

TEST REPORT

Applicant Name & : Chili Technology LLC
Address : 144 Talbert Pointe Drive Suite 103 Mooresville, NC 28117, USA

Sample Description

Product : Electric heating and cooling mattress
Model No. : Chili Cube
Electrical Rating : 150W, AC90~230V, 50/60Hz
FCC ID : 2ABA9-CP-CUBE-01

Date Received : 14 October 2013

Date Test Conducted : 14 October 2013 – 17 December 2013

Test standards : FCC Part 15:2011

Test Result : Pass


Conclusion : The submitted samples complied with the above rules/standards.

Remark : None.


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Prepared and Checked By:

Approved By:



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06 Jan., 2014 ***Signature***
Date

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TEST RESULTS SUMMARY

Classification of EUT: Class B

Test Item	Standard	Result
Conducted Emission	FCC Part 15, Subpart B: 2011	Pass
Radiated Emission	FCC Part 15, Subpart B: 2011	Pass

Remark: 1. The symbol “N/A” in above table means Not Applicable.

2. When determining the test results, measurement uncertainty of tests has been considered.

2

Test Results Conclusion
(with Justification)

RE: EMC Testing Pursuant to FCC Part 15, Subpart B: 2011 Performed On the Electric heating and cooling mattress, Model: Chili Cube.

We tested Electric heating and cooling mattress, Model: Chili Cube, to determine if it was in compliance with the relevant FCC rules as marked on the Test Results Summary. We found that the unit met the requirement of FCC Part 15, Subpart B: 2011 when tested as received. The worst case's test data was presented in this test report. Test items Conducted Emission and Radiated Emission were subcontracted.

The Equipment Under Test (EUT) is controlled by a controller, the controller is an intentional radiator using 433.92MHz frequency.

Antenna Type: Integral wire antenna.

The controller option of this receiver is subject to Certification procedure.

The data on the below test result table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

According 15.107, the worst case conducted emission at 20.15MHz

Judgement: Passed by -10.22 dB

According 15.109, the worst case radiated emission at 68.40 MHz

Judgement: Passed by -2.5 dB

The production units are required to conform to the initial sample as received when the units are placed on the market.

3

LABORATORY MEASUREMENTS

Configuration Information

Equipment Under Test (EUT):	Electric heating and cooling mattress
Model:	Chili Cube
Serial No.	Not Labelled
Support Equipment:	A controller
Rated Voltage:	AC90~230V, 50/60Hz
Condition of Environment:	Temperature : 15~35°C Relative Humidity: 35~60% Atmosphere Pressure 86~106kPa

Notes:

1. Test Environment

If ambient levels of emissions exceed the appropriate limit, the following steps were taken to assure compliance. First, the measurement bandwidth was reduced, if this did not affect the peak readings. Such a reduction can allow much closer examination of emissions close to local ambient signals. Second, the antenna could be brought closer to the EUT. Finally, in severe cases, testing was re-performed at night or other times when the offending signal was off the air. The measurements were made at nominal room temperature ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$).

2. Test Site

All of the tests are performed at:

Intertek Testing Services Shenzhen Ltd. Guangzhou Branch. Block E, No.7-2 Guang Dong Software Science Park, Caipin Road, Guangzhou Science City, GETDD Guangzhou, China. This test facility and site measurement data have been fully placed on file with the FCC, test firm registration number is 549654.

3. Test Platform

Radiated emission and Conducted emission tests were made on 12mm thick insulating material on the reference ground plane. The vertical conducting plane or wall of a screened room shall be located 40 cm to the rear of the EUT. All other surfaces of EUT shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

4. Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

4 TEST RESULTS

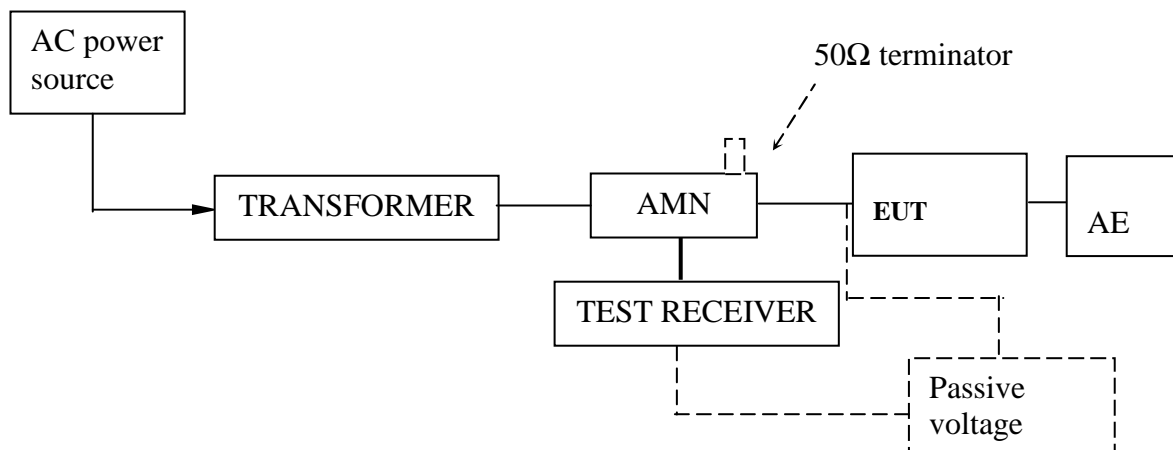
4.1 Conducted Emission Test

Test Result: Pass

4.1.1 Used Test Equipment

Equip No.	Description	Manufacturer	Model No.	Cal. Date	Due Date
EM 080-05	EMI Test Receiver	Rohde&Schwarz	ESCI	26 Oct 2013	26 Oct 2014
EM 006-05	LISN	Rohde&Schwarz	ENV216	22 Oct 2013	22 Oct 2014
EM 006-06-01	RF Cable	FUJIKURA	3D-2W	28 Apr 2013	28 Apr 2014

4.1.2 Block Diagram of Test Setup



4.1.3 Test Setup and Procedure

Test was performed according to ANSI C63.4: 2009. The EUT was set to achieve the maximum emission level. The mains terminal disturbance voltage was measured with the EUT in a shielded room. The EUT was connected to AC power source through an Artificial Mains Network which provides a 50Ω linear impedance. Artificial hand is used if appropriate (for handheld apparatus). The load/control terminal disturbance voltage was measured with passive voltage probe if appropriate.

The vertical conducting plane or wall of a screened room shall be located 40 cm to the rear of the EUT. All other surfaces of tabletop EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs. The table-top EUT was placed on a 0.8m high non-metallic table above earthed ground plane (Ground Reference Plane). And for floor standing EUT, was placed on a 12mm high non-metallic supported on GRP. The Artificial Mains Network is situated at a distance of 0.8m from the EUT.

During the test, mains lead of EUT excess 0.8m was folded back and forth parallel to the lead so as to form a horizontal bundle with a length between 0.3m and 0.4m.

The bandwidth of test receiver was set at 9 kHz. The frequency range from 150 kHz to 30MHz was checked.

4.1.4 Test Data

At main terminal: Pass

Operation Mode: EUT ON (Cooling)

L line:

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15-QP			
Trace2:	FCC15-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA	LIMIT dB
2 Average	21.57 MHz	35.02 L1	-14.97	
2 Average	10.538 MHz	33.92 L1	-16.07	
1 Quasi Peak	2.11 MHz	39.78 L1	-16.21	
2 Average	198 kHz	36.87 L1	-16.82	
1 Quasi Peak	2.202 MHz	39.16 L1	-16.84	
2 Average	10.198 MHz	33.08 L1	-16.91	
2 Average	1.99 MHz	29.00 L1	-17.00	
2 Average	6.07 MHz	32.82 L1	-17.17	
1 Quasi Peak	262 kHz	43.96 L1	-17.40	
2 Average	266 kHz	33.64 L1	-17.60	
1 Quasi Peak	3.65 MHz	38.32 L1	-17.67	
1 Quasi Peak	22.034 MHz	41.98 L1	-18.02	
2 Average	2.302 MHz	27.87 L1	-18.12	
1 Quasi Peak	9.918 MHz	41.24 L1	-18.75	
1 Quasi Peak	166 kHz	46.19 L1	-18.96	
1 Quasi Peak	10.422 MHz	40.28 L1	-19.71	
1 Quasi Peak	458 kHz	33.68 L1	-23.04	
1 Quasi Peak	790 kHz	31.28 L1	-24.71	

N line:

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15-QP			
Trace2:	FCC15-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA	LIMIT dB
2 Average	20.15 MHz	39.77 L1	-10.22	
1 Quasi Peak	1.918 MHz	44.23 L1	-11.76	
1 Quasi Peak	20.15 MHz	47.78 L1	-12.22	
2 Average	1.93 MHz	33.21 L1	-12.78	
2 Average	16.434 MHz	36.83 L1	-13.16	
2 Average	6.69 MHz	35.84 L1	-14.15	
2 Average	3.514 MHz	31.17 L1	-14.82	
2 Average	4.478 MHz	31.09 L1	-14.90	
1 Quasi Peak	4.026 MHz	40.84 L1	-15.15	
2 Average	198 kHz	38.42 L1	-15.27	
1 Quasi Peak	2.682 MHz	40.62 L1	-15.37	
1 Quasi Peak	7.366 MHz	43.85 L1	-16.14	
1 Quasi Peak	15.522 MHz	42.87 L1	-17.12	
1 Quasi Peak	262 kHz	43.45 L1	-17.91	
1 Quasi Peak	150 kHz	48.06 L1	-17.93	
2 Average	262 kHz	32.68 L1	-18.68	
1 Quasi Peak	1.222 MHz	35.32 L1	-20.67	
2 Average	1.17 MHz	24.23 L1	-21.76	
1 Quasi Peak	550 kHz	33.93 L1	-22.06	

Operation Mode: EUT ON (Heating)

