TEST REPORT CONCERNING THE COMPLIANCE OF A THERMAL BREWER- INDUCTIVE PROXIMITY CARD READER, OPERATING ON 13.56 MHz BRAND BRAVILOR, MODELS GTBSH-001,GTBSH-002,GTBSL-001,GTBSL-002,GTBSL-003,GTBTH-001,GTBTH-002, GTBTL-001, GTBTL-002, GTBTH-001 and GTBSH-002, WITH 47 CFR PART 15 (10-1-12 EDITION) AND THE REQUIREMENTS OF INDUSTRY CANADA: RSS-GEN (ISSUE 3, DECEMBER 2010) AND RSS-210 (ISSUE 8, DECEMBER 2010)

FCC listed : 90828
Industry Canada : 2932G-2
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

Brand: Bravilor
Models: GTBTH-001 and GTBSH-002
FCC ID: 2AAJ8-GTB
IC: 15519A-GTB

This report concerns: Original grant/certification ~~Class 2 Permissive Change~~ ~~Verification~~

Equipment type: Inductive Proximity Card Reader

Report prepared by:

Name	: R. van der Meer
Company name	: TÜV Rheinland EPS
Address	: Eiberkamp 10
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Telephone number	: + 31 594 505 005
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-12 Edition), RSS-GEN AND RSS-210 and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS at Leek, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: September 12, 2012

Signature: 

O. Hoekstra
Engineer Telecom TÜV Rheinland EPS

Summary

The device under test does:

- ● fulfill the general approval requirements as identified in this test report
- ○ not fulfill the general approval requirements as identified in this test report

Description of test item

Test item (EUT)	:	Thermal Brewer- Inductive Proximity Card Reader
Manufacturer	:	Bravilor Bonamat LLC
Brand	:	Bravilor
Model(s)	:	GTBTH-001 and GTBSH-002
Serial number(s)	:	020001361878 and 020001361877
FCC ID	:	2AAJ8-GTB
IC	:	15519A-GTB
Receipt date	:	May 20, 2013

Applicant information

Applicant's representative	:	Maarten Ponne & Kuno Teunissen
Company	:	Bravilor Bonamat LLC
Address	:	Pascalstraat 20
Postal code	:	1700 AD
City	:	Heerhugowaard
Country	:	The Netherlands
Telephone number	:	+31 (0)725751751
Telefax number	:	+31 (0)725751758
email		Maarten.Ponne@bravilor.com

Test(s) performed

Location	:	Leek
Test(s) started	:	May 22, 2013
Test(s) completed	:	September 12, 2013
Purpose of test(s)	:	Equipment Authorization (Original grant/certification)
Test specification(s)	:	47 CFR Part 15 (10-1-12 Edition) and RSS-GEN (ISSUE 3, DECEMBER 2010) AND RSS-210 (ISSUE 8, DECEMBER 2010)
Compliance statement	:	The test has demonstrated that this unit complies with stipulated standards.
Test engineer(s)	:	R. van der Meer 
Report written by	:	R. van der Meer 
Report date	:	September 12, 2013

Table of contents

1 General information.

1.1 Product description.

1.1.1 Introduction.

The Thermal Brewer/ Inductive Proximity Card Reader, brand Bravilor, models GTBTH-001 and GTBSH-002, hereafter referred to as EUT, are Thermal Brewer (coffee and hot water) with an inductive proximity card reader intended to be used for entering new recipes in the EUT. It is capable of reading 13.56 MHz inductive tags.
Refer to Appendix: Attestation of similarity regarding the range of models that are included in this product family.

The content of this report and measurement results have not been changed other than the way of presenting the data.

1.2 Related submittal(s) and/or Grant(s).

1.2.1 General.

This test report supports the original grant/certification in equipment authorization files under registration number.
FCC ID: 2AAJ8-GTB and IC: 15519A-GTB.

1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	Inductive Proximity Card Reader
Manufacturer	:	Bravilor Bonamat LLC
Brand	:	Bravilor
Tested Models	:	GTBTH-001 and GTBSH-002
Serial number	:	020001361878 and 020001361877
Voltage input rating	:	100 – 240 Vac
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	Integral
Operating frequency	:	13.56 MHz
Modulation Technique	:	ASK (Amplitude Shift Keying)
Remarks	:	n.a.

1.3.1 Description of input and output ports.

EUT has no communication ports.

No.	Port	From	To	Remarks
1.	Mains	Mains	EUT	--

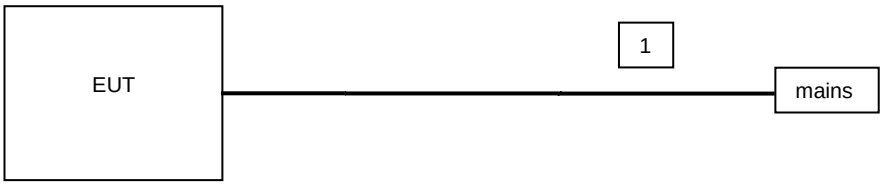


Figure 1. Basic set-up

1.4 Test Summary

The EUT was tested in accordance with the specifications given in Table 1 below.

