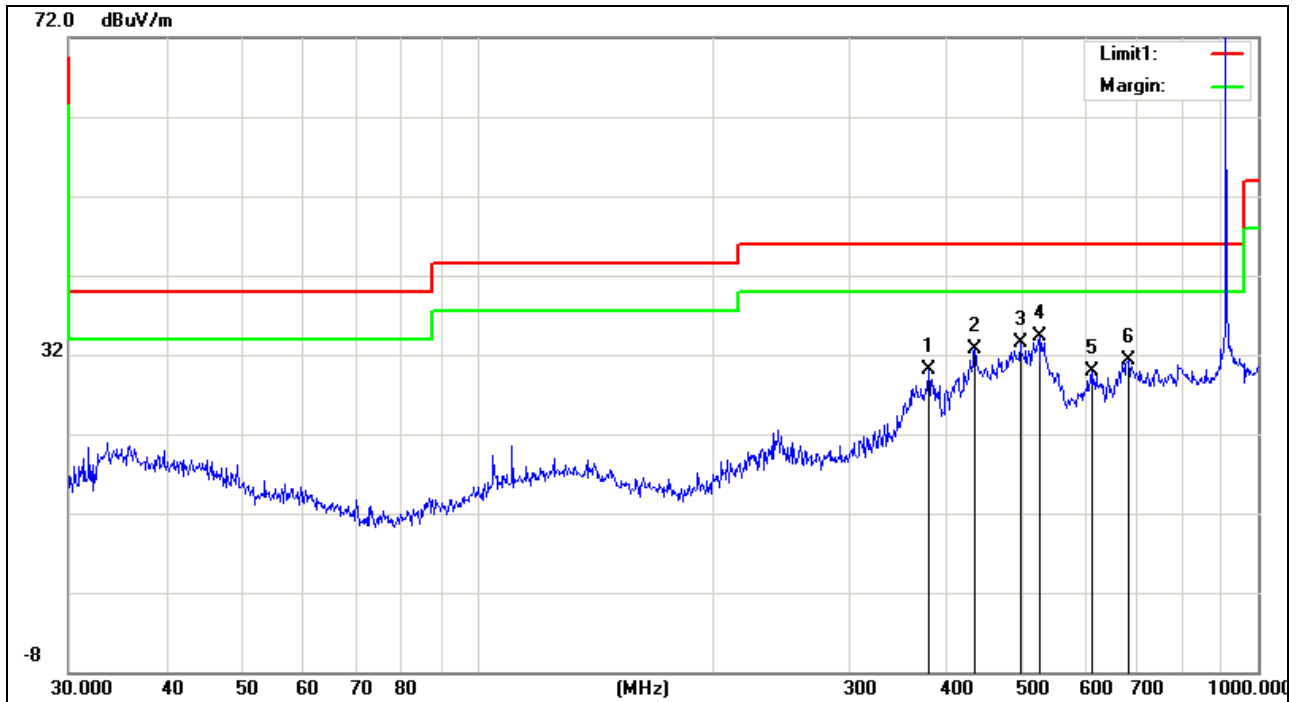
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	245.0900	12.61	13.32	25.93	46.00	-20.07	peak
2	399.0300	10.64	17.72	28.36	46.00	-17.64	peak
3	475.4990	14.36	18.69	33.05	46.00	-12.95	peak
4	494.1983	13.71	18.98	32.69	46.00	-13.31	peak
5	584.7894	10.52	20.27	30.79	46.00	-15.21	peak
6	691.9867	9.26	21.68	30.94	46.00	-15.06	peak

Project No.:	E201512235184	Polarziation:	Vertical
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	AC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:03:02
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:		Brian Xiao	



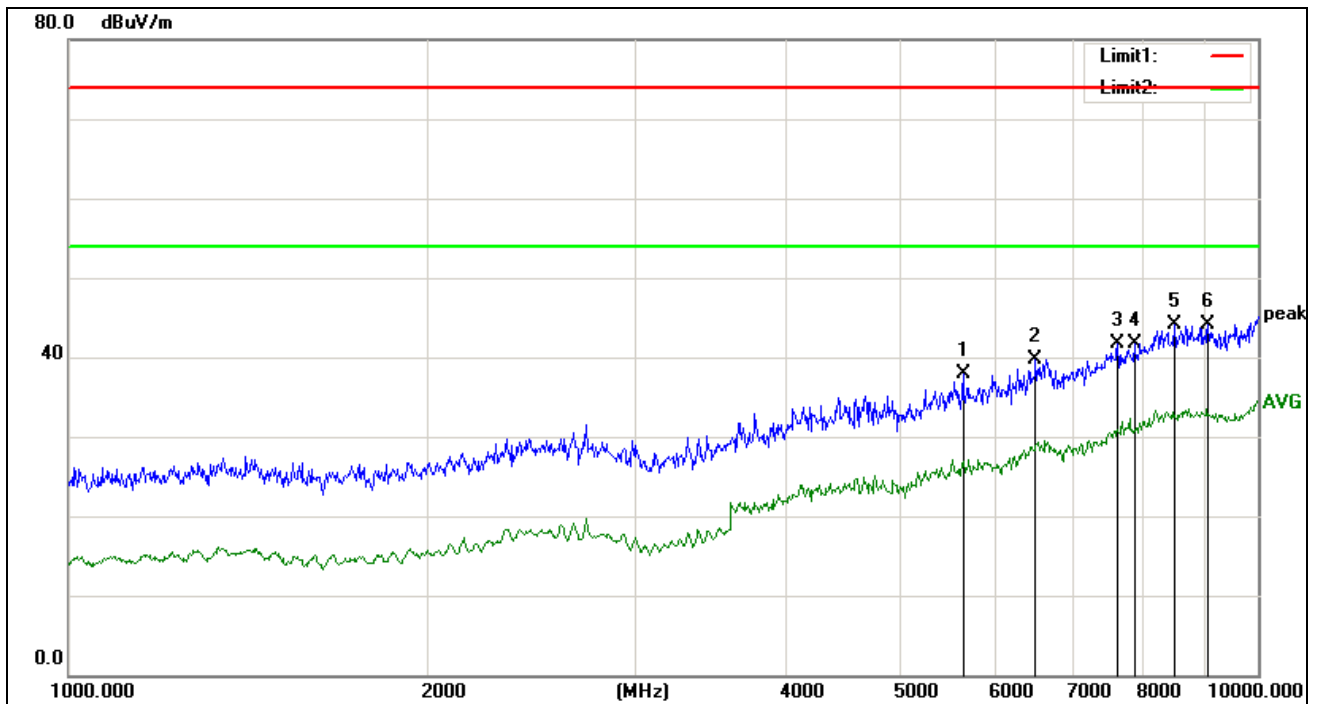
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	86.5029	12.07	8.12	20.19	40.00	-19.81	peak
2	148.9625	13.78	11.91	25.69	43.50	-17.81	peak
3	162.0414	13.07	11.29	24.36	43.50	-19.14	peak
4	381.2487	10.63	16.88	27.51	46.00	-18.49	peak
5	541.3725	12.84	20.32	33.16	46.00	-12.84	peak
6	607.7867	13.32	20.90	34.22	46.00	-11.78	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	AC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:08:03
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:		Brian Xiao	



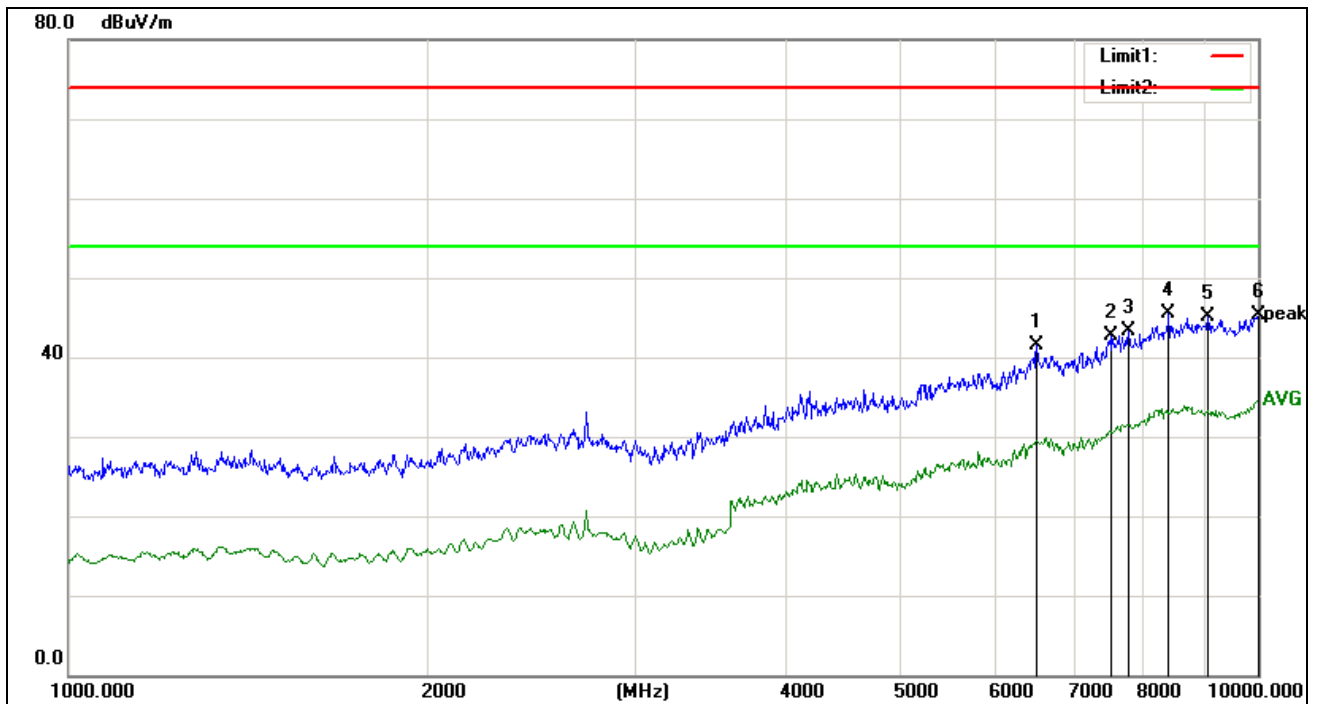
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	378.5843	13.29	16.78	30.07	46.00	-15.93	peak
2	434.0651	15.15	17.61	32.76	46.00	-13.24	peak
3	495.9344	14.58	19.00	33.58	46.00	-12.42	peak
4	524.5541	14.47	19.80	34.27	46.00	-11.73	peak
5	612.0642	8.95	21.01	29.96	46.00	-16.04	peak
6	682.3484	9.45	21.80	31.25	46.00	-14.75	peak

Project No.:	E201512235184	Polarization:	Vertical
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 3V
Test item:	3m_PEAK		
Temp./Hum.(%RH):	Radiation Test	Date:	2015-12-29
EUT:	21.5/54%RH	Time:	9:36:53
Model:	Thermostat	Distance:	3m
	CT200	Test Result:	Pass
Note:			
Test by: Brian Xiao			