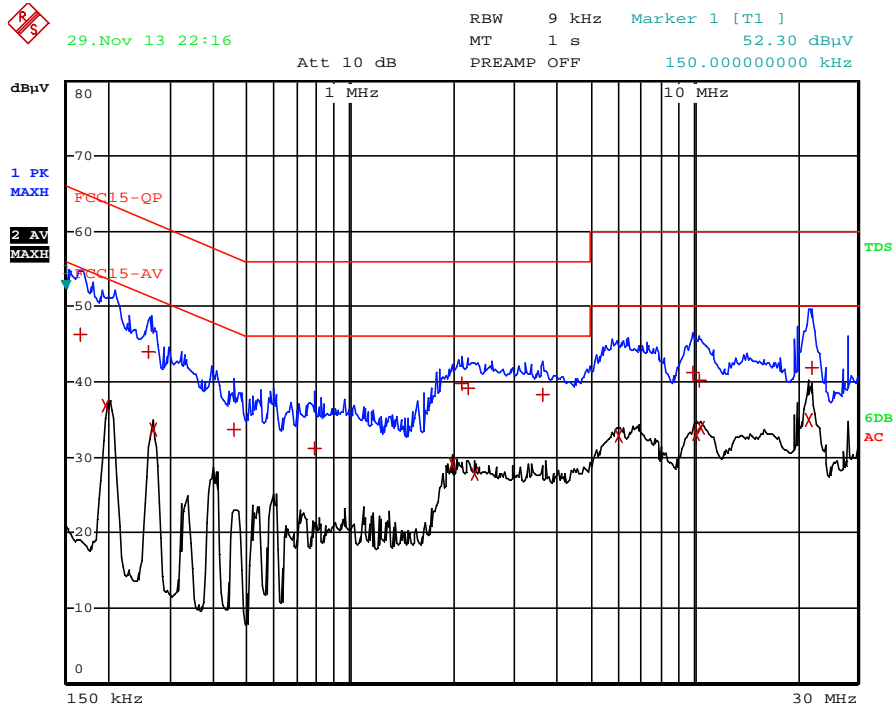
L line:

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15-QP			
Trace2:	FCC15-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
2 Average	23.474 MHz	34.83	L1	-15.16
2 Average	10.546 MHz	34.51	L1	-15.48
1 Quasi Peak	28.198 MHz	43.76	L1	-16.23
1 Quasi Peak	154 kHz	49.52	L1	-16.25
2 Average	2.126 MHz	29.45	L1	-16.54
2 Average	1.998 MHz	29.37	L1	-16.62
2 Average	198 kHz	37.05	L1	-16.63
2 Average	5.786 MHz	32.98	L1	-17.01
2 Average	6.138 MHz	32.75	L1	-17.25
1 Quasi Peak	266 kHz	43.76	L1	-17.47
2 Average	266 kHz	33.58	L1	-17.66
1 Quasi Peak	4.134 MHz	38.12	L1	-17.87
1 Quasi Peak	2.146 MHz	37.87	L1	-18.12
1 Quasi Peak	10.546 MHz	41.66	L1	-18.33
1 Quasi Peak	10.102 MHz	41.36	L1	-18.63
1 Quasi Peak	478 kHz	34.51	L1	-21.86
1 Quasi Peak	1.538 MHz	31.84	L1	-24.15
1 Quasi Peak	786 kHz	31.26	L1	-24.73

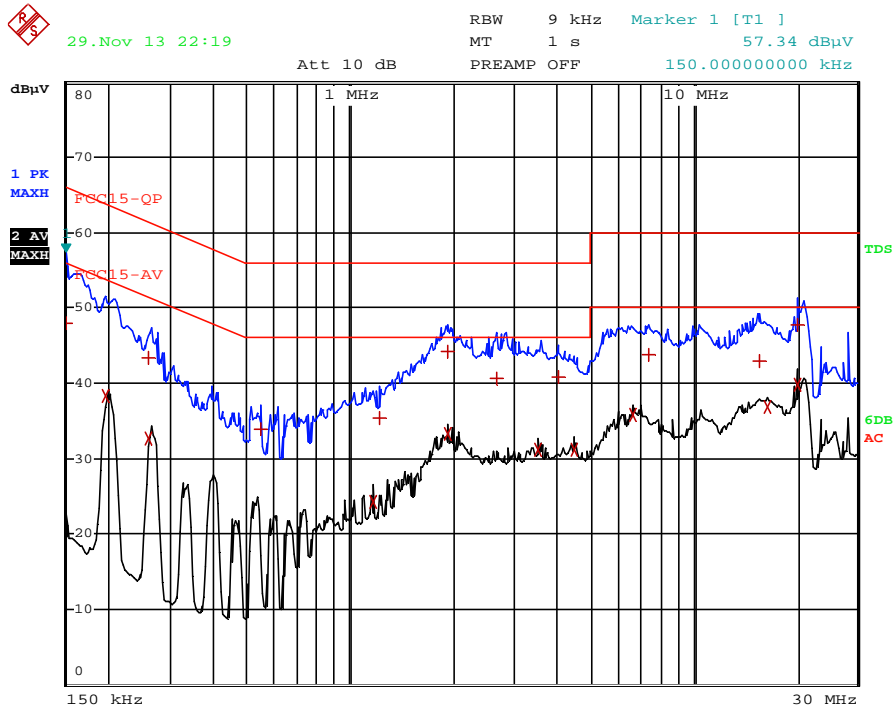
N line:

