UNISYS

PCTC
Product Compliance Test Center
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ELECTROMAGNETIC INTERFERENCE TEST REPORT

Doc. 20050117R1 / Project No. 1150

TEST STANDARD: USA 47 CFR PART 15

BBQ Guru Procomm 4 Handheld
FCC ID: SVI94030

THERM-OMEGA-TECH, INC.
WARMINSTER, PA

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ERRATA

This test is a revision 1 of EMI test report document number 20050117R (Project No. 1150) and it is marked as document number 20050117R1, Dated 2/16/2005. The reasons for this re-issue are (1) provide reference for the applicable Industry Canada standard in Section 3.1, (2) clarify the test distance in Section 4.1.2, and (3) correct the quasi-peak measurement data with taking in to account effect of the emission duty cycle and also clarify the peak and average measurements in Section 4.1.3.1.

PREFACE

This report documents product testing conducted to verify compliance of the specified EUT with applicable standards and requirements as identified herein. EUT, test instrument configurations, test procedures and recorded data are generally described in this report. The reader is referred to the applicable test standards for detailed procedures. The following table summarizes the test results obtained during this evaluation.

SUMMARY

The Therm-Omega-Tech, BBQ Guru Procomm 4 Handheld (FCC ID: SVI94030) was tested to the standards listed below, and found to have the following characteristics:

TEST	STANDARD	REQUIREMENT	RESULT
Radiated Emissions - Intentional Radiation	FCC Part 15C, Section 15.249 (Operating Band: 902 –928 MHz)	902 MHz – 10 GHz	Below Max. Permissible limit
Radiated Emissions - Spurious and Unintentional Radiation	FCC Part 15C, Section 15.209 FCC Part 15B, Class B	30 MHz – 10 GHz	Below Max. Permissible limit

EUT Modifications

The following modifications were made on the BBQ Guru Procomm 4 Handheld to meet the EMI requirements:

1. Changed the transmit interval from 120 ms to 240 ms.
2. Added one resistor (R5, 21.5K Ohms) and one capacitor (C15, 220 pF) to the Handheld PC board. Detail of this modification with picture is provided in Section 1.4 of this report.

MEASUREMENT UNCERTAINTY				
Measurement Type	Measurement Dist	Frequency Range	Measurement Limit	Expanded Combined Uncertainty
Radio Disturbance	10 meters	30 MHz to 1 GHz	Class A	4.3 dB
Radio Disturbance	10 meters	30 MHz to 1 GHz	Class B	5.0 dB
Radio Disturbance	3 meters	30 MHz to 1 GHz	Class B	4.3 dB
Conducted Disturbance	N/A	150 kHz to 30 MHz	Class A or B	3.6 dB

As all values of uncertainty are less than the CISPR 16-4:2002 recommendations, no adjustments to measured data presented in this report are required.

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1.0 Description of The Equipment Under Test (EUT)

Equipment Identification	BBQ Guru Procomm 4 Handheld
Model Number	94-030
ID Number	29
Manufacturer	Therm-Omega-Tech, Inc. 353 Ivyland Road Warminster, PA 18974
Technical Contact	Damian Coccio (NuWave Technologies, Inc.) Fred Pirkle (Therm-Omega-Tech, Inc.)
Condition Received	Acceptable for Test
Date Received	12/21/04
Sample Type	Production Unit
Equipment Classification	Intentional Radiator, Unlicensed Low power Transmitter
Unisys Test Personnel	Itamar Gonen Dipak Patel

Unless otherwise noted in the individual test results sections, testing was performed on the EUT configured as follows.

1.1 General Description

The BBQ Guru Procomm 4 is a Charcoal BBQ Pit temperature controller with a wireless handheld user interface.