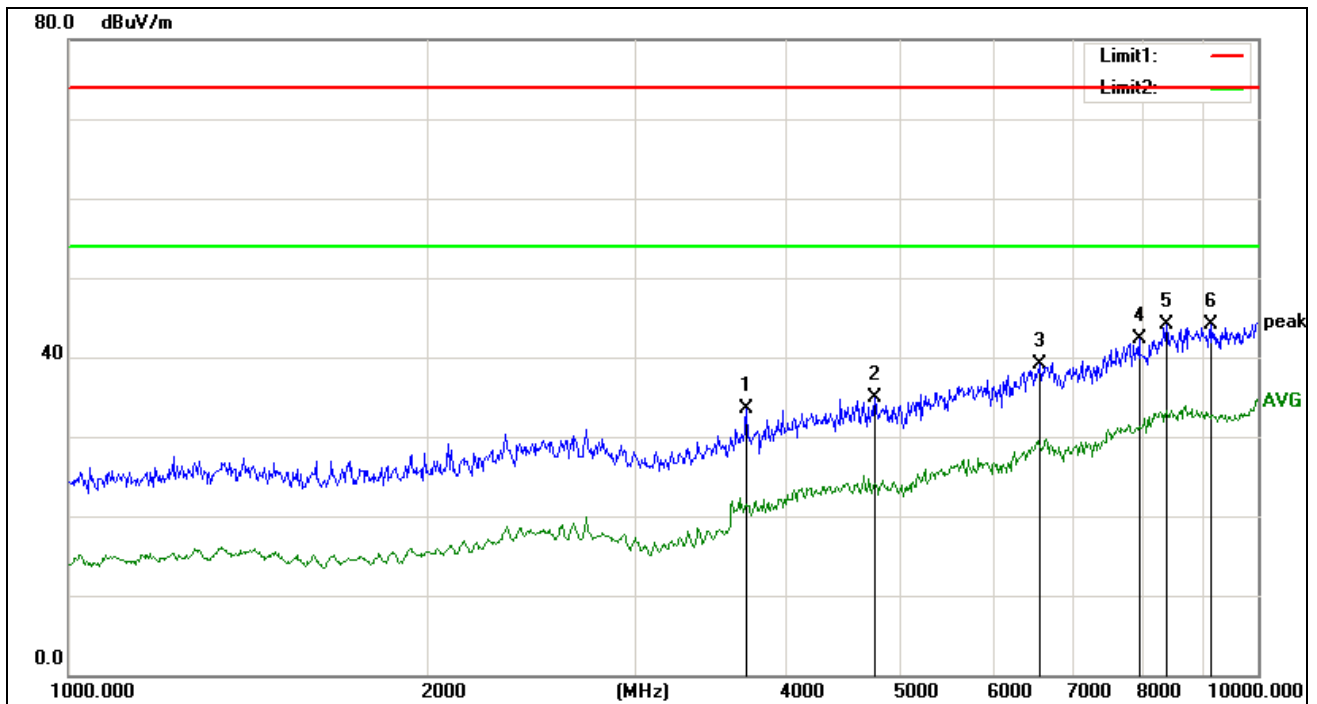
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	5649.370	30.95	7.00	37.95	74.00	-36.05	peak
2	6501.297	30.02	9.69	39.71	74.00	-34.29	peak
3	7620.790	29.73	11.96	41.69	74.00	-32.31	peak
4	7870.458	28.41	13.29	41.70	74.00	-32.30	peak
5	8511.380	28.96	15.19	44.15	74.00	-29.85	peak
6	9078.205	28.79	15.39	44.18	74.00	-29.82	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 3V
Test item:	3m_PEAK		
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:37:55
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:	Brian Xiao		



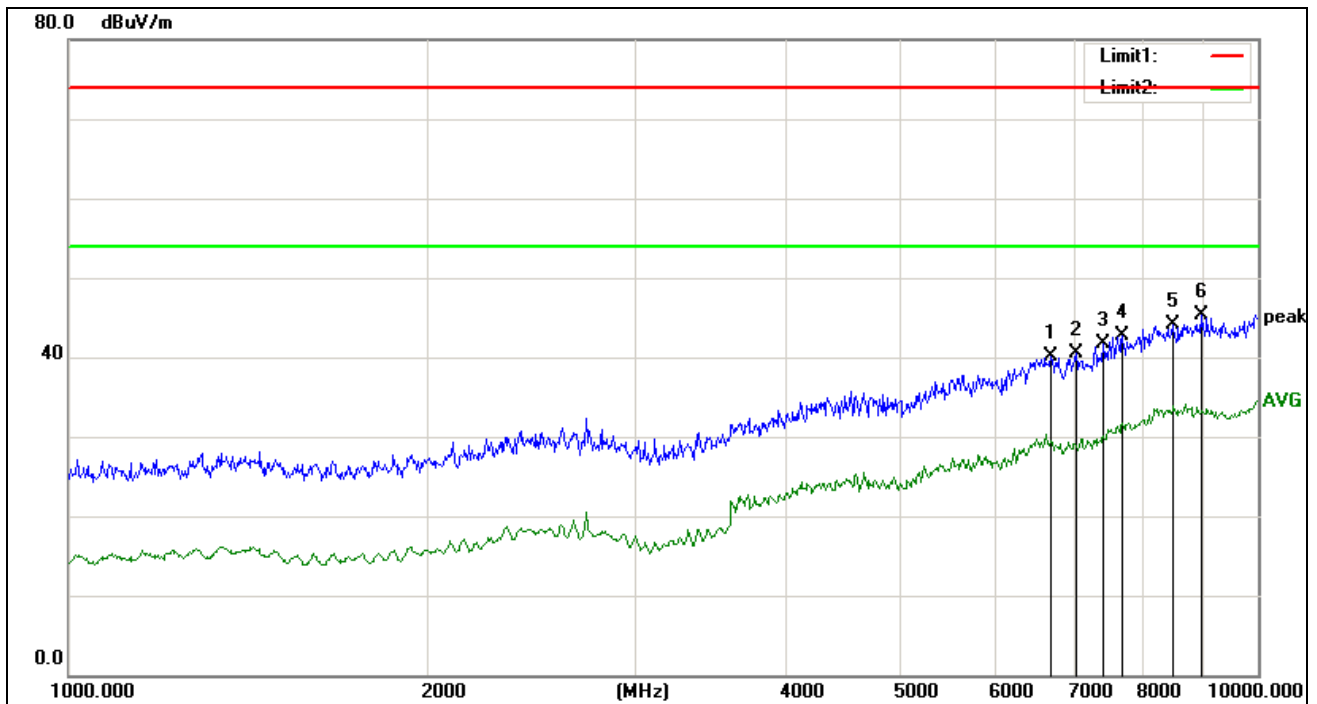
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6516.284	31.81	9.72	41.53	74.00	-32.47	peak
2	7516.229	31.34	11.41	42.75	74.00	-31.25	peak
3	7780.365	30.58	12.80	43.38	74.00	-30.62	peak
4	8413.951	30.47	14.98	45.45	74.00	-28.55	peak
5	9078.205	29.63	15.39	45.02	74.00	-28.98	peak
6	10000.000	29.14	16.17	45.31	74.00	-28.69	peak

Project No.:	E201512235184	Polarization:	Vertical
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:35:12
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:	Brian Xiao		



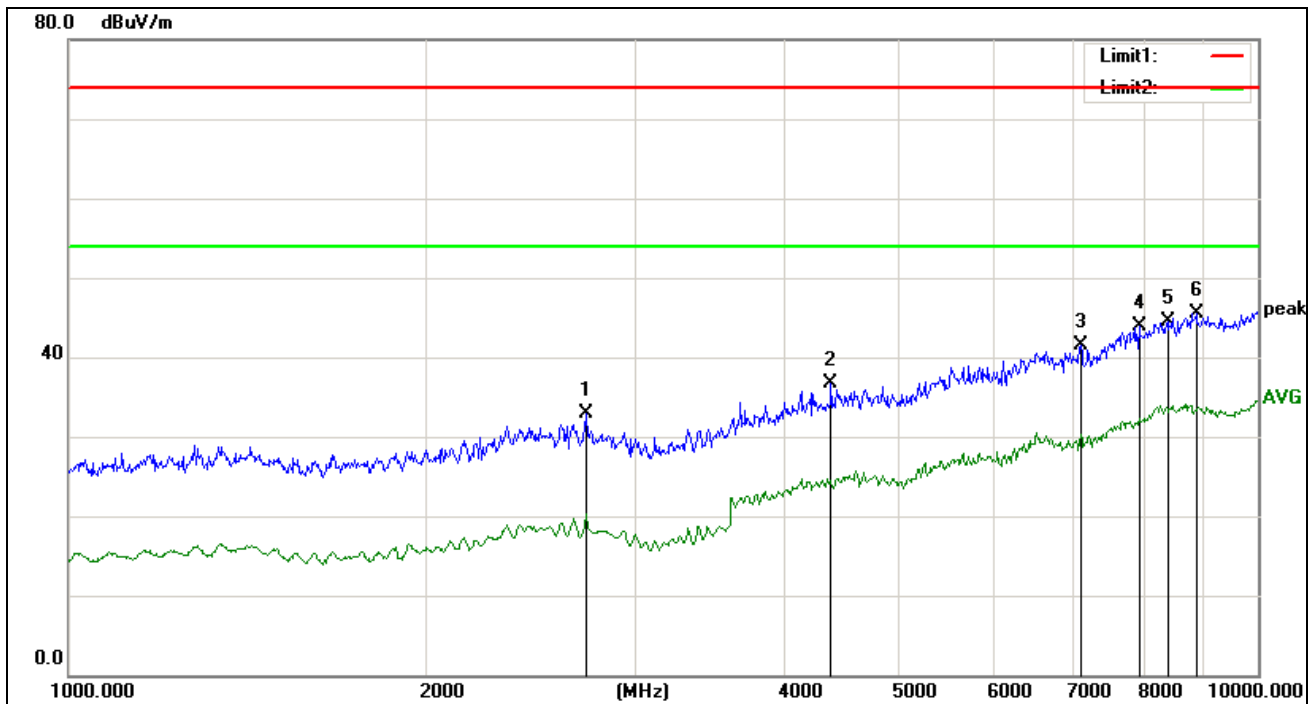
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	3715.352	31.41	2.03	33.44	74.00	-40.56	peak
2	4764.310	29.81	5.07	34.88	74.00	-39.12	peak
3	6561.453	29.34	9.77	39.11	74.00	-34.89	peak
4	7943.282	28.62	13.67	42.29	74.00	-31.71	peak
5	8375.293	29.13	14.89	44.02	74.00	-29.98	peak
6	9141.132	28.58	15.46	44.04	74.00	-29.96	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 24V
Test item:	3m_PEAK		
Temp./Hum.(%RH):	Radiation Test	Date:	2015-12-29
EUT:	21.5/54%RH	Time:	9:33:59
Model:	Thermostat	Distance:	3m
	CT200	Test Result:	Pass
Note:			
Test by: Brian Xiao			