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCC15-QP			
Trace2:	FCC15-AV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
2 Average	21.886 MHz	38.65	L1	-11.34
2 Average	16.11 MHz	37.46	L1	-12.53
2 Average	1.862 MHz	33.38	L1	-12.61
1 Quasi Peak	1.886 MHz	42.62	L1	-13.37
2 Average	198 kHz	39.07	L1	-14.62
1 Quasi Peak	6.202 MHz	45.11	L1	-14.88
2 Average	3.518 MHz	31.03	L1	-14.96
2 Average	6.63 MHz	34.92	L1	-15.07
1 Quasi Peak	21.37 MHz	44.86	L1	-15.14
1 Quasi Peak	2.866 MHz	40.72	L1	-15.27
1 Quasi Peak	3.93 MHz	40.71	L1	-15.28
2 Average	4.686 MHz	30.66	L1	-15.33
1 Quasi Peak	15.918 MHz	43.61	L1	-16.38
1 Quasi Peak	262 kHz	43.91	L1	-17.45
2 Average	262 kHz	33.33	L1	-18.03
1 Quasi Peak	154 kHz	47.42	L1	-18.36
1 Quasi Peak	1.17 MHz	36.66	L1	-19.33
2 Average	1.098 MHz	24.81	L1	-21.18
1 Quasi Peak	458 kHz	31.39	L1	-25.33

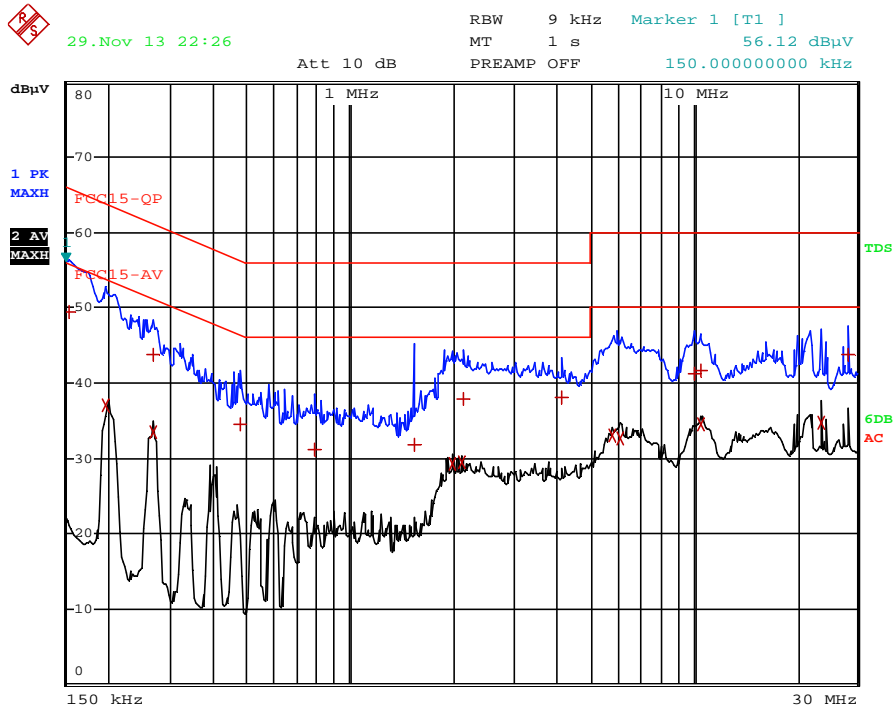
4.1.5 Emission Curve
Operation Mode: EUT ON (Cooling)
Tested Wire: Live