The BBQ Guru Procomm 4 consists of following two units:

(1) BBQ Guru Procomm 4 Controller
(2) BBQ Guru Procomm 4 Handheld

This report documents EMI testing performed on the BBQ Guru Procomm 4 Handheld. The output of the temperature controller turns a fan on and off feeding oxygen to a charcoal fire to maintain the user's cook temperature setpoint. The user can modify set points and monitor the pit/meat temperature remotely via the two-way FSK digital wireless communications between the handheld and the controller.

The BBQ Guru Procomm 4 Handheld incorporates permanently attached transmitting antenna.

Photo 1 – BBQ Guru Procomm 4 Handheld – Front View

Photo 2 – BBQ Guru Procomm 4 Handheld – Rear View

1.2 Test Configurations

Testing was carried out on a single EUT configuration. The EUT was placed on a wooden table of 80 cm height. The testing was performed with mounting the EUT in the three different positions as identified below:

1. Vertical Straight Up
2. On Left Side
3. Flat on Back

Detailed EUT Hardware Listing

The BBQ Guru Procomm 4 Handheld has a permanently attached antenna. It incorporates the following transmitter module:

Description	Manufacturer	Manufacturer's Model Number/Part Number
Transmitter Module	Linx Technologies	TXM-916-ES

Test Support Items

The following device was used to support the EUT operation.

Description	Manufacturer	Model Number	Serial Number
BBQ Guru Procomm 4 Controller	Therm-Omega-Tech, Inc.	94-037	29

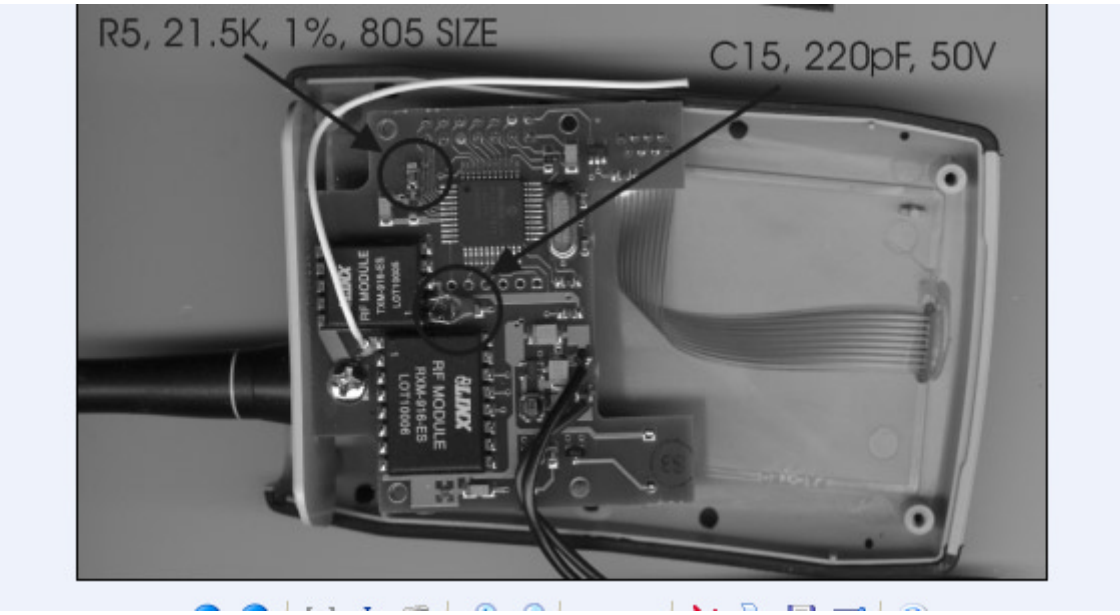
1.3 Rationale for The Chosen Configuration

The tested configuration represents deliverable hardware.

1.4 EUT Modifications

The following modifications were required for the Therm-Omega-Tech, BBQ Guru Procomm 4 Handheld to meet the EMI requirements:

1. Changed the transmit interval from 120 ms to 240 ms.
2. Added one resistor (R5, 21.5K Ohms) and one capacitor (C15, 220 pF) to the Handheld PC board. See the picture below:



2.0 Operation of The EUT During Testing

Unless otherwise noted in the individual test results sections, testing was performed on the EUT as follows.

