

TEST REPORT

Report Number: 101986270MPK-005

Project Number: G101986270

April 27, 2015

**Testing performed on the
Bard Uros Automated Urine Output and Temperature Monitor
Model: BK**

FCC ID: ZFK-URNBK

**to
FCC Part 15 Subpart C (15.225)
Industry Canada RSS-210 Issue 8
FCC Part 15, Subpart B
Industry Canada ICES-003**

For

BARD Medical Division of BMD

Test Performed by:

Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Test Authorized by:

BARD Medical Division of BMD
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Covington, CO 80027 USA

Prepared by: _____



Date: April 27, 2015

Reviewed by: _____



Krishna Vemuri

Date: April 27, 2015

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Report No. 101986270MPK-005

Equipment Under Test:	Bard Uros Automated Urine Output and Temperature Monitor
Trade Name:	BARD Medical Division of BMD
Model Number:	BK
Serial Number:	VERMDV1215103
FCC ID:	ZFK-URNBK
Applicant:	BARD Medical Division of BMD
Contact:	Chris Park
Address:	321 South Taylor Ave., Suite 200 Covington, CO 80027
Country	USA
Tel. Number:	(303) 327-5151
Email	chris.park@crbard.com
Applicable Regulation:	FCC Part 15 Subpart C (15.225) Industry Canada RSS-210 Issue 8 FCC Part 15, Subpart B Industry Canada ICES-003
Test Site Location:	ITS – Site 1 1365 Adams Drive Menlo Park, CA 94025
Date of Test:	April 07 – 10, 2015

We attest to the accuracy of this report:



Minh Ly
EMC Project Engineer



Krishna K Vemuri
EMC Senior Staff Engineer

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1.0 Summary of Tests

TEST	REFERENCE FCC	Reference Industry Canada	RESULTS
Field Strength of Fundamental	15.225(a)	A2.6	Complies
Radiated Emissions Outside the band	15.225(b), 15.225(c), 15.225(d), 15.209	A2.6	Complies
Frequency Tolerance of the Carrier	15.225(e)	A2.6	Complies
Line Conducted Emissions	15.207	RSS-GEN	Complies
Occupied Bandwidth	15.215	RSS-GEN	Complies
Antenna requirement	15.203	RSS-GEN	Complies (Internal Antenna)
Radiated Emissions	15.109	ICES-003	Complies
AC Line Conducted Emission	15.107	ICES-003	Complies

2.0 General Description

2.1 Product Description

The Uros model BK is a urine and temperature monitor.

Overview of the EUT

Applicant name & address	BARD Medical Division of BMD 321 South Taylor Ave., Suite 200 Covington, CO 80027 USA
Contact info / Email	Chris Park / chris.park@crbard.com
Model	BK
FCC Identifier	ZFK-URNBK
Operating Frequency	13.56MHz
Number of Channels	1
Type of Modulation	ASK
Operating Temperature	-20°C to +50°C
Antenna Type	Internal PCB Antenna

EUT receive date: April 07, 2015

EUT receive condition: The EUT was received in good condition with no apparent damage. As declared by the Applicant it is identical to the production units.

Test start date: April 07, 2015

Test completion date: April 10 , 2015

2.2 Related Submittal(s) Grants

None

2.3 Test Methodology

Both AC mains line-conducted and radiated emissions measurements were performed according to the procedures in ANSI C63.4. Radiated tests were performed at an antenna to EUT distance of 10 meters, unless stated otherwise in this test report. All other measurements were made in accordance with the procedures in part 2 of CFR 47 7& ANSI 63.10.