Test Standard		Description	Pass / Fail
47 CFR Part 15 (10-1-12 Edition)	**RSS-Gen Issue 3, December 2010 / RSS-210 Issue 8, December 2010**		
15.207(a)	RSS-Gen(7.2.4)	Conducted emissions	Pass
15.225(a)	RSS-210(A2.6(a))	Emissions in the band 13.553-13.567 MHz	Pass
15.225(d), 15.209	RSS-210(A2.6)	Emissions outside the band 13.110-14.010 MHz	Pass
15.225(e)	RSS-210(A2.6)	Frequency stability	Pass
15.215(c)	RSS-Gen(4.6.1)	Occupied bandwidth	Pass

Table 1: Test specifications

Test methods: ANSI C63.4:2009 and RSS-Gen Issue 3, December 2010

1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-12 Edition), sections 15.31, 15.35, 15.205, 15.209, 15.209 and 15.225 and RSS-GEN(ISSUE 3, DECEMBER 2010) AND RSS-210 (ISSUE 8, DECEMBER 2010).

The test methods, which have been used, are based on ANSI C63.4: 2009.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.
Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters.
To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the appropriate extrapolation factor is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS , located at Eiberkamp 10, 9351 VT Leek, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948.

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-2. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

1.7 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120 Vac
Air pressure	: 950 – 1050 hPa

When it was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

2.2 EUT mode of operation.

The EUT has been tested in both passive and active mode. To assess the behavior of the EUT while reading the card, the EUT is tested with a card presented such that it continuously reads the card. The intentional radiator tests have been performed with a complete functioning EUT.

2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

2.4 Equipment modifications.

No modifications have been made to the equipment.

2.5 Product Labeling

The product labeling information is available in the technical documentation package.

2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

2.8 Part list of the EUT.

The part list is available in the technical documentation package.

3 Radiated emission data.

3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

Frequency (MHz)	Measurement results @3m (dBµV)	Measurement antenna orientation	Correction factor (dB)	Results after correction @3m (dBµV/m)	Limits @3m (dBµV/m)	Pass/Fail
82.30	19.2	Vertical	7.8	27.0	43.5	Pass
95.96	16.4	Vertical	9.8	26.2	43.5	Pass
192.01	20.5	Vertical	9.5	30.0	43.5	Pass
189.83	15.7	Vertical	9.4	25.1	43.5	Pass
515.14	19.3	Vertical	21.5	35.2	46.0	Pass
542.40	9.2	Horizontal	22.3	31.5	46.0	Pass
650.70	8.1	Horizontal	22.6	30.7	46.0	Pass
678.00	6.7	Horizontal	23.1	29.8	46.0	Pass

Table 2 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 and 15.225 and RSS-210 section A2.6 and RSS-Gen section 7.2.5 are depicted in Table 2.

Notes:

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is ±5.0dB.
3. Tested on both GTBTH-001 and GTBSH-002. Worst case values noted.
4. The EUT was varied in three positions, the measuring antenna was varied in horizontal and vertical orientations and also around its axis. The reported value is the worst case found at the reported frequency.
5. The EUT was tested in both normal mode (i.e. without a label in its proximity) and in activated mode (i.e. with a label in its proximity). Worst case noted.
6. A Quasi-peak detector was used with a bandwidth of 120 kHz.

3.1.1 Test equipment used (for reference see test equipment listing).

15633	99580	99609	99857	99699	99608	99858

Test engineer

Signature : 

Name : R. van der Meer
Date : May 21, 2013

3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

Frequency (MHz)	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits	Pass/Fail
	dBµV @3m		dB	dB	dB	dBµV/m@30m (unless otherwise stated)	dBµV/m@30m (unless otherwise stated)	
13.553	5.3	Qp	19.7	1	40	-14.0	40.5	Pass
13.567	6.2	Qp	19.7	1	40	-13.1	50.5	Pass
13.560 fundamental	19.5	Qp	19.7	1	40	0.2	84.0	Pass
22.054	3.0	Qp	20.0	1	40	-16.0	29.5	Pass
23.504	3.0	Qp	20.0	1	40	-16.0	29.5	Pass
27.120 harmonic	2.0	Qp	19.7	1	40	-17.3	29.5	Pass

Table 3 Radiated emissions of the EUT, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209, 15.225 and RSS-210 and RSS-Gen are depicted in Table 3.

Notes:

1. Calculated measurement results are obtained by using the 40dB/decade factor (antenna factor and cable loss is included). i.e at 13.560 MHz: 40.2 dBµV + 19.7 dB + 1dB - 40dB= 0.2 dBµV/m.
2. A resolution bandwidth of 9 kHz was used during testing
3. Field strength values of radiated emissions at frequencies not listed in Table 3 are more than 20 dB below the applicable limit
4. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
5. The EUT was tested in horizontal and vertical orientations. Worst case values noted.
6. Tested on both GTBTH-001 and GTBSH-002. Worst case values noted.
7. Measurement uncertainty is ±5.0dB.