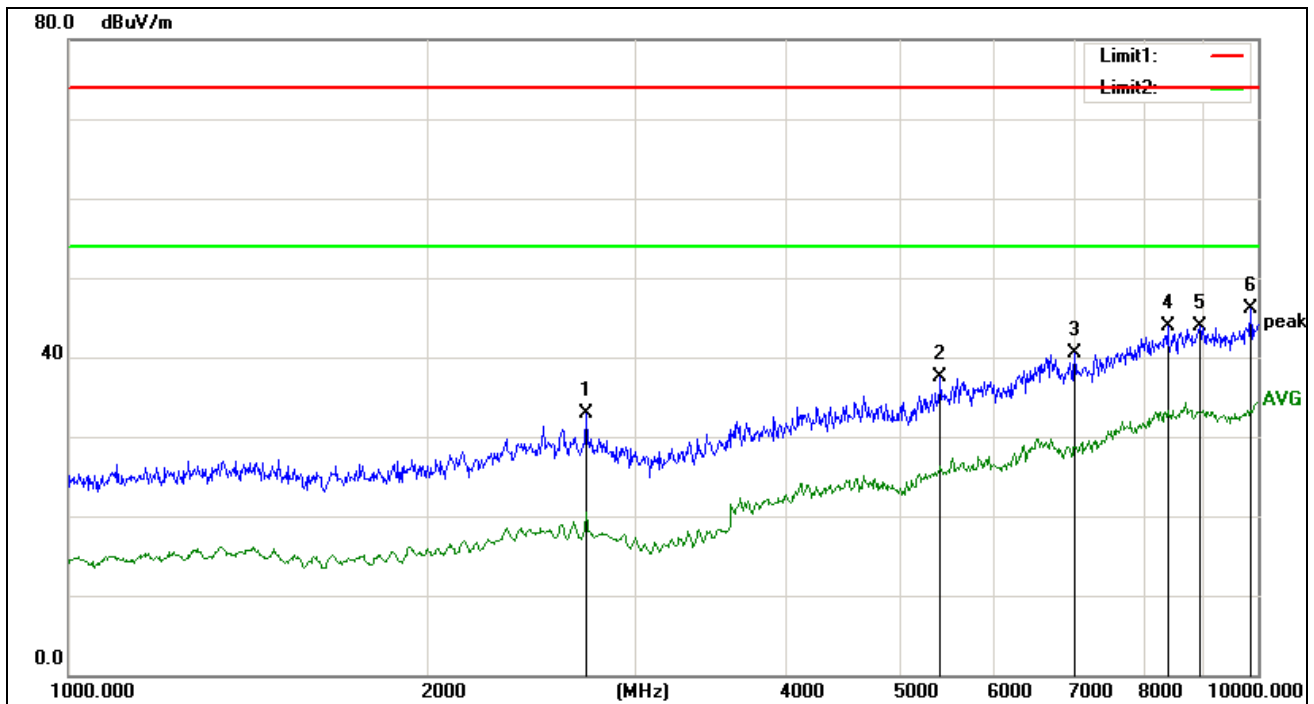
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	6698.846	30.12	9.96	40.08	74.00	-33.92	peak
2	7030.723	30.01	10.43	40.44	74.00	-33.56	peak
3	7413.102	30.46	11.16	41.62	74.00	-32.38	peak
4	7691.304	30.42	12.34	42.76	74.00	-31.24	peak
5	8472.274	28.92	15.13	44.05	74.00	-29.95	peak
6	8953.648	29.98	15.30	45.28	74.00	-28.72	peak

Project No.:	E201512235184	Polarization:	Vertical
Standard:	(RE)FCC PART 15 class B	Power Source:	AC 24V
Test item:	3m_PEAK		
Temp./Hum.(%RH):	Radiation Test	Date:	2015-12-29
EUT:	21.5/54%RH	Time:	9:31:58
Model:	Thermostat	Distance:	3m
	CT200	Test Result:	Pass
Note:			
Test by:	Brian Xiao		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2722.701	32.22	0.74	32.96	74.00	-41.04	peak
2	4375.221	32.18	4.48	36.66	74.00	-37.34	peak
3	7095.778	30.87	10.55	41.42	74.00	-32.58	peak
4	7943.282	30.18	13.67	43.85	74.00	-30.15	peak
5	8394.600	29.65	14.93	44.58	74.00	-29.42	peak
6	8871.560	30.21	15.28	45.49	74.00	-28.51	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B	Power Source:	AC 24V
Test item:	3m_PEAK		
Temp./Hum.(%RH):	Radiation Test	Date:	2015-12-29
EUT:	21.5/54%RH	Time:	9:33:00
Model:	Thermostat	Distance:	3m
	CT200	Test Result:	Pass
Note:			
Test by: Brian Xiao			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2722.701	32.22	0.74	32.96	74.00	-41.04	peak
2	5407.543	31.19	6.32	37.51	74.00	-36.49	peak
3	7014.553	30.01	10.40	40.41	74.00	-33.59	peak
4	8394.600	28.90	14.93	43.83	74.00	-30.17	peak
5	8933.055	28.63	15.29	43.92	74.00	-30.08	peak
6	9862.795	30.02	16.08	46.10	74.00	-27.90	peak

5.3 OUT OF BAND EMISSIONS

5.3.1 LIMITS

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

5.3.2 TEST PROCEDURES

Procedure of Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

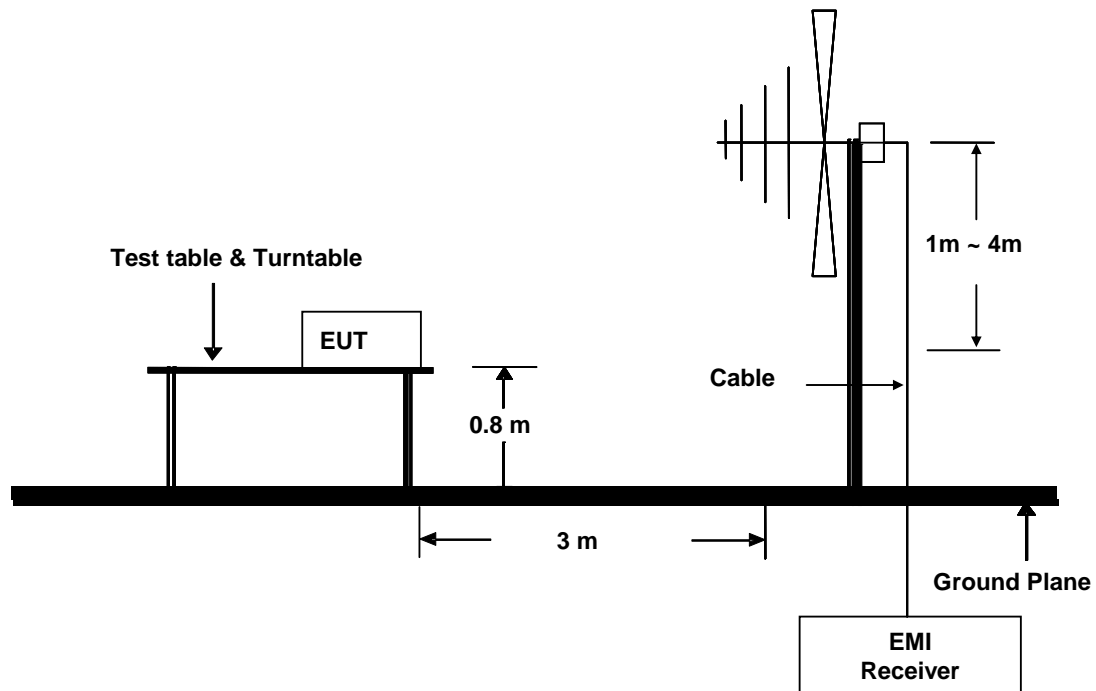
The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height $0,8\text{ m} \pm 0,01\text{ m}$, ANSI C63.10:2013 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the test.

5.3.3 TEST SETUP



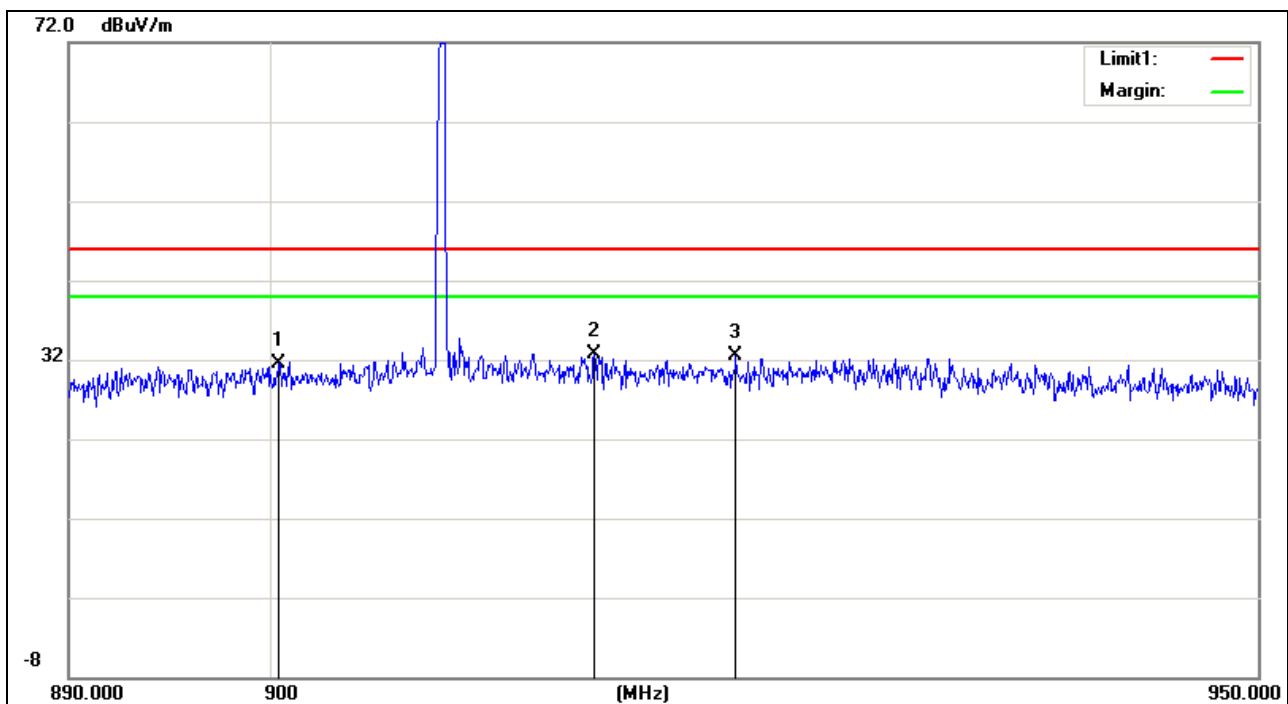
5.3.4 TEST RESULTS

The field strength was measured with an EMI measuring receiver and 100 kHz RBW / VBW for Peak and 120kHz RBW/VBW for QP at a distance of 3m.

Pre-scan DC 3V, DC 24V and AC 24V power supply, found that DC 24V is the worst case.