2.4 Test Facility

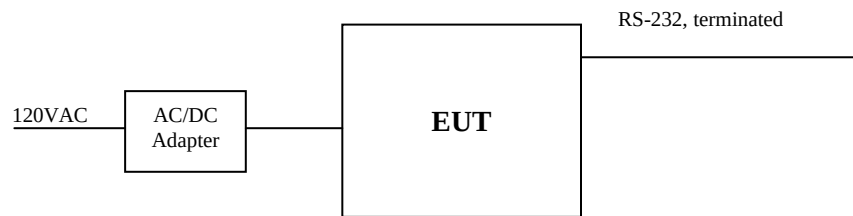
The radiated emission test site and conducted measurement facility used to collect the data is 10m semi-anechoic chamber located in Menlo Park, California. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada (Site # 2042L-1).

3.0 System Test Configuration

3.1 Support Equipment and description

EUT is a standalone equipment.

3.2 Block Diagram of Test Setup



Power Supply Manufacturer: XP Power, Model: AFM30US09C2

S = Shielded	F = With Ferrite
U = Unshielded	m = Length in Meters



3.3 Justification

For emission testing, the test procedures, as described in American National Standards Institute C63.4, were employed. The equipment under test (EUT) was configured to continuously transmit in maximum power when turned on. During testing, all cables were manipulated to produce worst-case emissions.

3.4 Software Exercise Program

None.

3.5 Mode of Operation during test

During transmitter testing, the transmitter was setup to continue transmit at maximum RF power.

3.6 Modifications required for Compliance

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance.

3.7 Additions, deviations and exclusions from standards

No additions, deviations or exclusion have been made from standard.

4.0 Measurement Results

4.1 Field Strength of Fundamental and Radiated Emissions Outside the band

4.1.1 Requirements

FCC Rules 15.225, 15.209

- a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter (84 dBuV) at 30 meters.
- b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.
- d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

§15.209 Radiated emission limits; general requirements.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3



4.1.2 Procedure

Radiated Measurements Below 30 MHz

During the test the EUT is rotated and the measuring antenna angles are varied during the search for maximum signal level.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Measurements for below 30 MHz were made at 10 meters. Data results below are corrected for distance back to 30 meters.

Radiated Measurements Above 30 MHz

During the test the EUT is rotated and the measuring antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Measurements for below above 30 MHz were made at 3 meters.

Radiated emission measurements were performed from 9kHz to 1 GHz.
Analyzer resolution is:

200Hz or greater for 9kHz to 150kHz
9 kHz or greater for 150kHz to 30 MHz
120 kHz or greater for 30MHz to 1000 MHz
For those frequencies quasi-peak detector applies

Data includes of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

Field Strength Calculation

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

$$FS = RA + AF + CF - AG - DCF$$

Where FS = Field Strength in dB (μ V/m)

RA = Receiver Amplitude (including preamplifier) in dB (μ V)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB (1/m)
AG = Amplifier Gain in dB
DCF = Distance Correction Factor

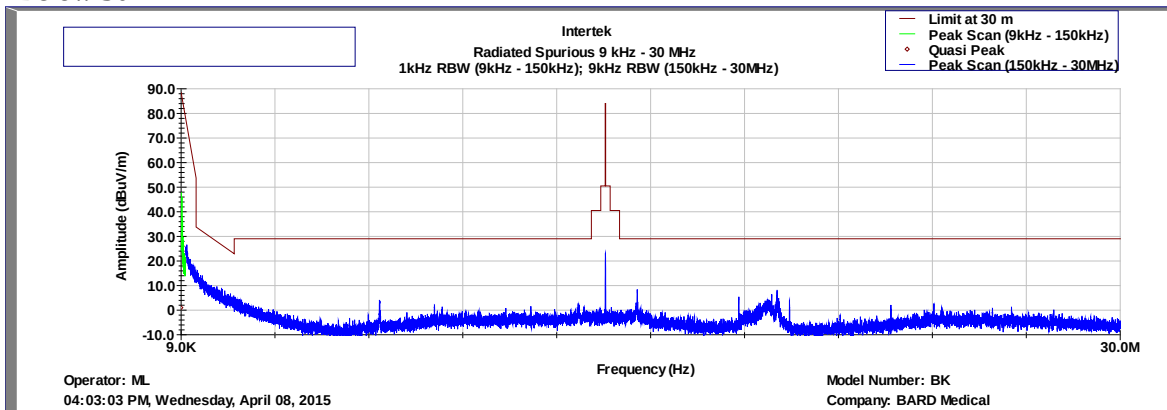
Note: FS was measured with loop antenna below 30MHz