3.2.1 Test equipment used (for reference see test equipment listing).

15453	99580	99699	99538	99857	99858	

Test engineer

Signature : 

Name : R. van der Meer
Date : May 21, 2013

4 Conducted emission data.

4.1 Conducted emission data of the EUT.

Frequency (MHz)	Measurement results dB(µV) Neutral		Measurement results dB(µV) Line 1		Limits dB(µV)		Pass/Fail
	QP	AV	QP	AV	QP	AV	
0.201	40.0	*5	39.8	*5	63.6	53.6	Pass
0.536	38.8	*5	38.1	*5	56.0	46.0	Pass
5.498	45.0	*5	43.0	*5	60.0	50.0	Pass
5.860	45.1	*5	43.1	*5	60.0	50.0	Pass
6.246	42.4	*5	40.0	*5	60.0	50.0	Pass
23.070	32.7	*5	27.1	*5	60.0	50.0	Pass

Table 4 Conducted emission measurements

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207 & RSS-Gen, section 7.2.4, at the 120 Volts AC mains connection terminals of the EUT, are depicted in Table 4.

Notes:

1. The test unit was modified to add a resistive termination in lieu of the antenna as per KDB 174176**.**
2. Tested on both GTBTH-001 and GTBSH-002. The test data shown the worst case of both. The six highest values recorded.
3. The values of conducted emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
4. Measurement uncertainty is ±3.5dB.
5. Qp values already within Av limits, therefore not tested on Av.
6. Tested on 120 Vac, highest values noted.

4.1.1 Test equipment used (for reference see test equipment listing).

12512	99161	99852	99699	13313	99848	

Test engineer

Signature :

Name : R. van der Meer
Date : May 22, 2013

5 Carrier stability under special conditions.

5.1 Frequency stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.225 (e) & RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6:

1) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 °C to +50 °C at normal supply voltage (see Table 5).

Stability under special conditions	Supply Voltage	Measured frequency (MHz)	Frequency deviation (limit ±0.01%) (%)	PASS/FAIL
Temperature (°C)	(Vac)			
21.0	120.0	13.560.146 *(reference)*	N.A.	N.A.
0.0	120.0	13.560.150	< 0.01	PASS
50.0	120.0	13.560.108	< 0.01	PASS

Table 5 The frequency tolerance of the carrier signal

5.1.1 At 85% and 115% of rated voltage supply level

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency at 85% and at 115% of the rated power supply voltage (120 Vac) at 20 °C environmental temperature. The results are stated in Table 6. The rated power supply voltage range is not exceeded since correct operation of the EUT beyond that range is not guaranteed.

Stability under special conditions	Measured frequency (MHz)	Frequency deviation (limit ±0.01%) (%)	PASS/FAIL
% variation U			
100.0 (120 Vac)	13.560.146 *(reference)*	N.A.	N.A.
85.0 (102 Vac)	13.560.146	< 0.01	PASS
115.0 (138 Vac)	13.560.146	< 0.01	PASS

Table 6 The frequency tolerance of the carrier signal

5.2 Bandwidth of the emission on 13.56 MHz in accordance with RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6.

Limit: 20 dB of the bandwidth of the emission shall be within the specified frequency band.
Bandwidth of the emission is determined at 99% Occupied Bandwidth.
Specified frequency band: 13553 kHz - 13567 kHz.

Temperature (°C)	Minimum frequency (kHz)	Maximum frequency (kHz)
+20.0	13558.840	13561.880
-20.0	13560.560	13563.626
+50.0	13557.270	13560.336
Bandwidth	13557.270	13563.626

Table 7 Bandwidth of the emission (99% power bandwidth)

The measured minimum frequency of 13557.270 kHz and maximum frequency of 13563.626 kHz are within the specified frequency bandwidth.