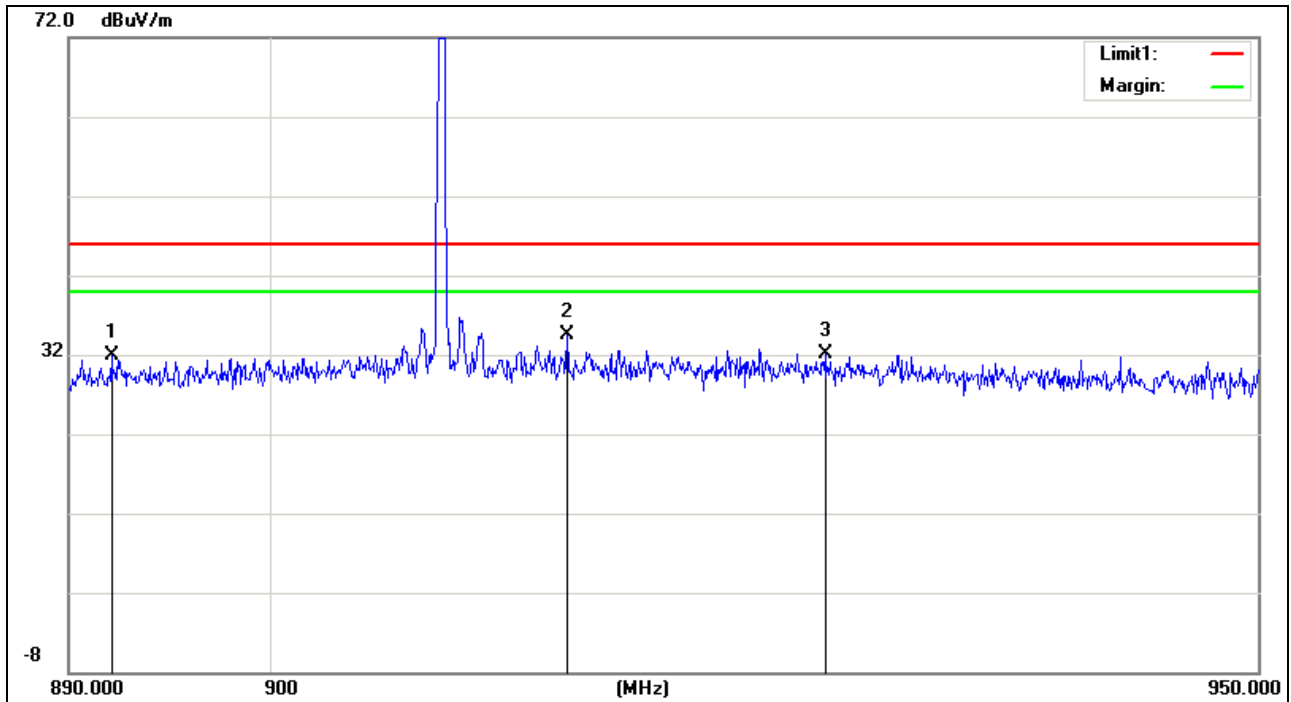
Measurement result:

Project No.:	E201512235184	Polarization:	Vertical
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:04:28
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by:	Brian Xiao		



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	900.3800	5.08	26.48	31.56	46.00	-14.44	peak
2	916.0400	5.75	27.02	32.77	46.00	-13.23	peak
3	923.1800	5.59	26.94	32.53	46.00	-13.47	peak

Project No.:	E201512235184	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B 3m	Power Source:	DC 24V
Test item:	Radiation Test	Date:	2015-12-29
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:05:57
EUT:	Thermostat	Distance:	3m
Model:	CT200	Test Result:	Pass
Note:			
Test by: Brian Xiao			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	892.1000	6.16	25.74	31.90	46.00	-14.10	peak
2	914.7200	7.57	27.03	34.60	46.00	-11.40	peak
3	927.7400	5.24	26.85	32.09	46.00	-13.91	peak

5.4 CONDUCTED EMISSION MEASUREMENT

5.4.1 LIMITS

Frequency range	Limits (dB μ V)	
	Quasi-peak	Average
150kHz \sim 0.5MHz	66 \sim 56	56 \sim 46
0.5 MHz \sim 5 MHz	56	46
5 MHz \sim 30 MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150kHz to 0.5MHz.

5.4.2 TEST PROCEDURES

Procedure of Preliminary Test

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

- Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:

- 1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or

- 2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;

- All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;

- The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;

- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.

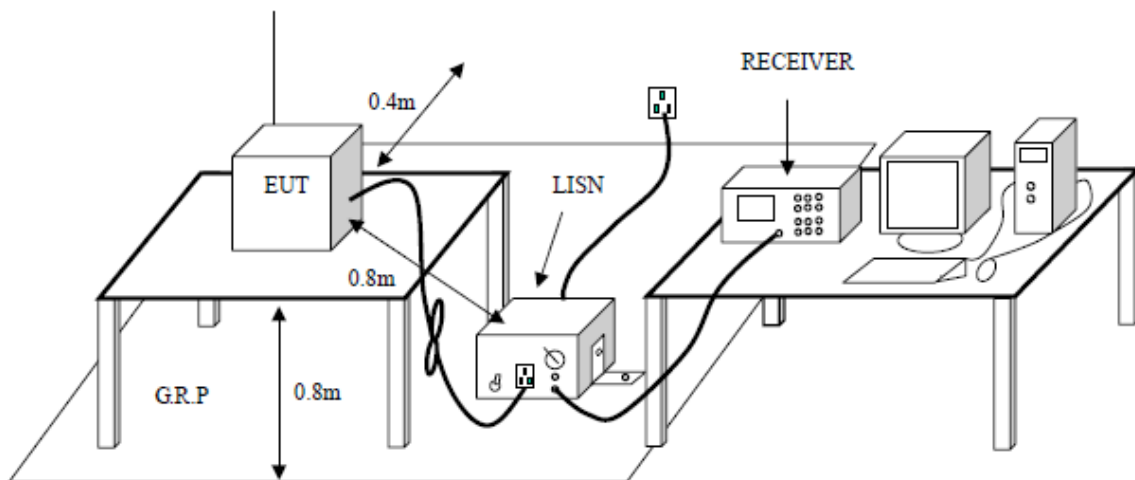
- I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

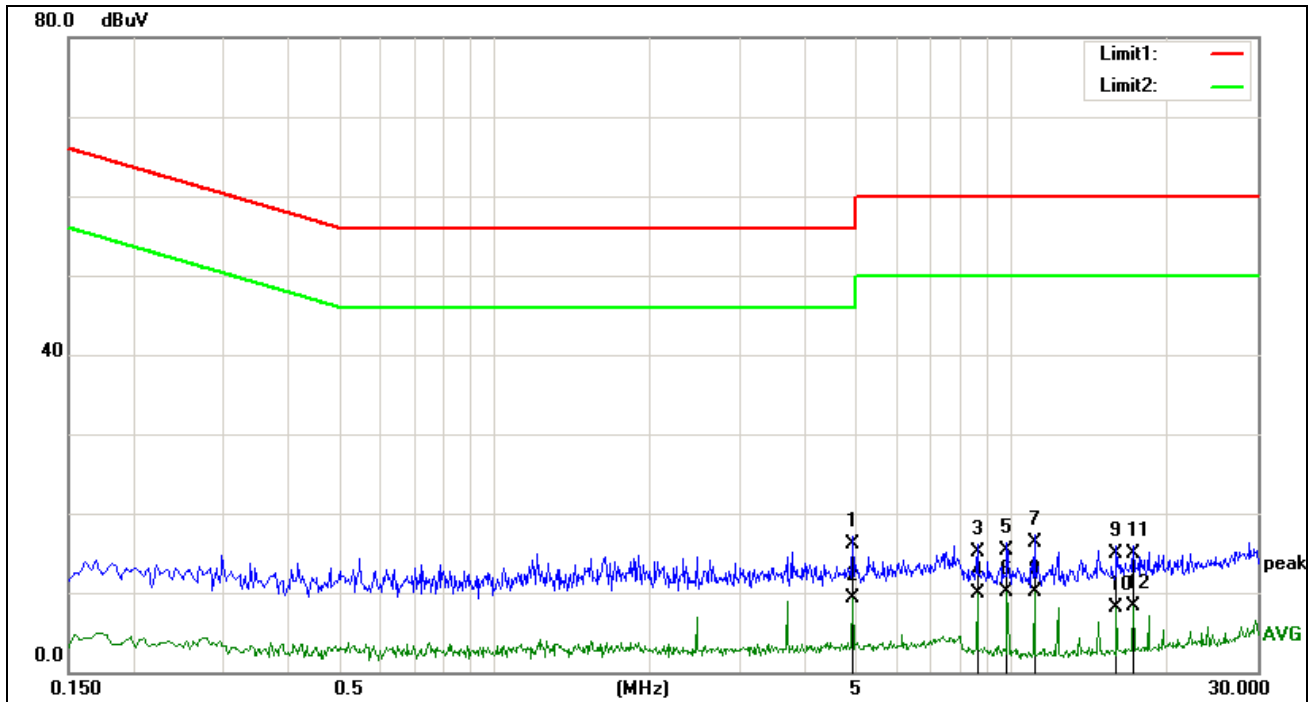
EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.4.3 TEST SETUP



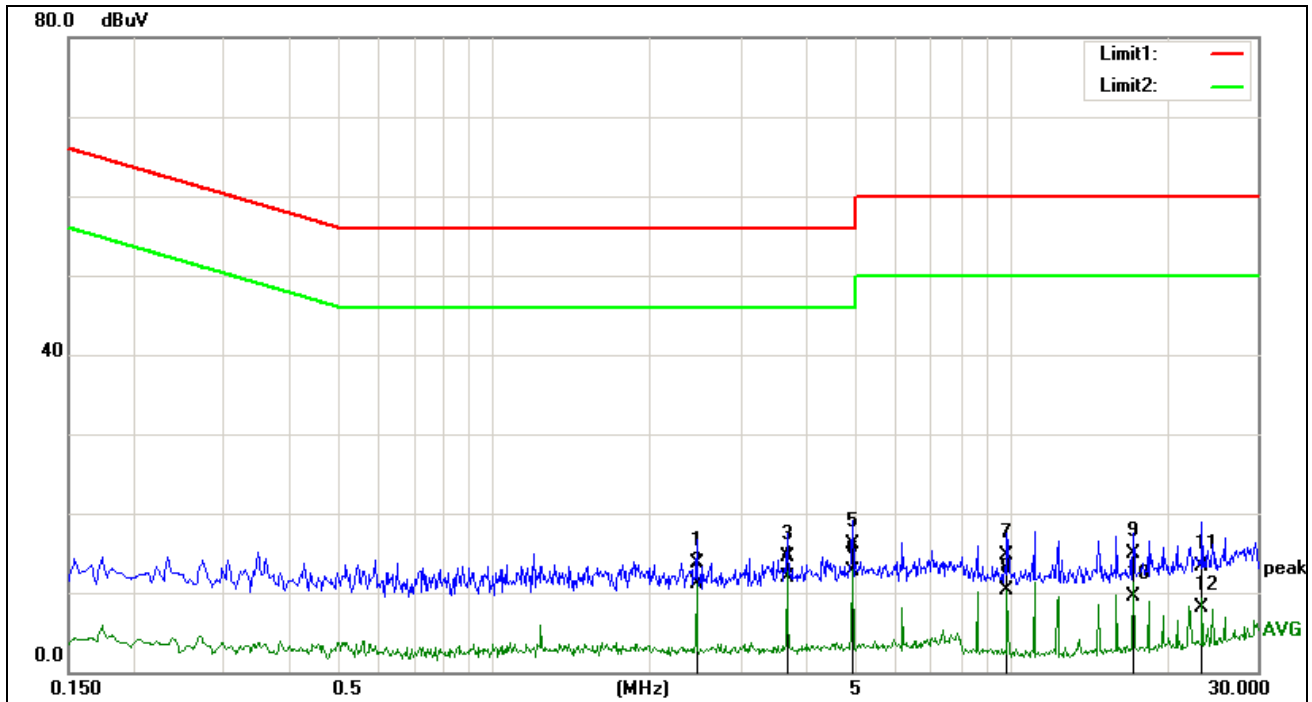
5.4.4 TEST RESULTS

Project No.:	E201512235184	Probe:	-
Standard:	(CE)FCC PART 15 class B_QP	Power Source:	DC 24V
Test item:	Conduction Test	Date:	2015-12-29
Temp./Hum.(%RH):	22.4/54%RH	Time:	13:34:18
EUT:	Thermostat	Test Result:	Pass
Model:	CT200		
Note:			
Test by:	Brian Xiao		