4.1.3 Test Result 15.225 (a)(b)(c)

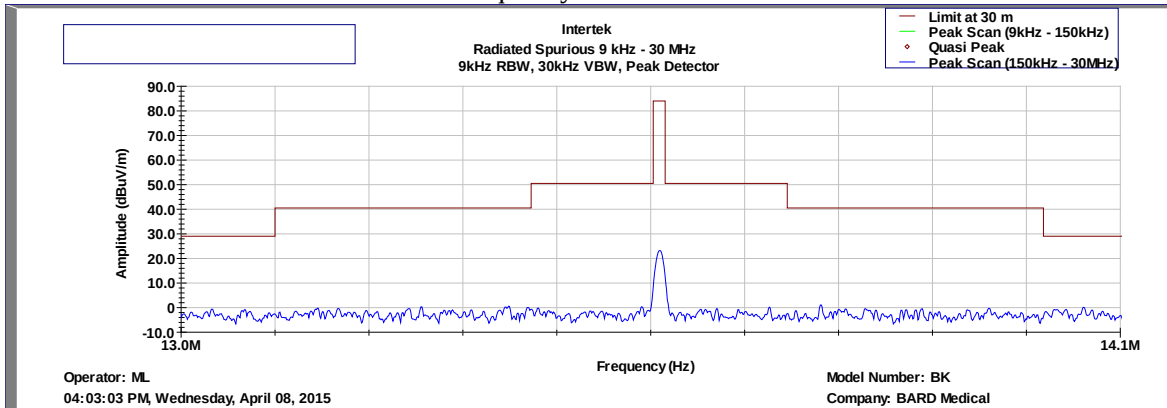
The data below shows the significant emission frequencies, the limit and the margin of compliance.
Note: Measurements were performed with parallel and perpendicular orientation of loop antenna. Also, the EUT was investigated with different orientation. The worst case data was presented below.

Radiated Spurious Emissions

Below 30MHz



Radiated emissions at fundamental frequency



Frequency (MHz)	Peak FS dB(uV/m)	Limit@30m dB(uV/m)	Margin dB	RA@10m dB(uV)	CF dB	AG dB	DCF dB	AF dB(1/m)
13.56	21.9	84	-62.1	37.7	0.4	32.1	-19.1	35

4.1.4 Test Result 15.225 (d)

Radiated Spurious Emissions 30 MHz to 10th Harmonic of Fundamental Transmitter (135.6MHz)

Above 30 MHz

Frequency	Quasi Pk FS	Limit@3m	Margin	RA	Cable	AG	DCF	AF
MHz	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB	dB(1/m)
67.8	21.8	40.0	-18.2	34.4	1.0	32.1	10.5	8.0
135.6	22.9	43.5	-20.6	33.0	1.2	32.0	10.5	10.2

Result:	Complies by 18.2 dB
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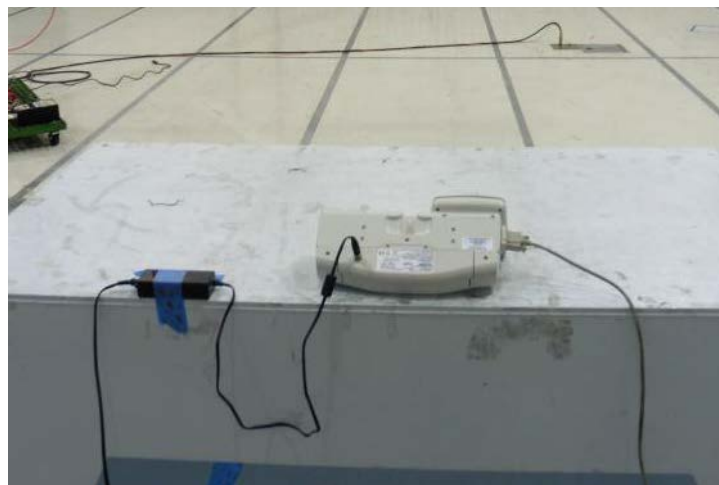
4.1.5 Test Configuration Photographs

The following photographs show the testing configurations used.