5.2.1 Test equipment used (for reference see test equipment listing).

12640	99318	12563	99538	99857	99077	

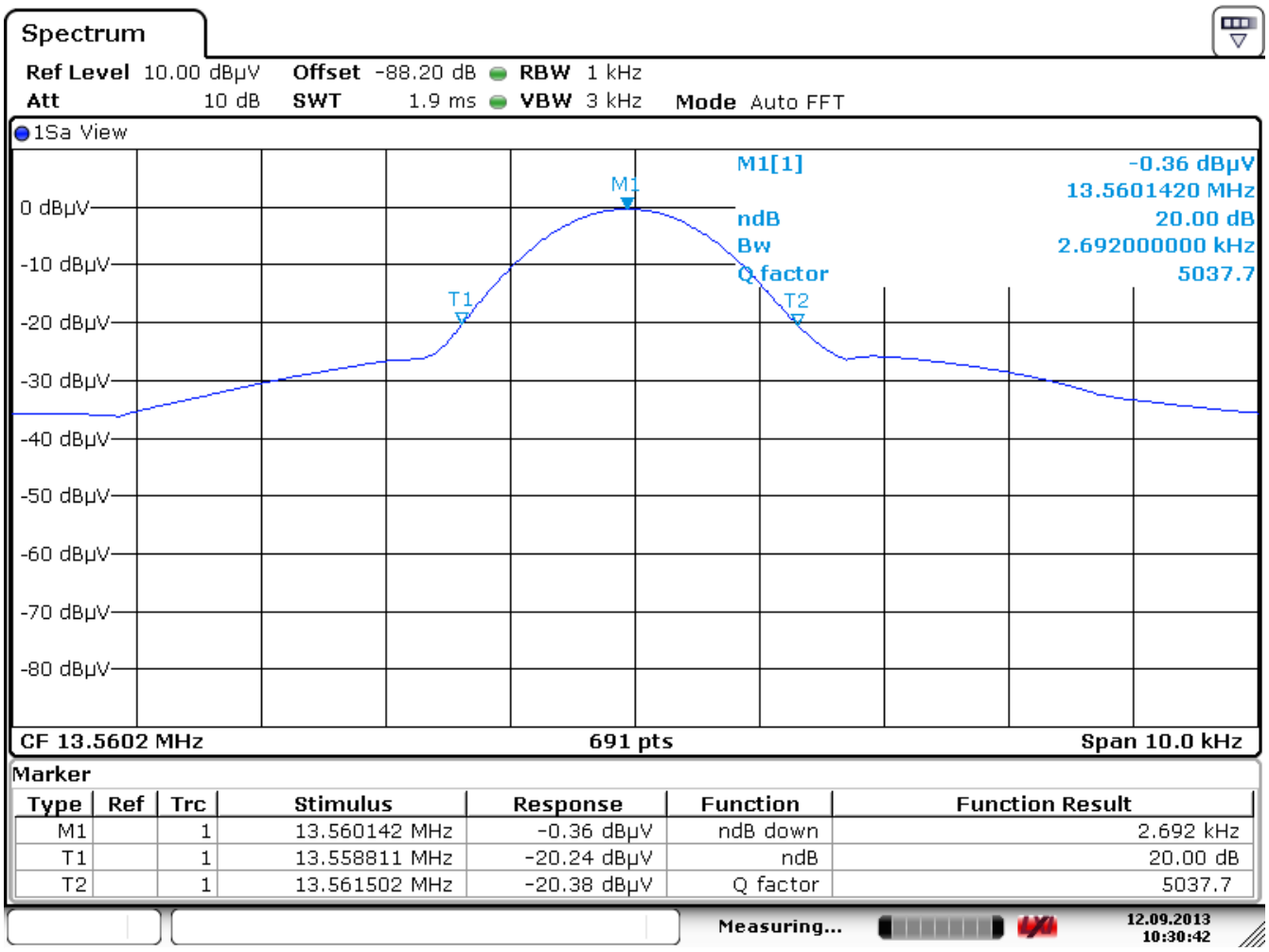
Test engineer

Signature :