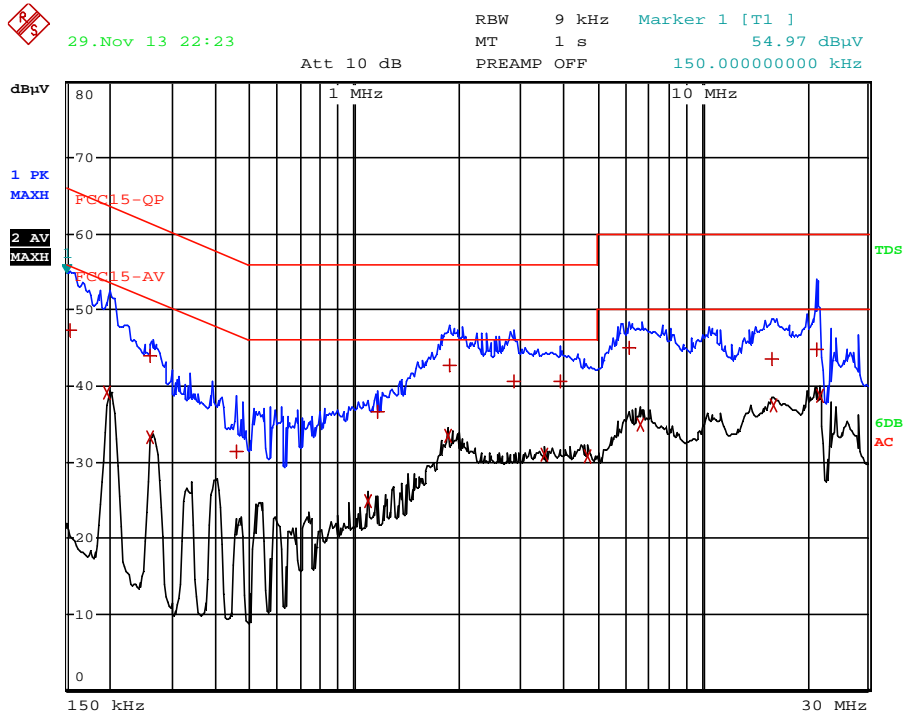
Tested Wire: Neutral



Operation Mode: EUT ON (Heating)
Tested Wire: Live



Tested Wire: Neutral



4.1.6 Measurement Uncertainty

Uncertainty: 2.50 dB at a level of confidence of 95%

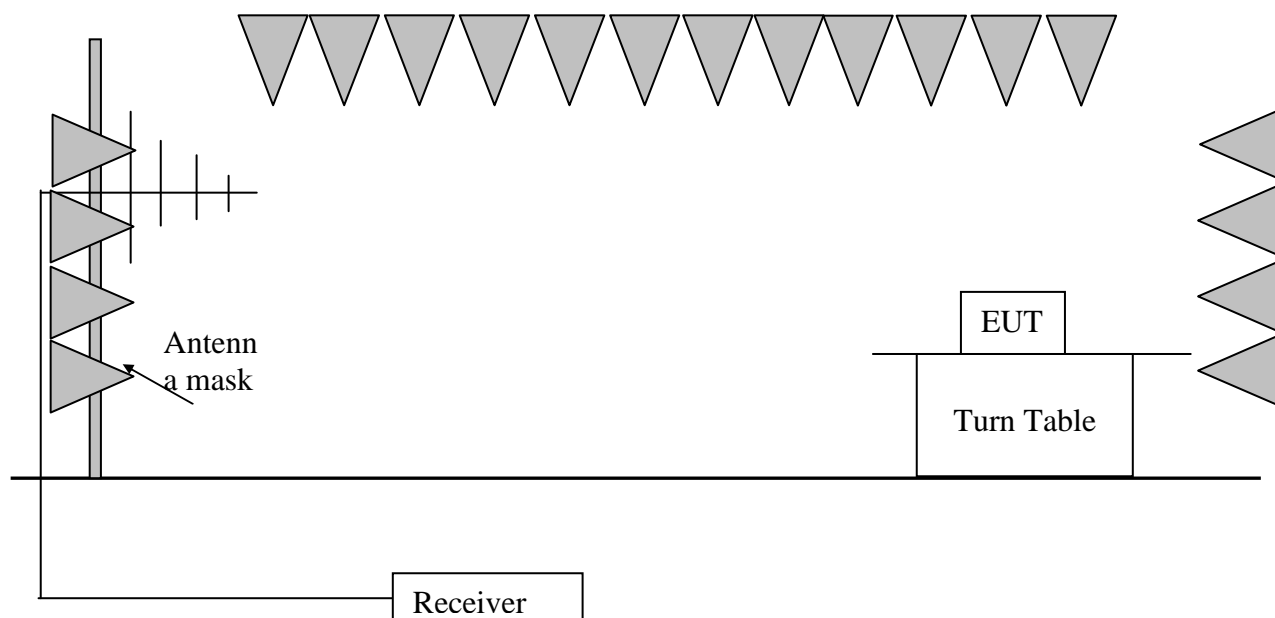
4.2 Radiated Emission

Test Result: Pass

4.2.1 Used Test Equipment

Equipment No.	Equipment	Manufacturer	Model No.	Cal. Date	Due Date
EM031-02	EMI Test Receiver	R&S	R&S ESR7	03-Jun-2013	03-Jun-2014
EM061-03	Bilog Antenna	SCHWARZBECK	VULB 9161	25-May-2013	25-May-2014
EM031-02-01	Coaxial cable	R&S	/	03-Jun-2013	03-Jun-2014
EM031-03	Spectrum Analyzer	R&S	R&S FSV40	03-Jun-2013	03-Jun-2014
EM033-02	Horn Antenna	R&S	R&S HF907	25-May-2013	25-May-2014
EM031-02-01	Coaxial cable	R&S	/	03-Jun-2013	03-Jun-2014
EM080-05	EMI receiver	R&S	ESCI	26-Oct-2013	26-Oct-2014
EM033-02-01	Signal Amplifier	R&S	R&S SCU-18	25-May-2013	25-May-2014

4.2.2 Block Diagram of Test Setup



4.2.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

$$\begin{aligned} \text{FS} &= \text{RA} + \text{AF} + \text{CF} - \text{AG} + \text{AV} \\ \rightarrow \text{FS} &= \text{RA} + \text{Correct Factor} + \text{AV} \\ \text{where FS} &= \text{Field Strength in dB}\mu\text{V/m} \\ \text{RA} &= \text{Receiver Amplitude (including preamplifier) in dB}\mu\text{V} \\ \text{CF} &= \text{Cable Attenuation Factor in dB} \\ \text{AF} &= \text{Antenna Factor in dB} \\ \text{AG} &= \text{Amplifier Gain in dB} \\ \text{AV} &= \text{Average Factor in -dB} \\ \text{Correct Factor} &= \text{AF} + \text{CF} - \text{AG} \end{aligned}$$