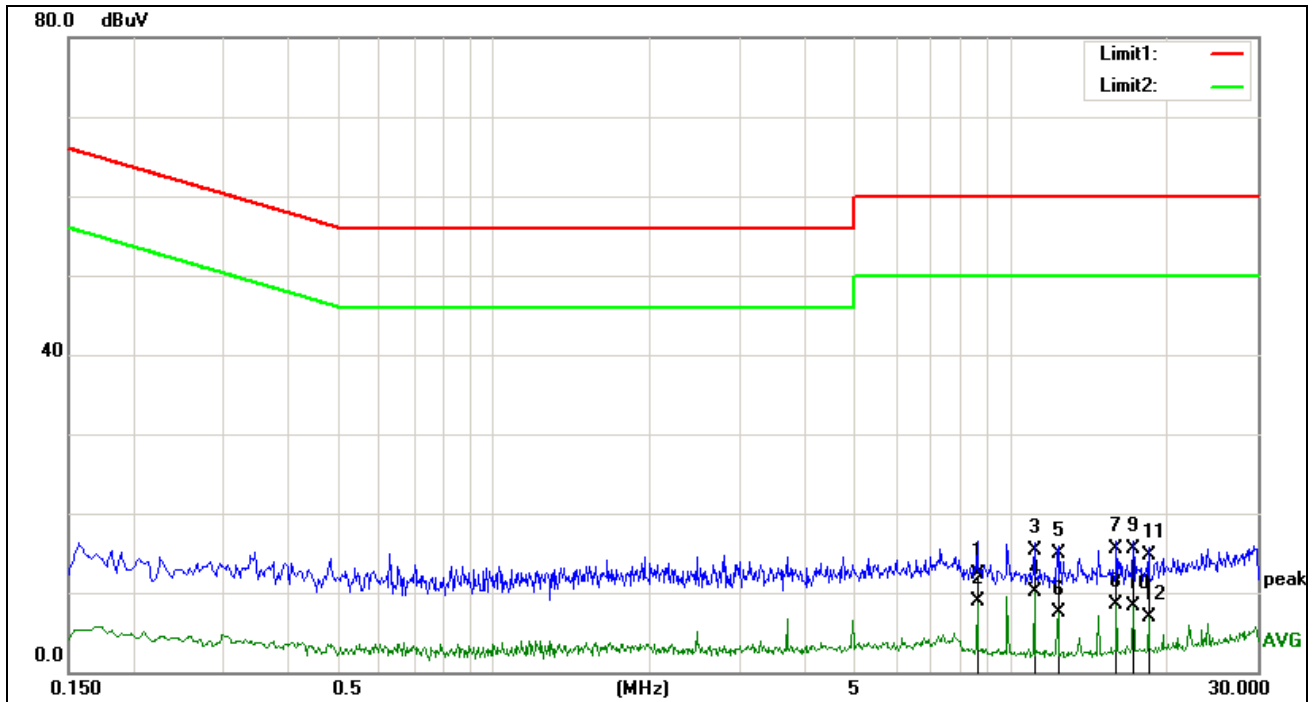
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	4.9298	9.38	6.71	16.09	56.00	-39.91	QP
2	4.9298	2.67	6.71	9.38	46.00	-36.62	AVG
3	8.6258	8.44	6.73	15.17	60.00	-44.83	QP
4	8.6258	3.14	6.73	9.87	50.00	-40.13	AVG
5	9.8579	8.46	6.76	15.22	60.00	-44.78	QP
6	9.8579	3.39	6.76	10.15	50.00	-39.85	AVG
7	11.0899	9.67	6.69	16.36	60.00	-43.64	QP
8	11.0899	3.50	6.69	10.19	50.00	-39.81	AVG
9	16.0178	8.10	6.81	14.91	60.00	-45.09	QP
10	16.0178	1.36	6.81	8.17	50.00	-41.83	AVG
11	17.2539	7.99	6.94	14.93	60.00	-45.07	QP
12	17.2539	1.32	6.94	8.26	50.00	-41.74	AVG

Project No.:	E201512235184	Probe:	+
Standard:	(CE)FCC PART 15 class B_QP	Power Source:	DC 24V
Test item:	Conduction Test	Date:	2015-12-29
Temp./Hum.(%RH):	22.4/54%RH	Time:	13:29:42
EUT:	Thermostat	Test Result:	Pass
Model:	CT200		
Note:			
Test by:	Brian Xiao		



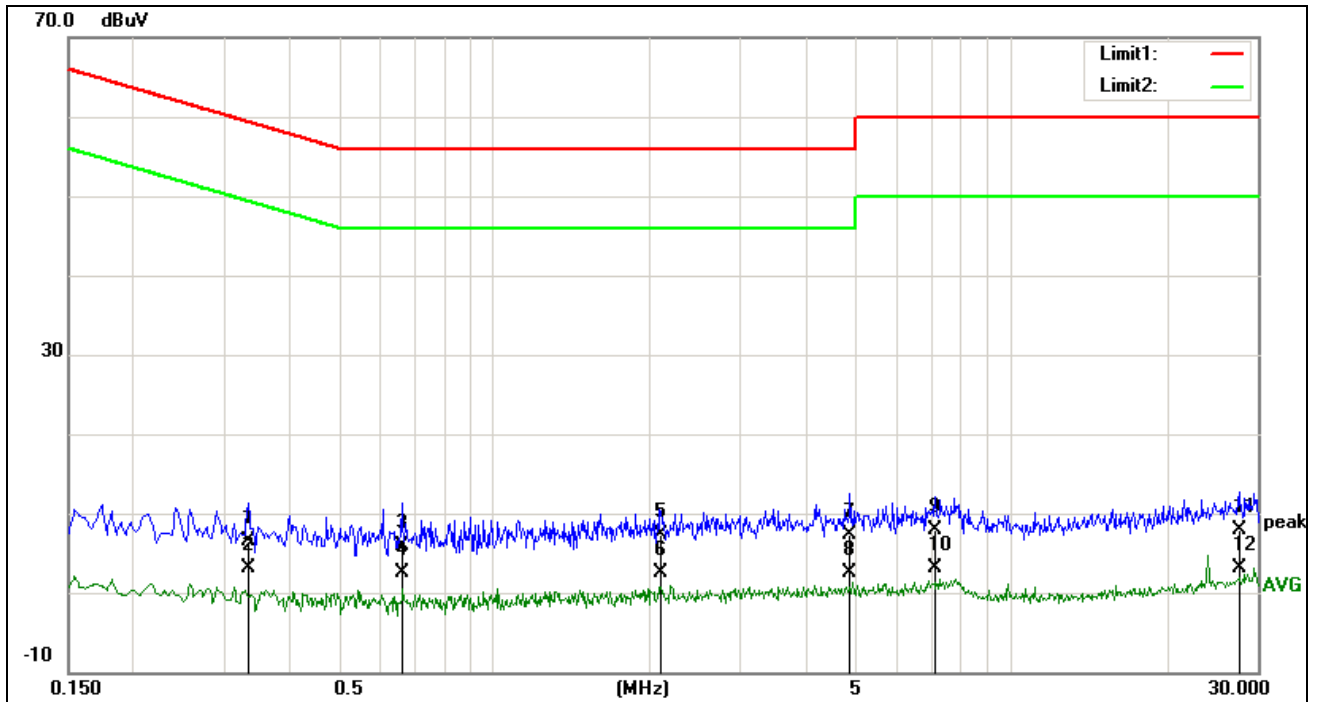
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	2.4644	7.12	6.66	13.78	56.00	-42.22	QP
2	2.4644	4.39	6.66	11.05	46.00	-34.95	AVG
3	3.6950	7.89	6.70	14.59	56.00	-41.41	QP
4	3.6950	5.29	6.70	11.99	46.00	-34.01	AVG
5	4.9281	9.40	6.71	16.11	56.00	-39.89	QP
6	4.9281	6.00	6.71	12.71	46.00	-33.29	AVG
7	9.8536	7.94	6.76	14.70	60.00	-45.30	QP
8	9.8536	3.58	6.76	10.34	50.00	-39.66	AVG
9	17.2479	7.94	6.94	14.88	60.00	-45.12	QP
10	17.2479	2.52	6.94	9.46	50.00	-40.54	AVG
11	23.4117	6.36	6.96	13.32	60.00	-46.68	QP
12	23.4117	1.14	6.96	8.10	50.00	-41.90	AVG

Project No.:	E201512235184	Probe:	L1
Standard:	(CE)FCC PART 15 class B_QP	Power Source:	AC 24V
Test item:	Conduction Test	Date:	2015-12-29
Temp./Hum.(%RH):	22.4/54%RH	Time:	13:24:16
EUT:	Thermostat		
Model:	CT200	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	8.6260	5.66	6.74	12.40	60.00	-47.60	QP
2	8.6260	2.16	6.74	8.90	50.00	-41.10	AVG
3	11.0899	8.69	6.69	15.38	60.00	-44.62	QP
4	11.0899	3.40	6.69	10.09	50.00	-39.91	AVG
5	12.3258	8.07	6.76	14.83	60.00	-45.17	QP
6	12.3258	0.67	6.76	7.43	50.00	-42.57	AVG
7	16.0138	8.79	6.81	15.60	60.00	-44.40	QP
8	16.0138	1.60	6.81	8.41	50.00	-41.59	AVG
9	17.2499	8.54	6.94	15.48	60.00	-44.52	QP
10	17.2499	1.35	6.94	8.29	50.00	-41.71	AVG
11	18.4819	7.65	7.05	14.70	60.00	-45.30	QP
12	18.4819	-0.08	7.05	6.97	50.00	-43.03	AVG

Project No.:	E201512235184	Probe:	N
Standard:	(CE)FCC PART 15 class B_QP	Power Source:	AC 24V
Test item:	Conduction Test	Date:	2015-12-29
Temp./Hum.(%RH):	22.4/54%RH	Time:	13:17:41
EUT:	Thermostat		
Model:	CT200	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.3335	0.08	6.50	6.58	59.36	-52.78	QP
2	0.3335	-3.33	6.50	3.17	49.36	-46.19	AVG
3	0.6616	-0.60	6.48	5.88	56.00	-50.12	QP
4	0.6616	-3.89	6.48	2.59	46.00	-43.41	AVG
5	2.1170	0.74	6.59	7.33	56.00	-48.67	QP
6	2.1170	-4.14	6.59	2.45	46.00	-43.55	AVG
7	4.9092	0.63	6.71	7.34	56.00	-48.66	QP
8	4.9092	-4.18	6.71	2.53	46.00	-43.47	AVG
9	7.1503	1.10	6.86	7.96	60.00	-52.04	QP
10	7.1503	-3.67	6.86	3.19	50.00	-46.81	AVG
11	27.6109	0.76	7.17	7.93	60.00	-52.07	QP
12	27.6109	-4.00	7.17	3.17	50.00	-46.83	AVG

5.5 20dB BANDWIDTH

5.5.1 LIMITS

When an occupied bandwidth value is not specified in the applicable FCC, the transmitted signal bandwidth to be reported is to be its 20dB emission bandwidth, as calculated or measured

5.5.2 TEST PROCEDURES

Procedure of Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height $0,8\text{ m} \pm 0,01\text{ m}$, ANSI C63.10:2013 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the test.