Name : R. van der Meer
Date : May 22, 2013

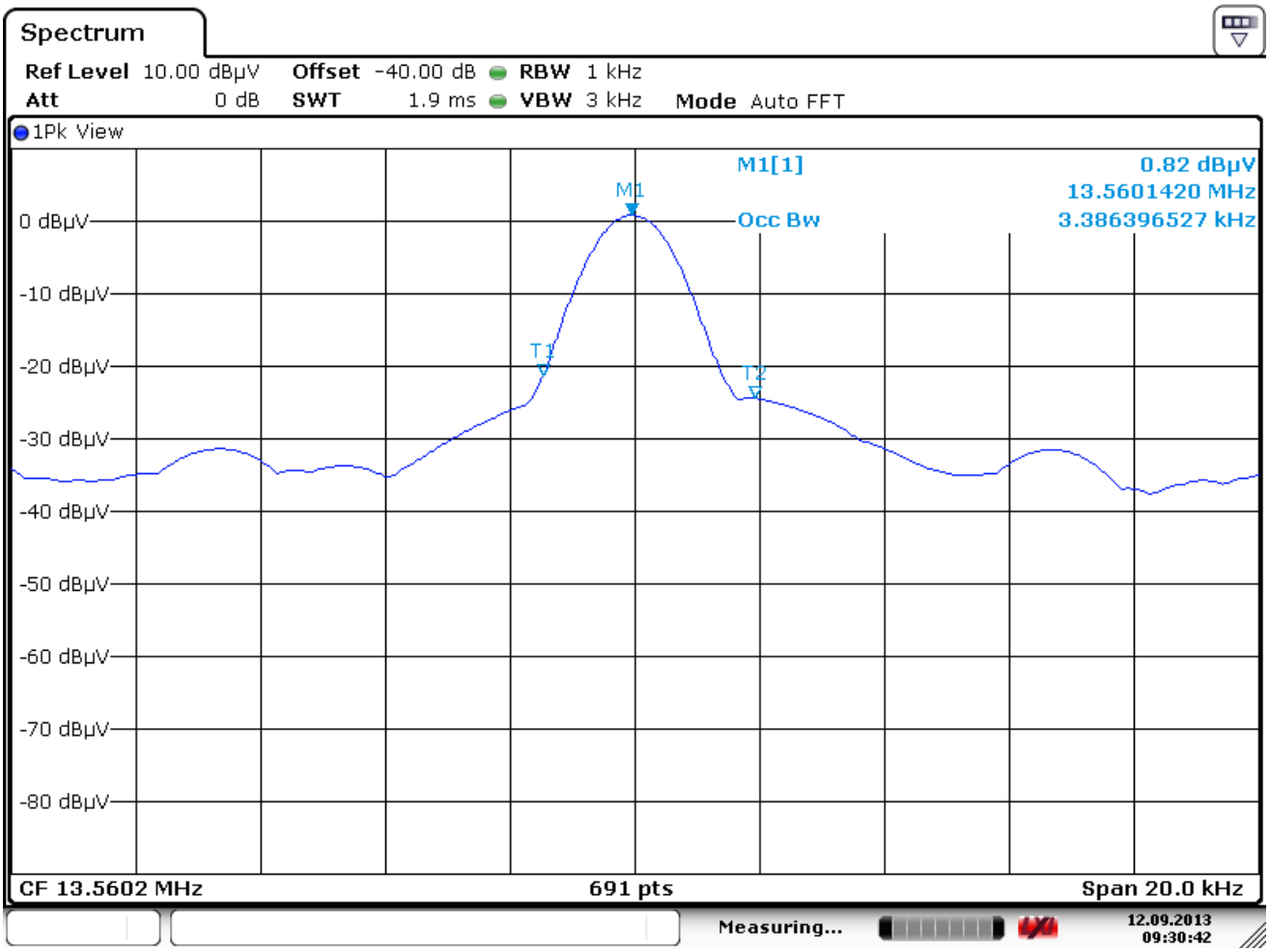
6 Plots of measurement data

6.1 Bandwidth of the emission



Date: 12.SEP.2013 10:30:42

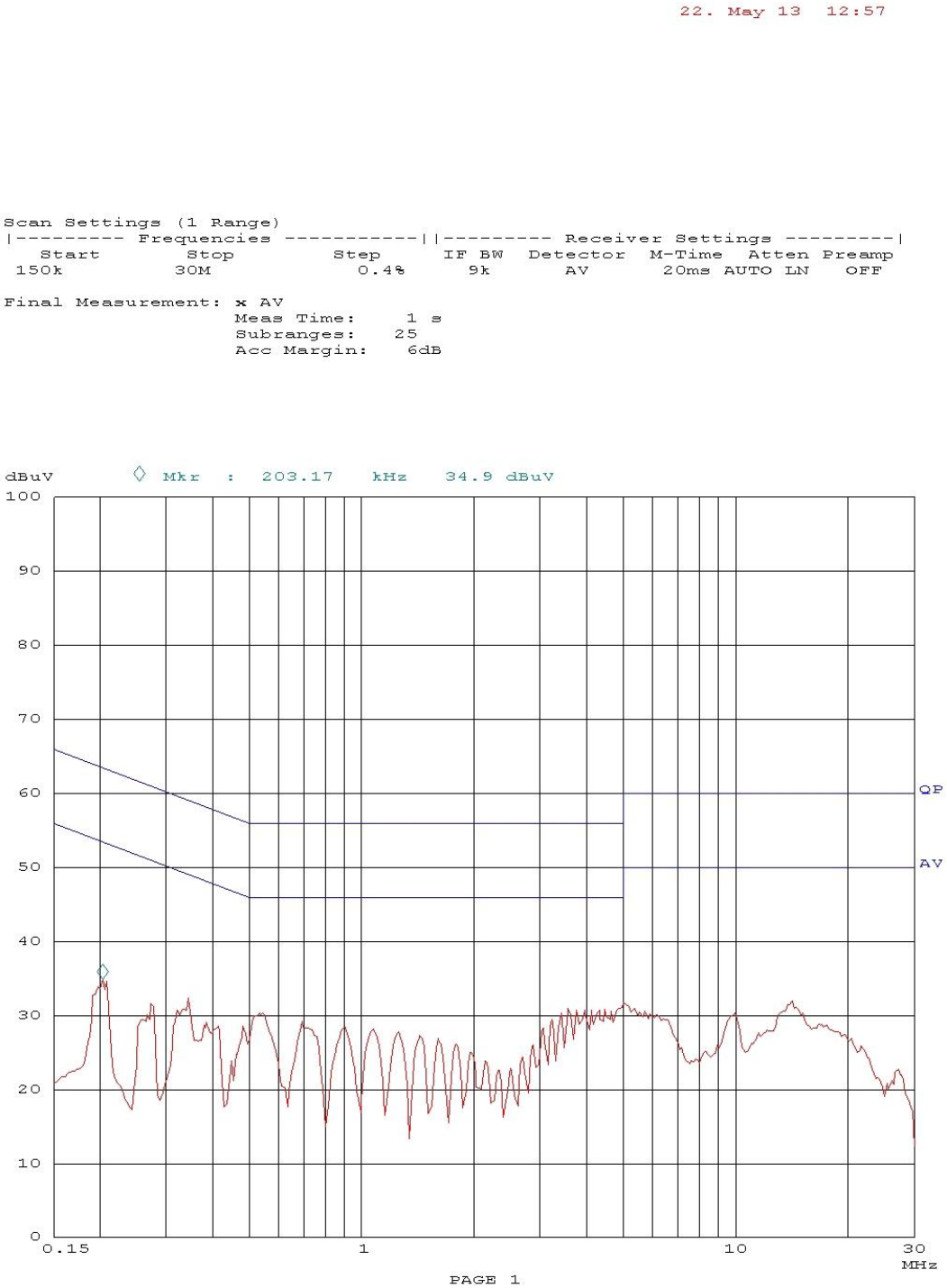
Plot1
Emission Bandwidth (-20 dB down points) of the emission at 13.56 MHz (Fundamental Carrier).
As measured with a Spectrum Analyzer