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$\text{FS} = \text{RA} + \text{Correct Factor} + \text{AV}$$

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\begin{aligned} \text{RA} &= 52.0 \text{ dB}\mu\text{V/m} \\ \text{AF} &= 7.4 \text{ dB} \\ \text{CF} &= 1.6 \text{ dB} \\ \text{AG} &= 29.0 \text{ dB} \\ \text{AV} &= -5.0 \text{ dB} \\ \text{Correct Factor} &= -20 \\ \text{FS} &= 52.0 - 20 - 5.0 = 27.0 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$

4.2.4 Test Setup and Procedure

The measurement was applied in a 3 m semi-anechoic chamber. The EUT was placed on a 12mm thick insulating material above the reference ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mask. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.

Broadband antenna was used as receiving antenna. Both horizontal and vertical polarization of the antenna was set on measurement. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2009 requirement during radiated test. The bandwidth setting on R&S Test Receiver was 120 kHz. The frequency range from 30MHz to 2000MHz was checked

4.2.5 Test Data

Radiated Emissions Pursuant to FCC 15.109: Emissions Requirement: 30MHz-1GHz

Operation mode: EUT ON (Cooling)

Polarization	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
Horizontal	72.680	14.0	8.1	22.1	40.00	-17.9
Horizontal	82.865	13.7	8.0	21.7	40.00	-18.3
Horizontal	108.813	11.0	12.0	23.0	43.50	-20.6
Horizontal	160.223	13.5	10.5	24.0	43.50	-19.5
Horizontal	169.195	12.9	11.0	23.9	43.50	-19.6
Horizontal	217.695	12.3	11.4	23.7	46.00	-22.3
Vertical	39.960	18.7	13.5	32.2	40.00	-10.7
Vertical	48.200	16.5	13.6	30.1	40.00	-9.9
Vertical	68.400	28.5	9.0	37.5	40.00	-2.5
Vertical	93.520	15.7	11.7	27.4	43.50	-18.1
Vertical	163.600	14.0	10.7	24.7	43.50	-18.8
Vertical	269.600	17.0	14.3	21.3	46.0	-24.7

Operation mode: EUT ON (Heating)

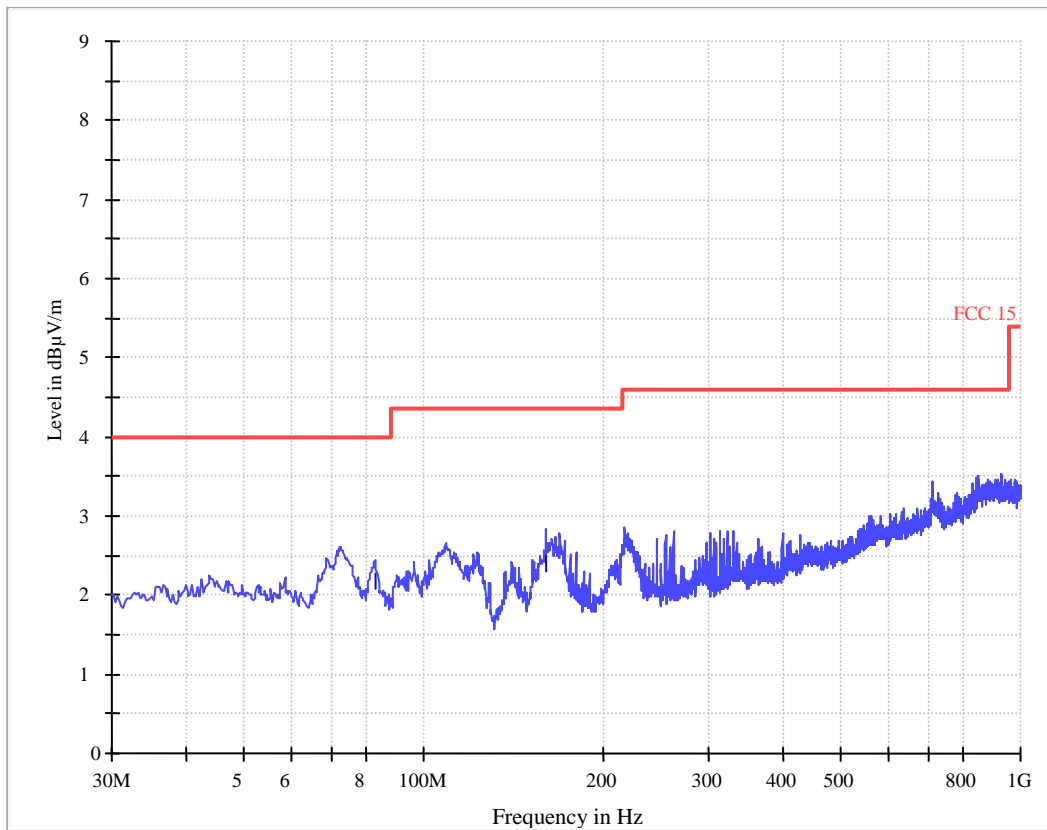
Polarization	Frequency (MHz)	Reading (dB μ V)	Correction factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
Horizontal	69.040	7.3	8.8	16.1	40.00	-23.9
Horizontal	101.520	8.0	12.4	20.4	43.50	-23.1
Horizontal	120.680	8.7	10.8	19.5	43.50	-24.0
Horizontal	152.720	8.1	9.6	17.7	43.50	-25.8
Horizontal	225.960	8.1	11.9	20.0	46.00	-26.0
Horizontal	362.240	6.2	17.1	23.3	46.00	-22.8
Vertical	39.440	16.4	13.6	30.0	40.00	-10
Vertical	68.400	27.8	9.0	36.8	40.00	-3.2
Vertical	93.760	20.3	11.7	32.0	43.50	-11.5
Vertical	120.680	15.7	10.8	26.5	43.50	-17.0
Vertical	171.880	8.6	10.9	19.5	43.50	-24.0
Vertical	289.240	6.4	15.3	21.7	46.0	-24.3