2.1 General

Climatic Environment

The following were the ambient conditions in the laboratory during testing:
Temperature: 22^{o} C ± 5^{o} C
Relative Humidity 50% ± 10% RH

Input Power

The BBQ Guru Procomm 4 handheld is powered from 2 AA (1.5 VDC) size batteries. Testing was performed using new batteries.

2.2 Operating Mode

During the emissions testing the BBQ Guru Procomm 4 handheld was operated for continuous transmit/receive mode of operation. The communication was established with BBQ Guru Procomm 4 Controller (used as support item). The fundamental transmission frequency of the EUT was 916.52 MHz.

2.3 Rationale for The Chosen Mode of Operation

The selected mode of operation simulated the actual application of the EUT therefore it was considered as an appropriate operating mode for the EMI evaluation.

3.0 Applicable Requirements, Methods and Procedures

3.1 Applicable Requirements

The results of the measurement of the radio disturbance characteristics of the EUT described herein may be applied and, where appropriate, provide a presumption of compliance to one or more of the following requirements or to other requirement at the discretion of the client, regulatory agencies, or other entities.

USA

47 CFR, Part 15, Radio Frequency Devices,
- Subpart B, "Unintentional Radiators".
- Subpart C, "Intentional Radiators".

Canada

Industry Canada (IC) Spectrum Management and Telecommunication Policy, Radio Standards Specification RSS-210, "Low Power License – Exempt Radiocommunication Devices (All Frequency Bands)". Issue 5, November 2001.

3.2 Basic Test Methods and Procedures

The applicable regulatory product family or generic standards require that radio disturbance/interference tests be performed in accordance with the following:

- C63.4, 2003 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in The Range of 9 kHz to 40 GHz".

3.3 Deviations Or Exclusions From The Requirements And Standards

There were no deviations or exclusions from the requirements and standards.

4.0 Test Results

4.1 Radiated Emissions

4.1.1 Test Facility

The test site is an all weather, open field measurement facility defined by an elliptical area of 3258 square meters, which is free of reflective metallic objects and extraneous electromagnetic signals. A non-metallic A-Frame enclosure covers 172 square meters of the ellipse. This enclosure contains a ground level 5-meter diameter turntable, capable of rotating equipment through a complete 360 degrees, and a 3-meter and 10-meter test range with a remotely controlled antenna mast. The floor of the A-Frame and surface of the turntable are covered with a flat metal continuous ground plane. The ground plane extends outside the A-Frame to a distance of 35.6 meters from the center of the turntable. The width of the extension is 2.4 meters.

The ground plane, under the A-Frame enclosure, is covered with protective insulating material. A cellar located beneath the ground level of the A-Frame structure houses personnel and instrumentation for remote control of the antenna mast, the turntable, and other equipment above ground level. The test site complies with the Attenuation Measurements specified in ANSI C63.4 - 2001, and is registered with FCC, VCCI, BSMI, NEMKO and EZU.

For electric field radiated emissions, the EUT and support peripherals or devices required to facilitate EUT operation were positioned either directly on the turntable surface (floor standing equipment) or on a wooden table 80 cm. in height (tabletop equipment), depending on the size and status of the sample. Hardware not needed in the test field such as remote terminals or non-standard exercisers were placed in the basement below the turntable.