Date: 12.SEP.2013 09:30:42

Plot2
Occupied Bandwidth (99% power bandwidth) of the emission at 13.56 MHz (Fundamental Carrier)
As measured with a Spectrum Analyzer using it's automatic function.

6.2 Plots of the conducted emissions



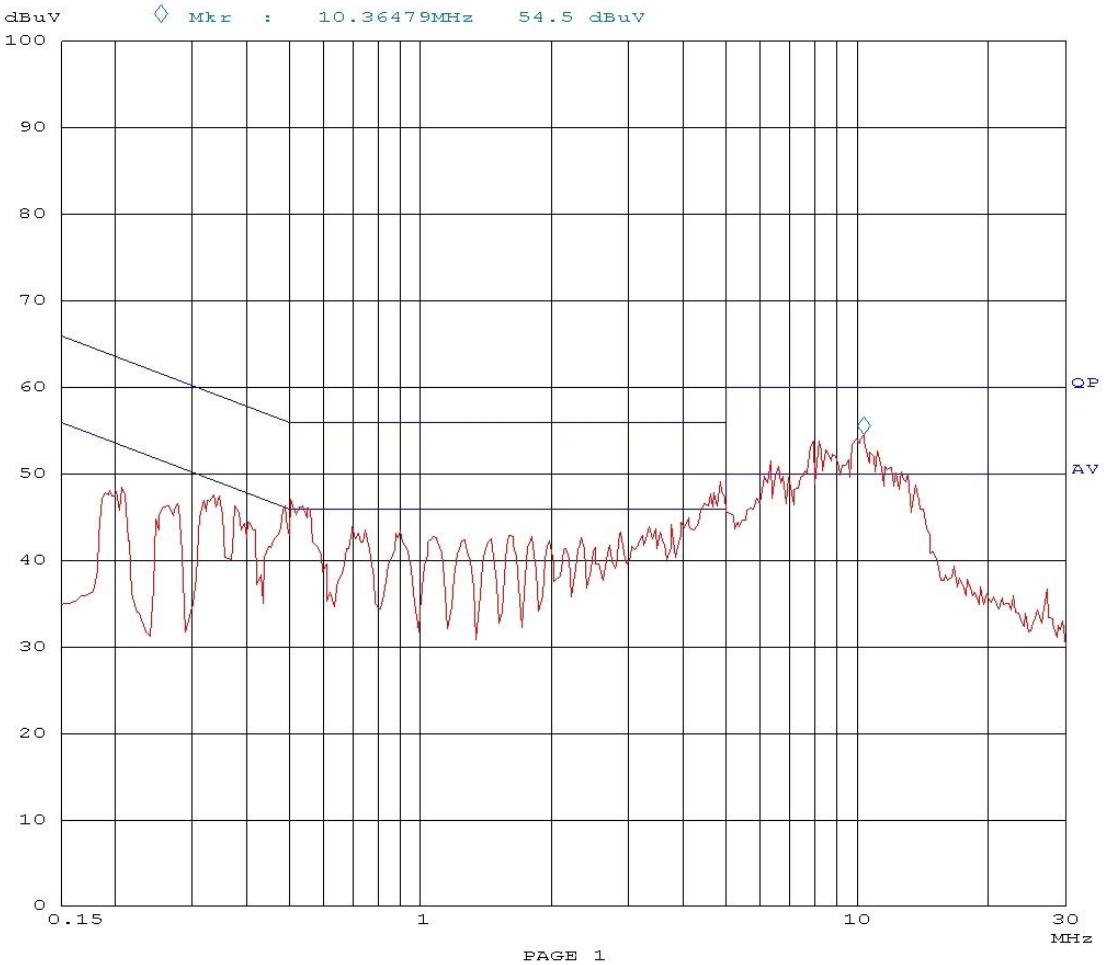
Conducted emissions on L1 (GTBTH-001)

22. May 13 12:18

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	0.4%	9k	PK	20ms	AUTO	LN OFF