- Notes:
1. Quasi-peak detector was used at below 1GHz, peak detector was used at above 1GHz.
 2. All measurements were made at 3 meter.
 3. Negative value in the margin column shows emission below limit.
 4. When tested above 1GHz, the emissions found were at least 20 dB below the limit.

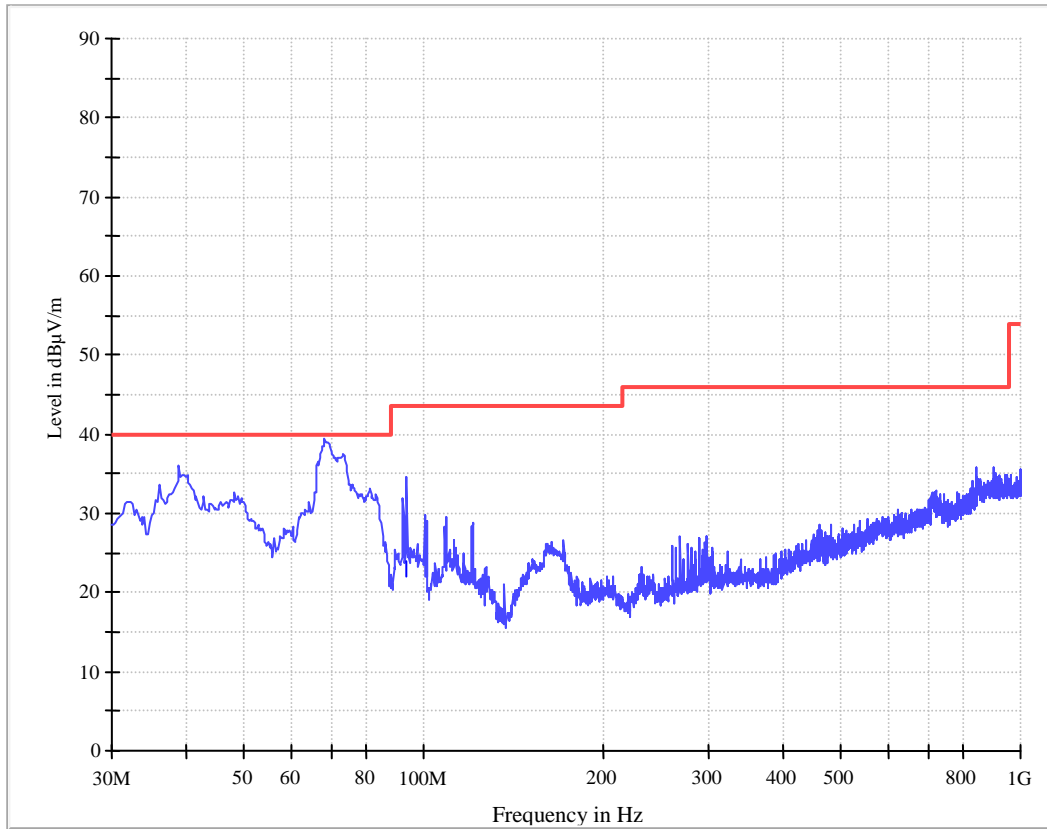
4.2.6 Test Curve

Operation mode: EUT ON (Cooling)