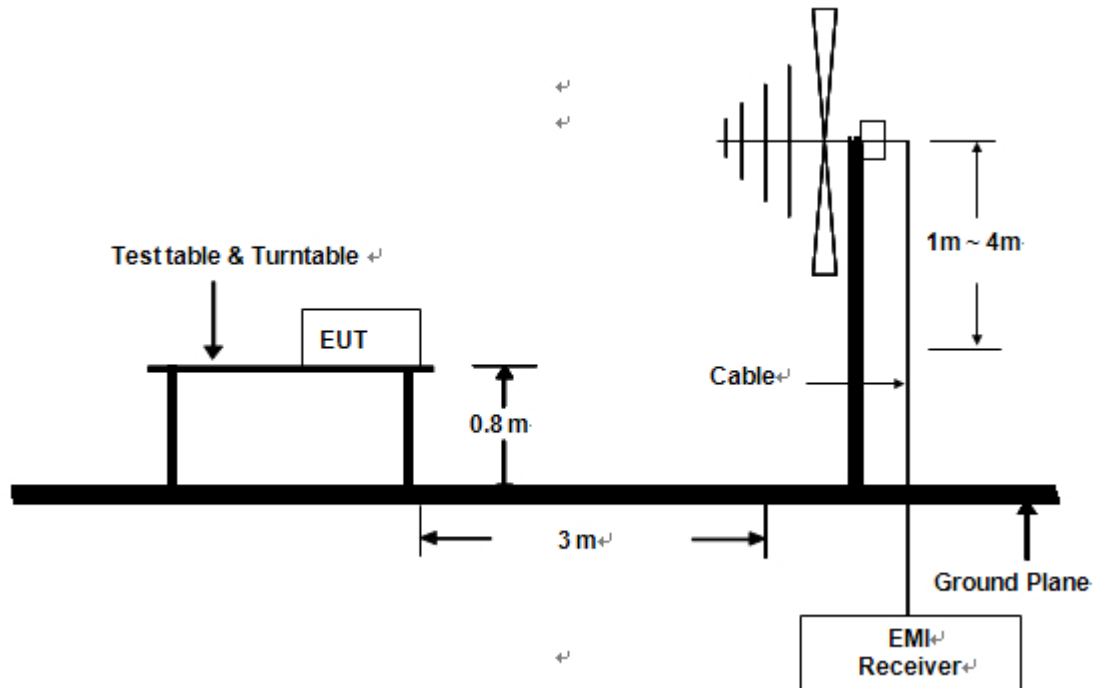
Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on a test channel;

Set the spectrum analyzer: RBW $\geq 1\%$ of the 20dB bandwidth (set 10 kHz). VBW \geq RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.

Mark the peak frequency 20dB bandwidth.

Bandwidth value is OBW value.

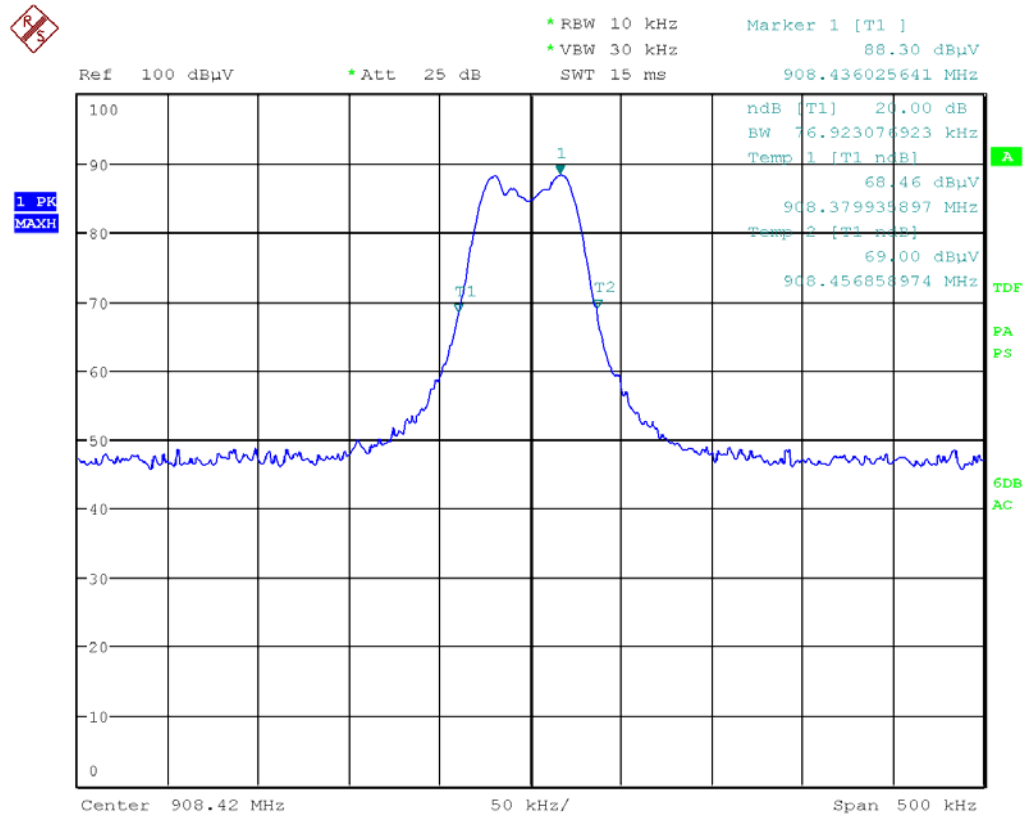
5.5.3 TEST SETUP



5.5.4 TEST RESULTS

Worst case: vertical

Frequency (GHz)	bandwidth	Fl	FH
908.42	76.92kHz	908.38MHz	908.46MHz



APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT

Radiated Emission (Below 1GHZ)

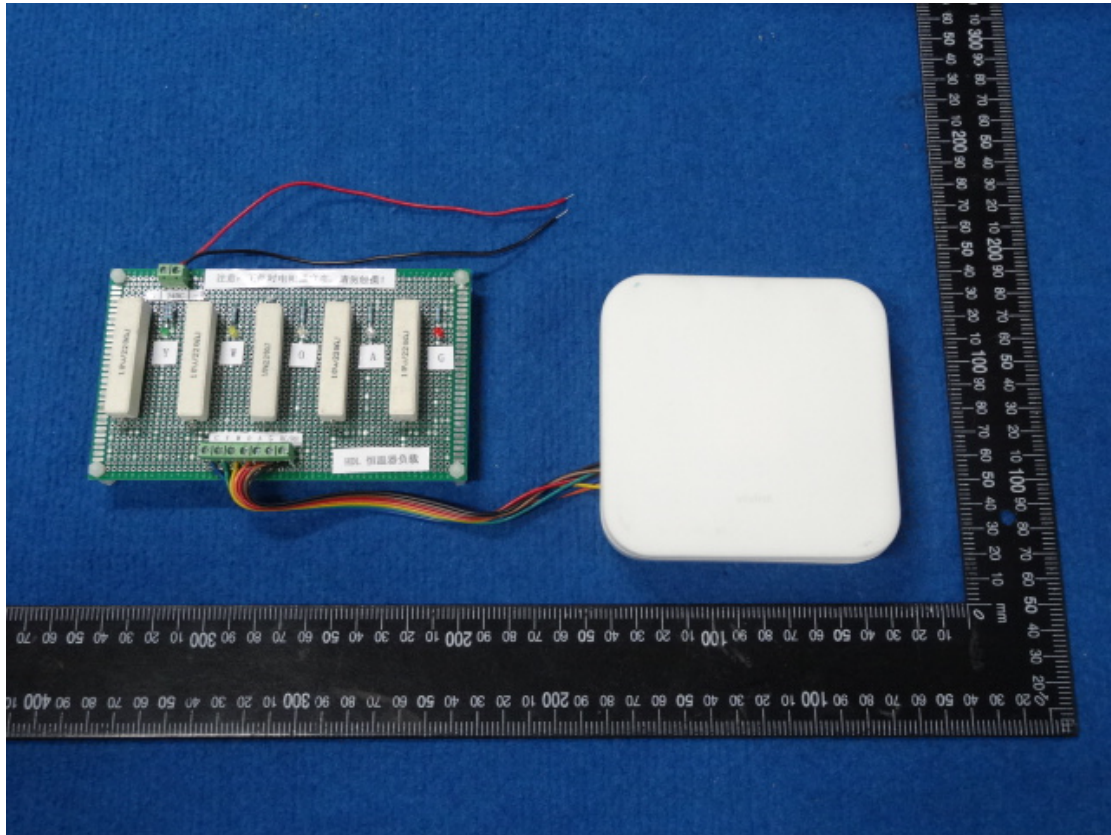


Radiated Emission (Above 1GHz)