Final Measurement: x QP
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



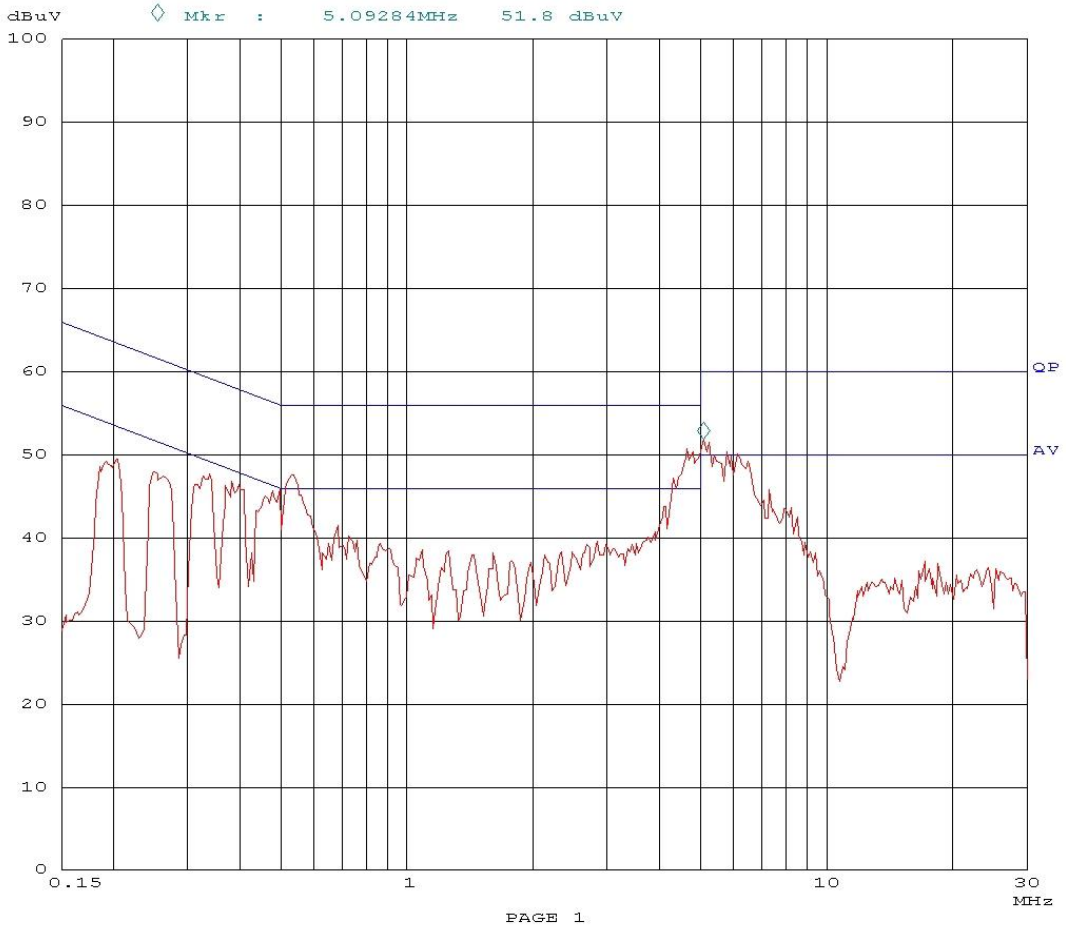
Conducted emissions on L2 (GTBTH-001)

22. May 13 10:52

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	30M	0.4%	9k	PK	20ms	AUTO	LN OFF

Final Measurement: x QP
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



Conducted emissions on L1 (GTBSH-002)

22. May 13 11:10

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Scan Settings (1 Range)
|--------- Frequencies -----------||--------- Receiver Settings ---------|
   Start        Stop          Step       IF BW   Detector   M-Time   Atten Preamp
 150k          30M             0.4%       9k        PK       20ms AUTO LN    OFF