4.1.2 Radiated Emissions Test Procedure

Radiated Emissions 30 MHz – 1000 MHz

Initial measurements, for the purpose of identifying suspect emissions from the equipment under test, were performed by dividing the test frequency range into the following twenty bands:

Band	Frequency Range	Band	Frequency Range	Band	Frequency Range
1)	30 - 40 MHz	8)	108 - 148 MHz	15)	570 - 670 MHz
2)	40 - 50 MHz	9)	148 - 165 MHz	16)	670 - 770 MHz
3)	50 - 88 MHz	10)	165 - 200 MHz	17)	770 - 855 MHz
4)	88 - 93 MHz	11)	200 - 300 MHz	18)	855 - 875 MHz
5)	93 - 98 MHz	12)	300 - 450 MHz	19)	875 - 892 MHz
6)	98 - 103 MHz	13)	450 - 470 MHz	20)	892 - 1000 MHz
7)	103 - 108 MHz	14)	470 - 570 MHz		

Each of these bands was monitored on a spectrum analyzer display while the turntable was initially positioned at the reference 0 degree point. A mast mounted broadband antenna was located at a distance of 3/10 meters (as applicable) from the periphery of the EUT(s). The antenna was set to a height of 1 meter, for the vertical polarity and a height of 2.5 meters, for horizontal polarity for these suspect emission scans. All emissions with amplitudes 8 dB or less below the appropriate regulatory limit were identified and saved for later source identification and investigation. This initial suspect identification procedure was repeated for turntable positions of 90, 180 and 270 degrees.

The source of questionable emissions was verified by powering off the EUT(s). Those emissions remaining were removed from the suspect list. Valid suspect emissions were then maximized through cable manipulation. The highest six signals or all within 4 dB of the limit, identified during this initial investigation, were then maximized by rotating the turntable through a complete 360 degrees of azimuth and then raising the antenna from 1 to 4 meters of elevation with the turntable positioned at the angle of maximum signal level. When the EUT(s) azimuth, antenna height and polarization that produced the maximum indication were found, the emission amplitude and frequency were remeasured to obtain maximum peak and quasi-peak field strength. The frequencies and amplitudes of RFI emissions are recorded in this report in units derived as follows:

Field Strength (dBuV/m) = meter reading (dBuV) + antenna factor (dB/m)+ Cable Loss (dB)

Radiated Emissions above 1 GHz

The required test frequency range above 1 GHz, was scanned manually by placing a Double Ridged Guide antenna at a distance of 3 meters from the perimeter of the equipment under test. Emissions were monitored using EMI Test Receiver ESIB 40 set for a 1 MHz bandwidth with rotating the turntable through a complete 360 degrees of azimuth. Both horizontal and vertical antenna polarities were investigated for suspect emissions. The support equipment and test item(s) were powered off in turn to determine the source of the emissions. The test procedure described above for 30 –1000 MHz was observed to maximize the emissions. The measurements were made with both peak and average detectors. The field strengths were recorded as follows:

Field Strength (dBuV/m) = Meter reading (dBuV) + Correction Factor*

* Correction Factor includes Antenna Factor (dB/m) + Cable Loss (dB) – Amplifier Gain (dB)

4.1.3 Radiated Emissions Test Results (12/21/04-12/29/04)

4.1.3.1 Radiated Emissions - Intentional Radiator

Fundamental Frequency Emissions

Fundamental frequency emissions were measured at a test distance of 3 meter for all the three EUT orientations. The quasi-peak detector levels measured by the RF measurement receiver were corrected as the PRF of the transmission was found less than 20 Hz. It is understood that because of the emission PRF was less then the 20 Hz, the RF receiver indicated quasi-peak detector levels may have lower amplitude value than the actual amplitude. The required correction to the receiver indicated reading was determined by finding the difference between the amplitudes of EUT emission and the emission that has a same pulse width but a PRF of 20 Hz.

The pulse width and PRF of the emission at the fundamental frequency were measured as below:

Pulse width: 11.3 ms PRF: 3.77 Hz

Using a Agilent model E8254A (250 KHz- 40 GHz) signal generator, a simulated signals having above measured pulse width and PRF of 3.77 Hz and 20 Hz were generated. The amplitudes of these two simulated signals were measured using quasi-peak detector. The measured amplitudes showed a difference of 1.48 dB. This difference was added to the RF receiver indicated quasi-peak detector level to find accurate amplitude.