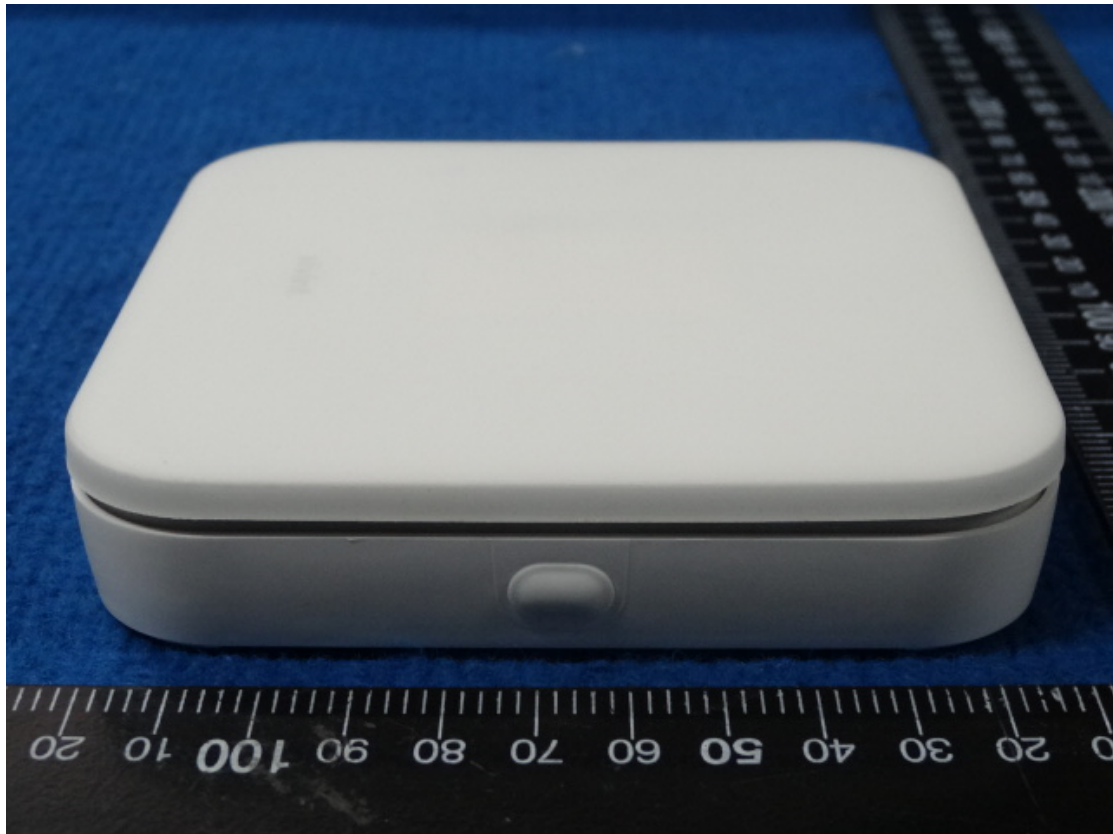


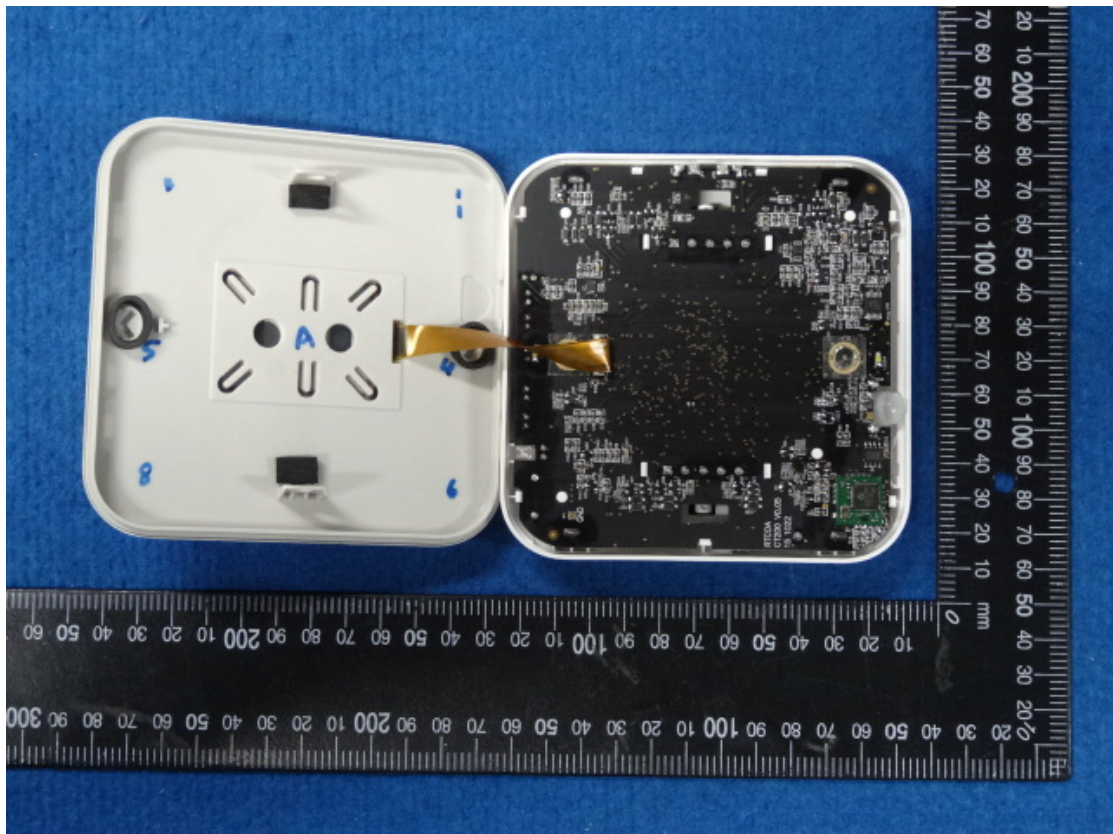
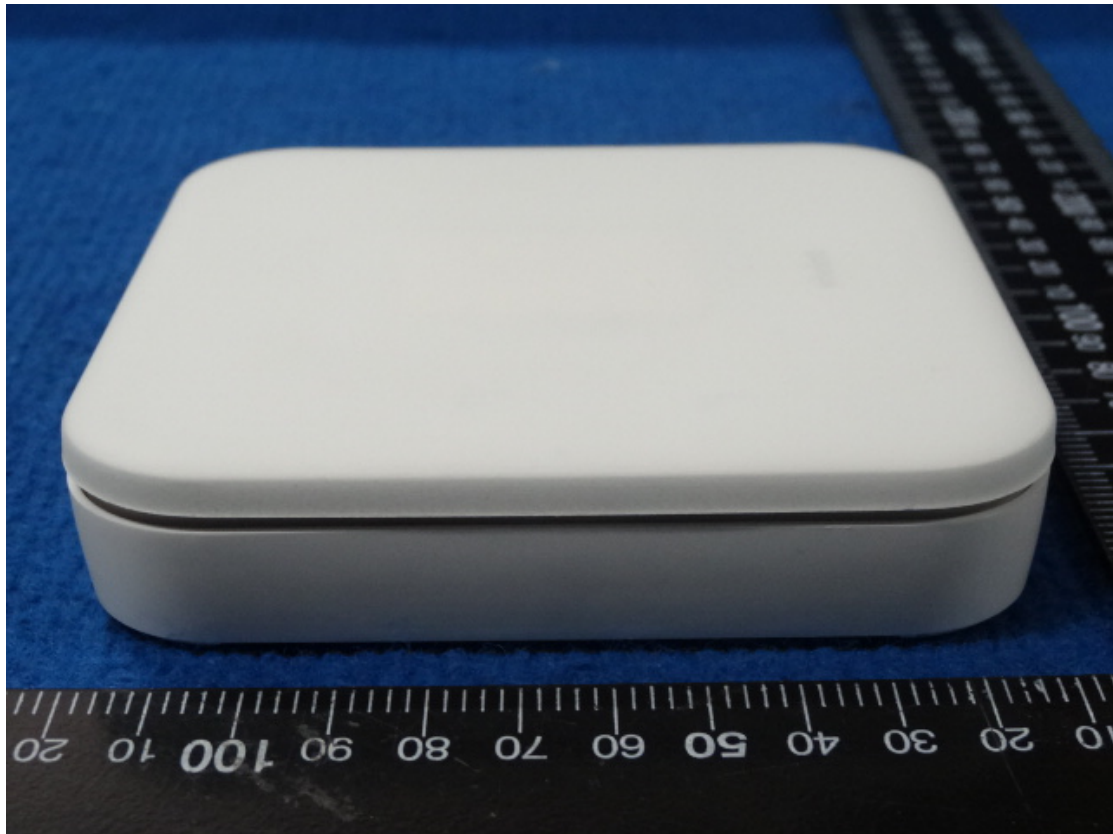
Conducted emission

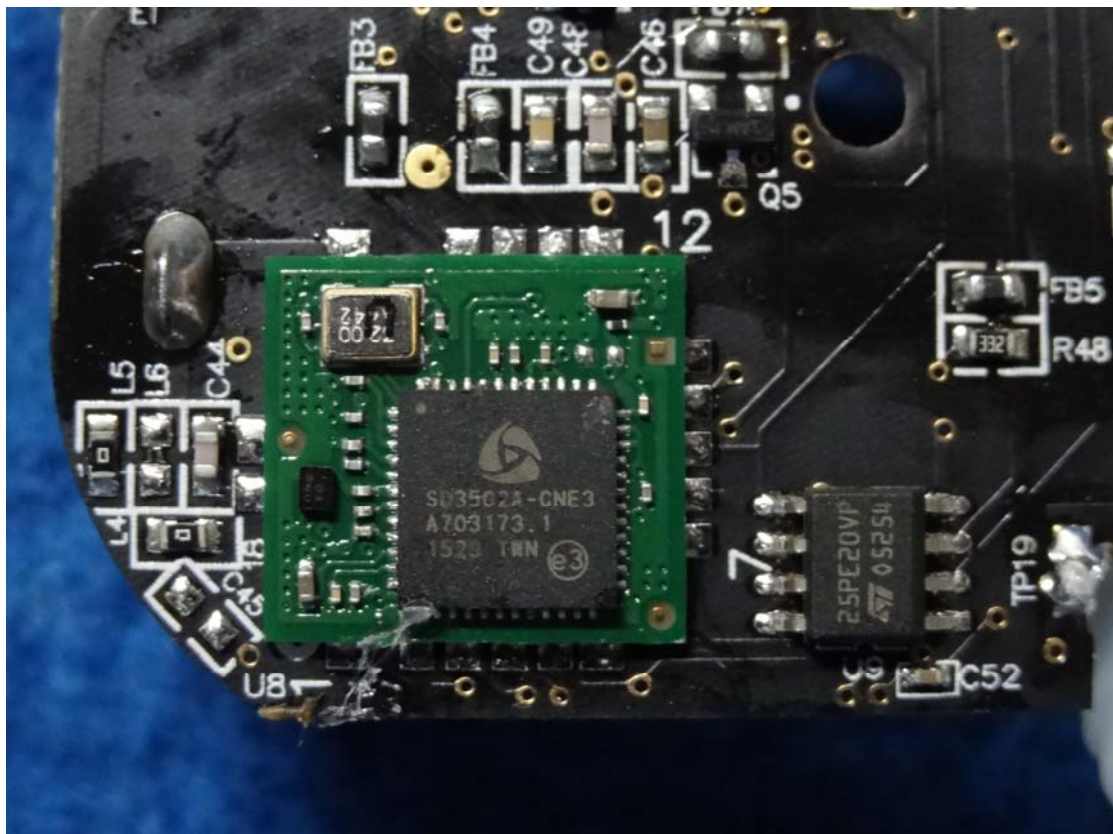


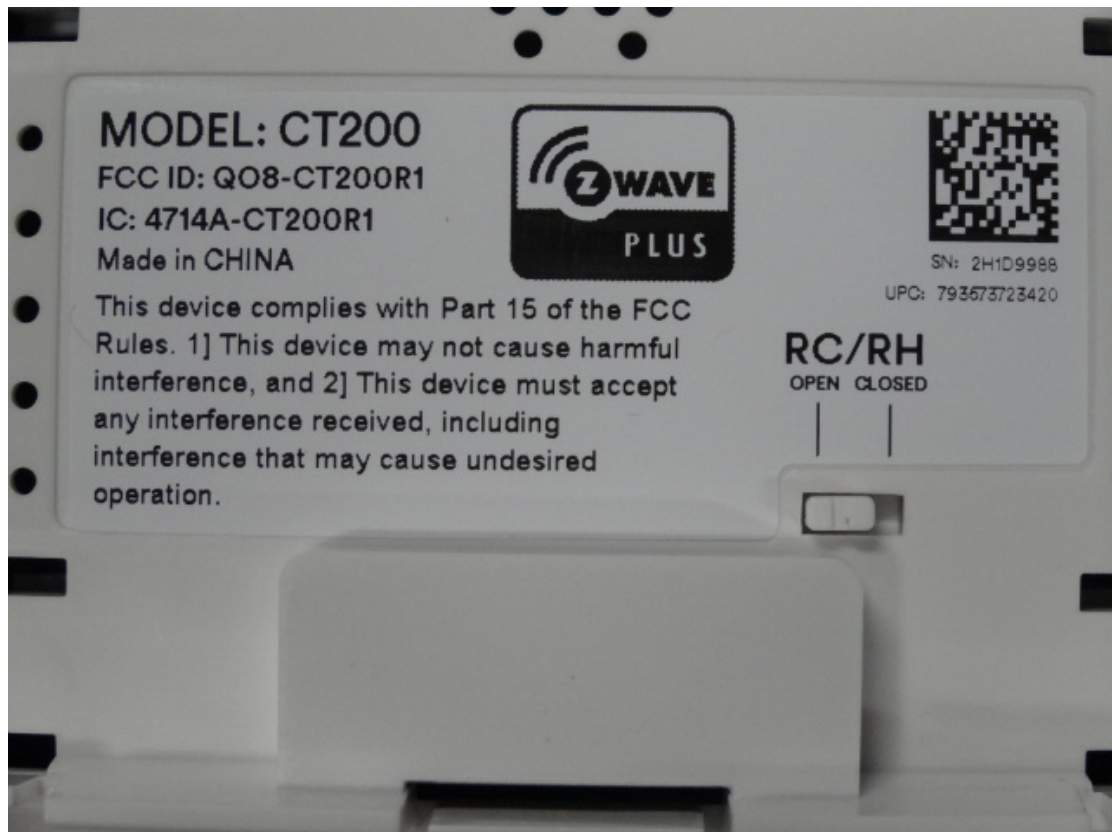
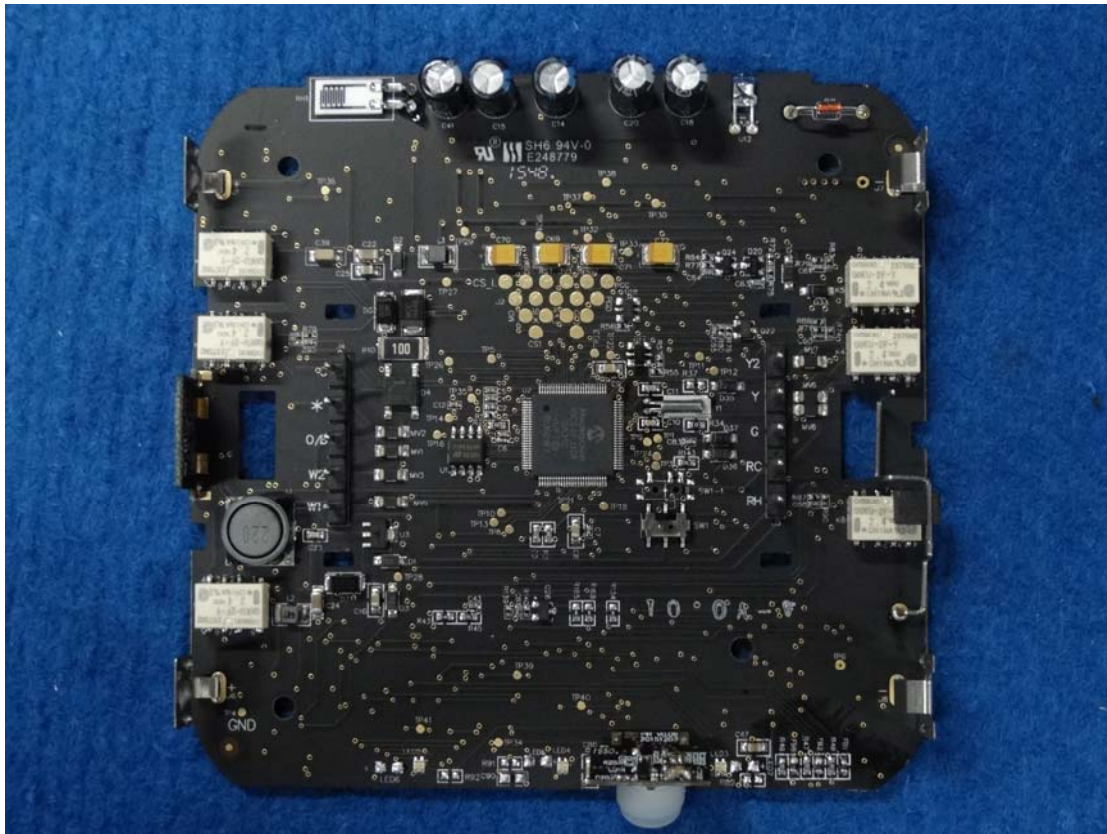
APPENDIX B: PHOTOGRAPH OF EUT