Electromagnetic Radiated Disturbance Setup Photograph

4.1.5 Test Configuration Photographs (continued)



Electromagnetic Radiated Disturbance Setup Photograph

4.2 Frequency Tolerance

4.2.1 Requirement FCC 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to $+50$ degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

4.2.2 Procedure

The EUT was placed in the temperature chamber. The frequency counter was connected to the transmitter output. For each temperature, the carrier frequency was recorded. In addition, the carrier frequency was recorded when the power was set to 138 V AC (115% of 120V AC) and to 102 V AC (85% of 120V AC).

4.2.3 Test Results
15.225 (e)

Nominal Frequency: 13560000 Hz

Voltage (AC)	Temperature (C)	Measured Frequency (Hz)	Deviation from Reference (Hz)	Deviation (%)
120	-20	13560536	54	0.000398
120	-10	13560572	18	0.000133
120	0	13560584	6	0.000044
120	10	13560589	1	0.000007
120	20	13560590	0	0.000000
120	30	13560577	13	0.000096
120	40	13560563	27	0.000199
120	50	13560551	39	0.000288
102	20	13560589	1	0.000007
138	20	13560589	1	0.000007

Nominal Frequency @ 20C, 120VAC: 13560590 Hz

4.3 Occupied Bandwidth FCC 15.215

4.3.1 Requirements

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

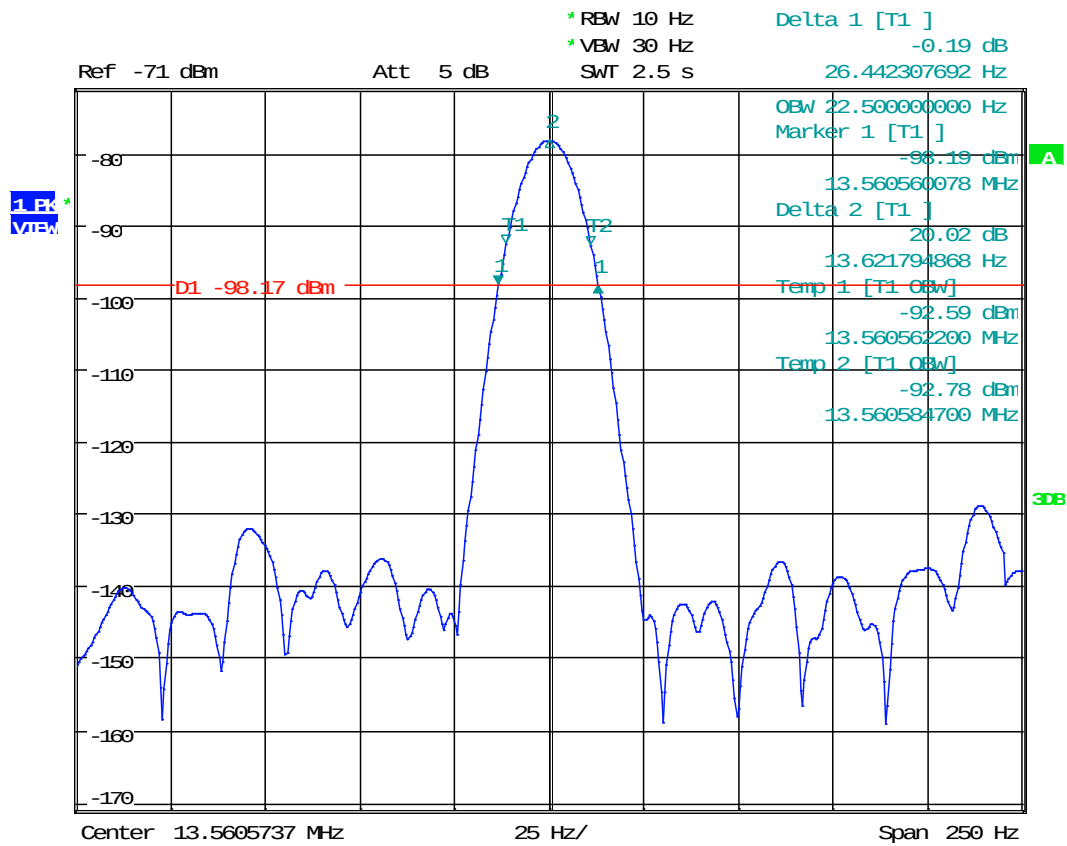
4.3.2 Procedure

The EUT was setup to transmit in normal operating condition.