The following table on the next page shows the corrected (taking in to account effect of the emission PRF) quasi-peak data compared to the FCC Part 15 Section 15.249 limit for fundamental emissions at 3 meter test distance.

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EUT orientation straight up

Freq	Q-Pk	Pol	Angle	Ht	CF*	Limit	Delta
[MHz]	[dBmV/m]		[deg]	[cm]	[dB]	[dBmV/m]	[dB]
916.52	93.50	V	256	100	47.47	94	-0.5
916.52	79.08	H	182	100	47.47	94	-14.92

EUT orientation flat on back

Freq	Q-Pk	Pol	Angle	Ht	CF*	Limit	Delta
[MHz]	[dBmV/m]		[deg]	[cm]	[dB]	[dBmV/m]	[dB]
916.52	82.2	V	339	242	47.47	94	-11.8
916.52	93.28	H	92	151	47.47	94	-0.72

EUT orientation Left side (when looking at front of Handheld Unit)

Freq	Q-Pk	Pol	Angle	Ht	CF*	Limit	Delta
[MHz]	[dBmV/m]		[deg]	[cm]	[dB]	[dBmV/m]	[dB]
916.52	82.42	V	271	244	47.47	94	-11.58
916.52	89.64	H	139	100	47.47	94	-4.36

* The correction factor (CF) also includes RF attenuators used at RF input of EMI Test Receiver used to prevent receiver overload.

Harmonics of Fundamental Frequency Emissions (Upto 10 GHz)

Emission scan for harmonics of the fundamental frequency was performed up to 10 GHz at a test distance of 3 meter for all the three EUT orientations. Harmonics emissions detected with peak detector were significantly below the applicable average limit specified in FCC Part 15, Section 15.249, therefore no peak or average measurements performed/recorded.

Overall Results: All fundamental radiated emissions and harmonics of the fundamental frequency, at a distance of 3 meters from the BBQ Guru Procomm 4 Handheld, are below the 3 meter limit specified by FCC Part 15, Section 15.249.

4.1.3.2 Radiated Emissions – Spurious and Unintentional Radiation (30 MHz-10 GHz)

Emission scan for detection of spurious and unintentional radiation was performed for all the three EUT orientations. The following table identifies the emissions other then fundamental frequency and harmonics of it. The recorded levels are compared with the applicable limit specified in FCC Part 15, Section 15.209 which is the same limit as FCC Part 15 specified for Class B digital devices for the test measurement frequency spectrum. Measurement scan was performed for the frequency range of 30 MHz to 10 GHz, at the test distance of 3 meters.