Final Measurement: x QP
                   Meas Time:     1 s
                   Subranges:    25
                   Acc Margin:   6dB
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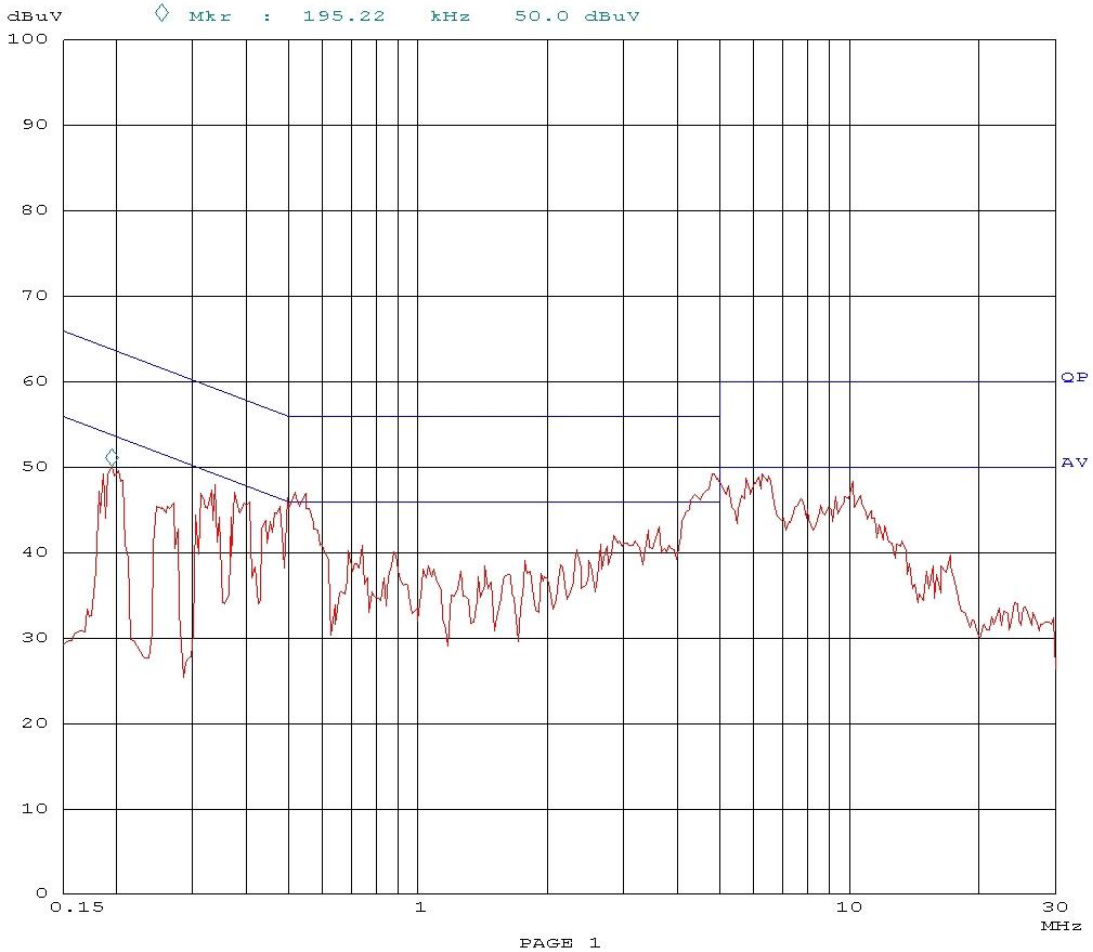

Conducted emissions on L2 (GTBSH-002)

7 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN FCC 50 uH / 50 ohm	Emco	3725/2	01/2012	01/2014
12563	Power supply	Delta	SM7020-D	04/2012	04/2013
12640	Temperature chamber	Heraeus	VEM03/500	NA	NA
13313	Pulse limiter	R&S	ESH3-Z2	01/2013	01/2014
15453	Active loop antenna 60 cm	Chase	HLA6120	04-2012	04-2013
15633	Biconilog Test antenna	Chase	CBL 6111B	01-2013	01-2014
99077	Variac 250V 6A	RFT	LTS006	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99318	Digital multimeter	HP	34401A	10/2012	10/2013
99538	Spectrum Analyzer	R&S	FSP40	11-2012	11-2013
99580	Semi Anechoïc Room	Siepel	FCC listed: 90828 IC: 2932G-2	12-2011	12-2014
99608	Antenna mast controller	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99852 / 99857	Temperature-Humiditymeter	Extech	SD500	02-2013	02-2014
99699	Measuring receiver	R&S	ESCI	02-2013	02-2014
99848	Shielded room for Conducted emissions	--	--	NA	NA
99858	RF Cable S-AR	Gigalink	APG0500	01/2013	01/2014

NA= Not Applicable

Bravilor Bonamat LLC, 1204 Bilter Road, Aurora, IL 60502-4729, USA
Tel: +1 630 423 9400, e-mail: info.us@bravilor.com, internet: www.bravilor.com

Attestation of similarity

TÜV Rheinland EPS
Attn.: Mr. Richard van der Meer
Eiberkamp 10
9351 VT Leek
The Netherlands

Heerhugowaard, October 1, 2013

Subject : Attestation of Similarity of series FCC ID: 2AAJ8-GTB _ IC: 11218A-GTB

Dear Mr. van der Meer:

The GTBSH-002 and GTBTH-001 as mentioned in this test report are coffee brewers which use wireless low power communication devices operating on 13.56 MHz for data transfer intended for service operation. The difference being a single appliance (SH) or twin appliance (TH).

There are several models of devices that are electrically, radio and hardware wise the same. Only the names, the height of the enclosure and the rated power due to different heating elements of the models differ. All models are listed below:

1. Model : GTBSH-001,
2. Model : GTBSH-002,
3. Model : GTBSL-001,
4. Model : GTBSL-002,
5. Model : GTBSL-003,
6. Model : GTBTH-001,
7. Model : GTBTH-002,
8. Model : GTBTL-001,
9. Model : GTBTL-002,

The letters GTB stand for Gallon Thermal Brewer.
The letters after stand for S=Single, T=Twin, H=High and L=Low.

We, Bravilor Bonamat LLC, declare that the model that has been tested and mentioned in the test reports is similar as the models mentioned above regarding radio testing.

Best regards,
Bravilor Bonamat LLC

Maarten Ponne
Vice President Sales