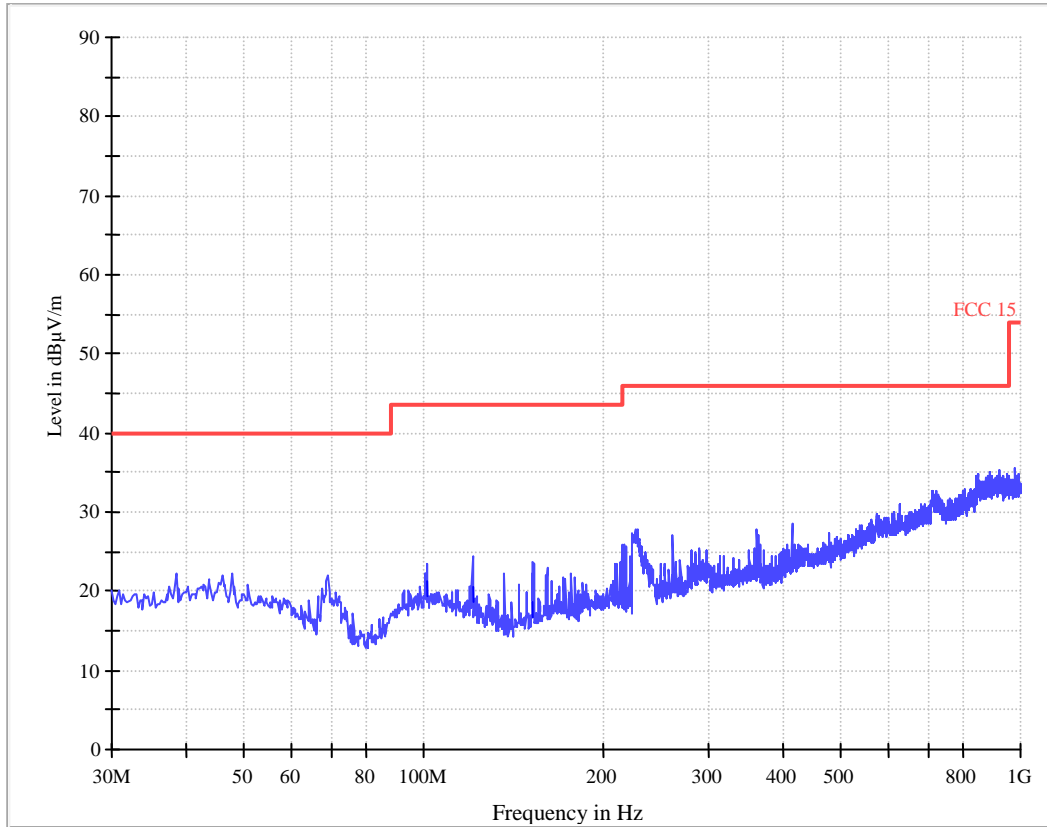
Horizontal:



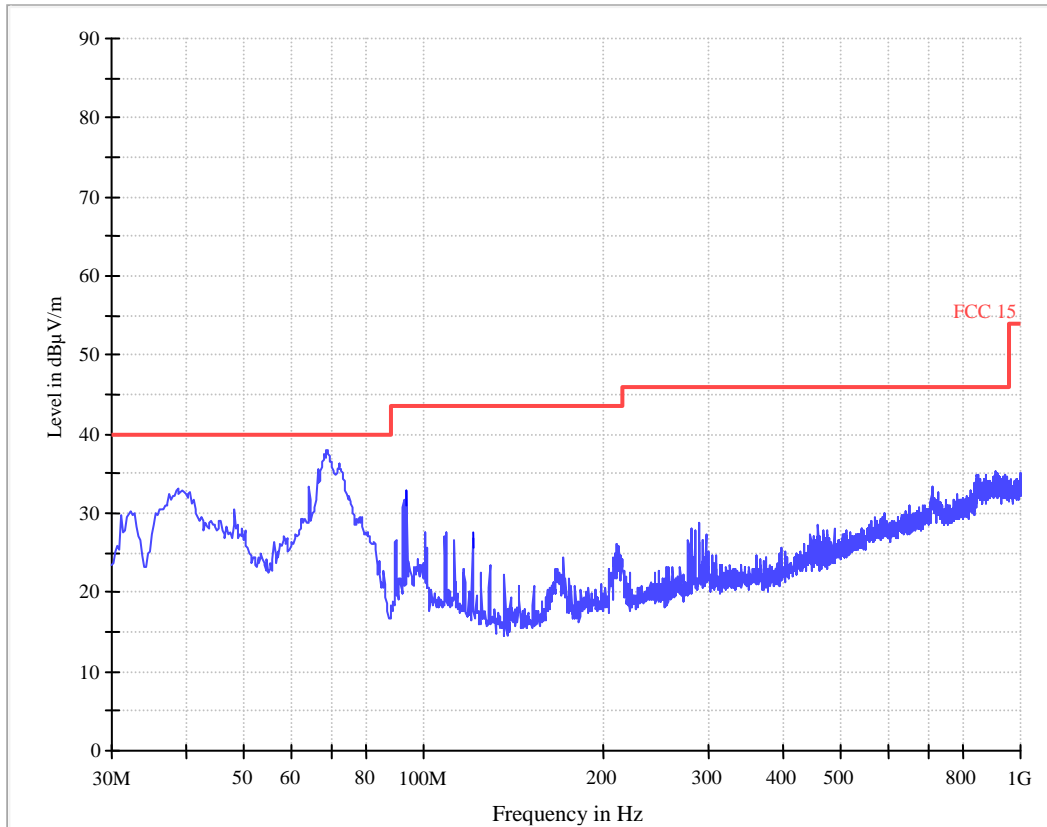
Vertical:



Operation mode: EUT ON (Heating)
Horizontal:



Vertical:



4.2.7 Measurement uncertainty

Uncertainty: 4.8 dB at a level of confidence of 95%