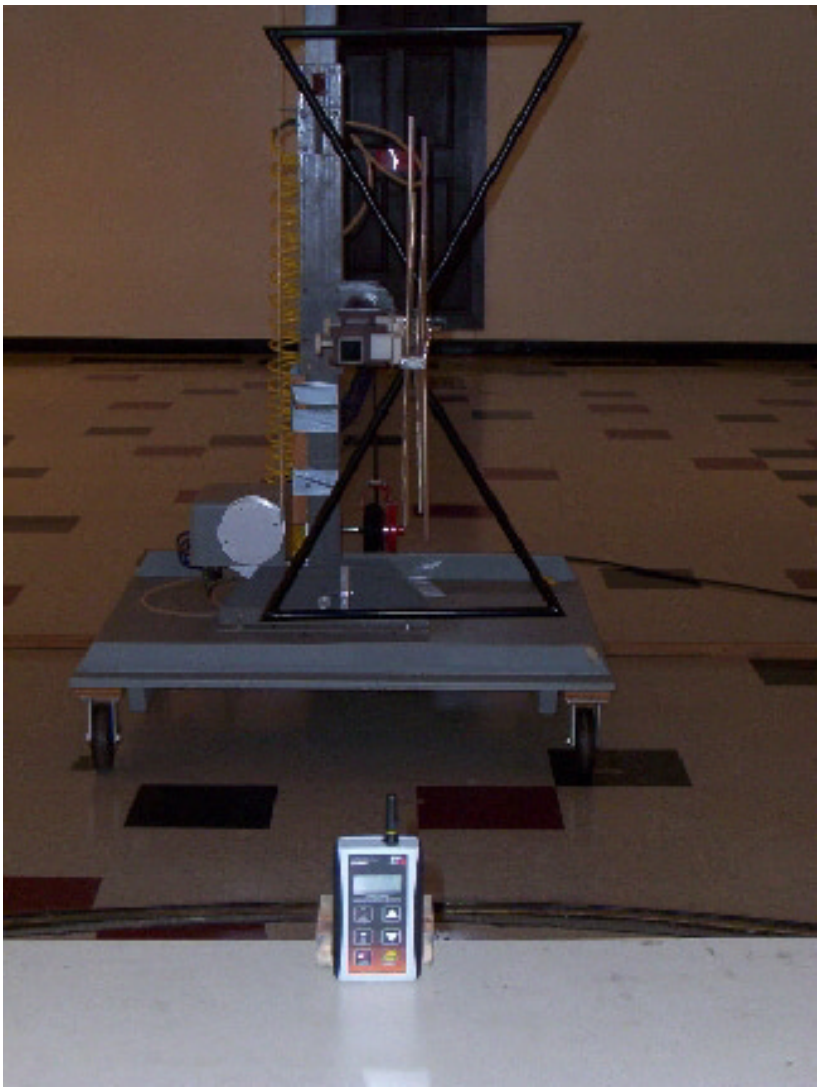
Freq [MHz]	Q-Pk [dBuV/m]	Pol	Angle [deg]	Ht [cm]	CF [dB]	Limit [dBuV/m]	Delta [dB]	Comment
928.6	42.57	V	356	101	28.37	46	-3.43	Note 1
918.99	40.10	H	149	100	28.18	46	-5.9	Note 2
927.35	41.32	H	159	127	28.20	46	-4.68	Note 2
40	29.93	V	1	100	17.03	40	-10.07	Noise Floor
340	25.68	V	1	100	17.24	46	-20.32	Noise Floor
610	33.52	V	1	100	23.23	46	-12.48	Noise Floor
750	35.57	V	1	100	25.30	46	-10.43	Noise Floor
900	38.57	V	1	100	27.57	46	-7.43	Noise Floor

Notes

1. EUT emission, Handheld in Vertical Straight Up orientation
2. EUT emission, Handheld in Left Side orientation

Overall Results: All the EUT signals, other then fundamental and its harmonics, are under the 3 meter limit specified by FCC Part 15, Class B digital devices and FCC Part 15, Section 15.209.

Test Setup Photos



Radiated Emission Test Setup – Front View (Vertical Straight Up)

Radiated Emission Test Setup – Rear View (Vertical Straight Up)

Radiated Emission Test Setup – On Left Side

Radiated Emission Test Setup – Flat On Back

Appendix A – Test Equipment

Description	Freq Range (Hz)	Model Number	Manufacturer	ID / SN	Last Cal Date
EMI Test Receiver	20 Hz – 40 GHz	ESIB 40	Rohde & Schwarz	C-062	12/7/04
Antenna	25M - 2G	LPB-2520/A	ARA	B962	4/7/04
Controller, Tower and Turntable	NA	2090	EMCO	B812	NA
Amplifier	1G – 40G	NSP4000-44	Miteq	B827	8/3/04
Antenna	1G – 18G	96001	EATON	U926	2/11/04
High Pass Filter	1.5G-18G	6HC1500/18000-3-KK	Trilithic Inc.	A088	11/1/04
10 dB Attenuator	DC-12GHz	1A-10	Weinschel Engineering	Y0325	7/27/04
10 dB Attenuator	DC-18GHz	2	Weinschel Engineering	Y0324	8/17/04