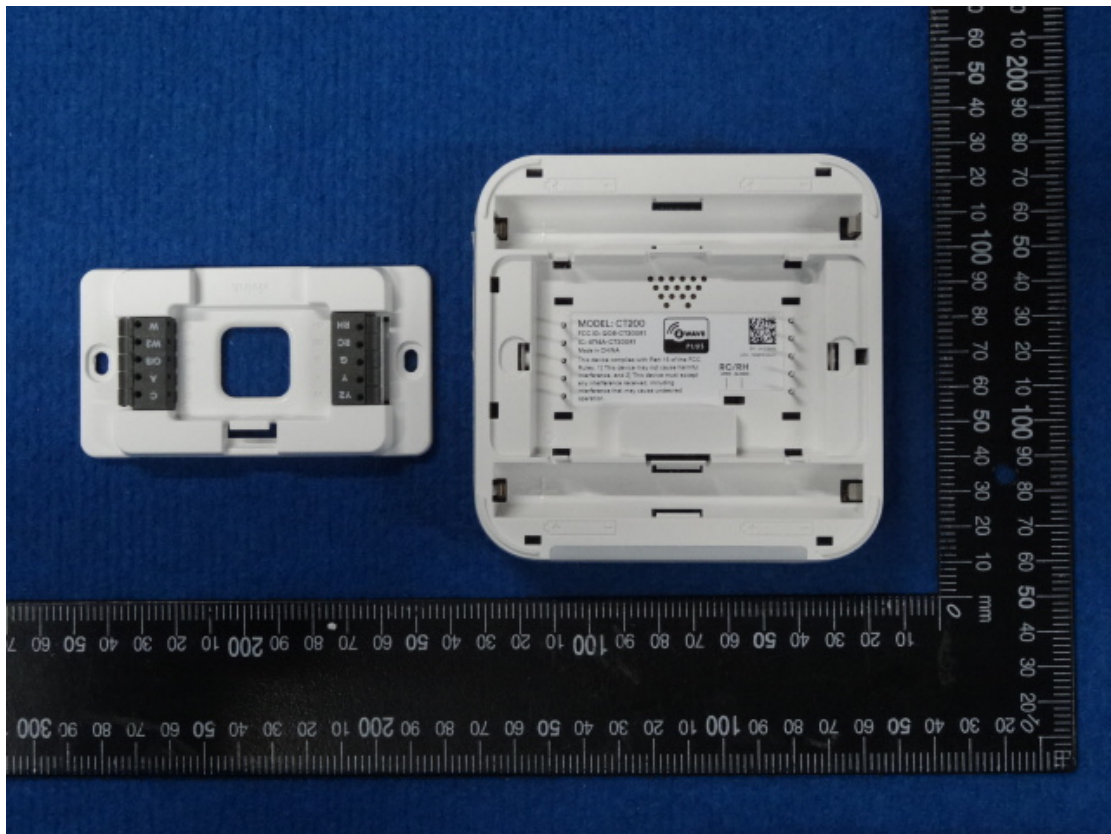




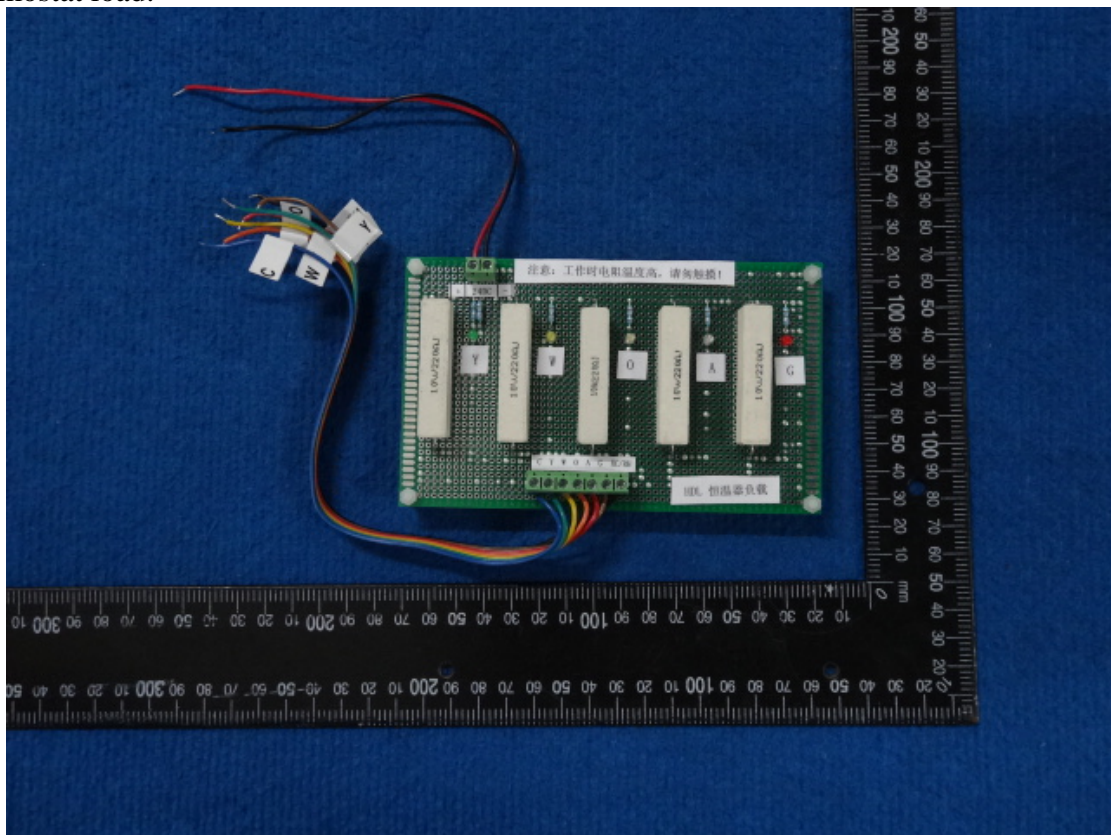


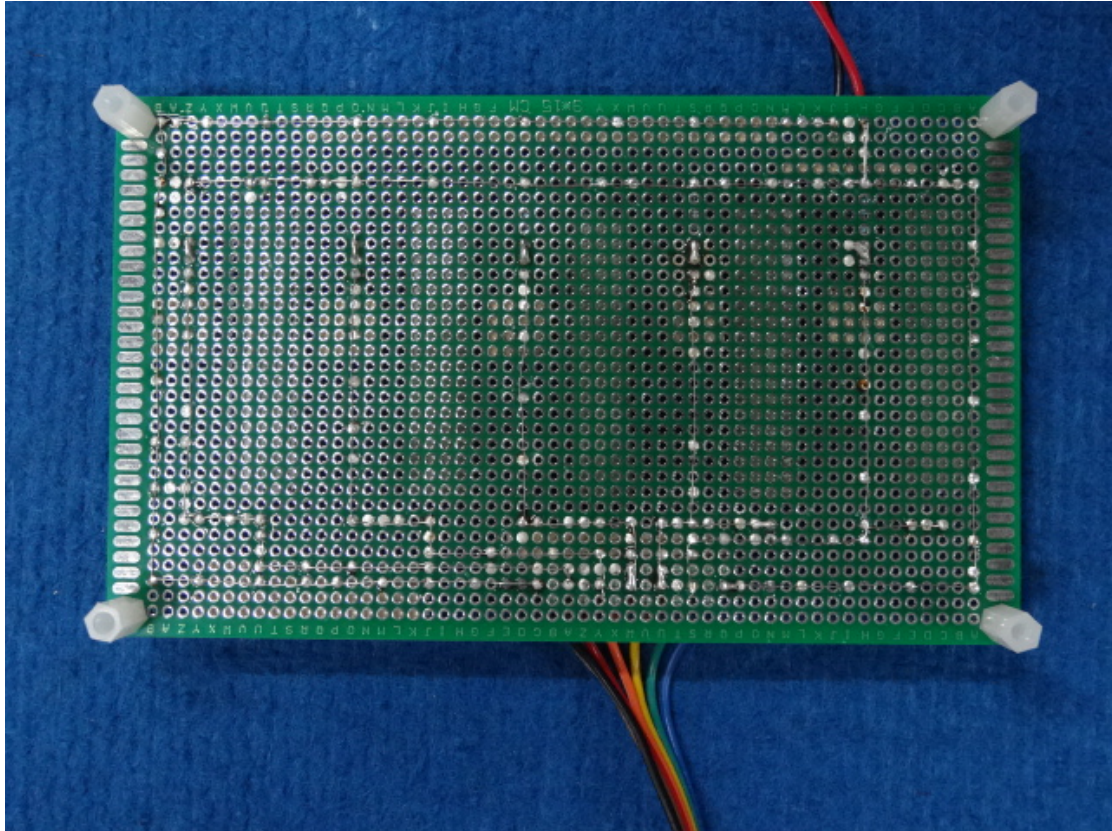






Thermostat load:





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