Measurements were made with the loop antenna in close proximity of the EUT. Following the procedures of ANSI 63.10, the 20dB bandwidth measurements were taken. The following plots show Occupied Bandwidth.



4.3.3 Test Results



Date: 10.APR.2015 11:31:46

Frequency (MHz)	20-dB Channel Bandwidth (Hz)	99% Channel Bandwidth (Hz)
13.56	26.44	22.50

4.4 AC Line Conducted Emission FCC Rule 15.207; FCC Rule 15.107

4.4.1 Requirement

Frequency Band MHz	Class B Limit dB(μV)		Class A Limit dB(μV)	
	Quasi-Peak	Average	Quasi-Peak	Average
0.15-0.50	66 to 56 *	56 to 46 *	79	66
0.50-5.00	56	46	73	60
5.00-30.00	60	50	73	60

Note: *Decreases linearly with the logarithm of the frequency. At the transition frequency the lower limit applies.

4.4.2 Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

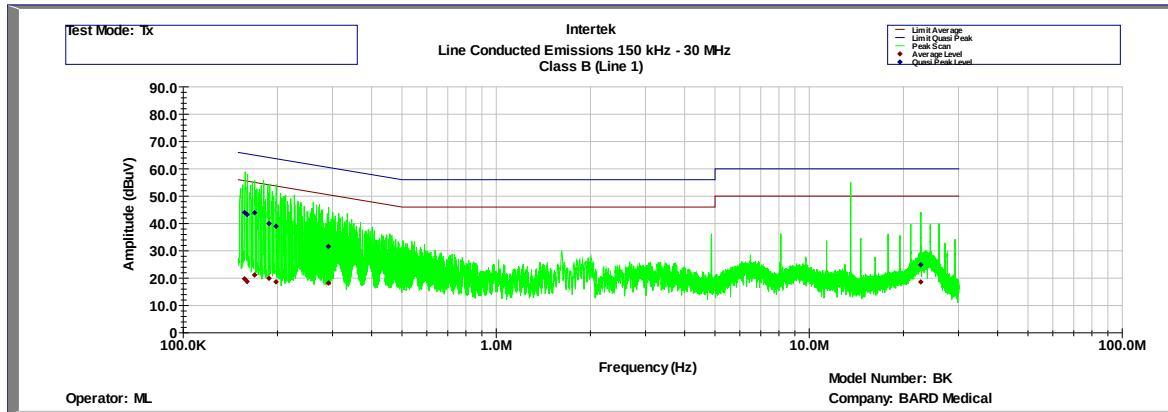
Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

EUT was placed in transmission mode then tested for conducted emissions per 15.207 to ensure the device complies with 15.207 outside the transmitter fundamental emissions band. After, the EUT antenna is removed from the EUT and only the fundamental emission band was measured to show that the fundamental emission band is in compliance with the 15.207 limits.

Equipment setup for conducted disturbance tests followed.

4.4.3 Test Result

120VAC 60 Hz – Line 1
FCC 15.207

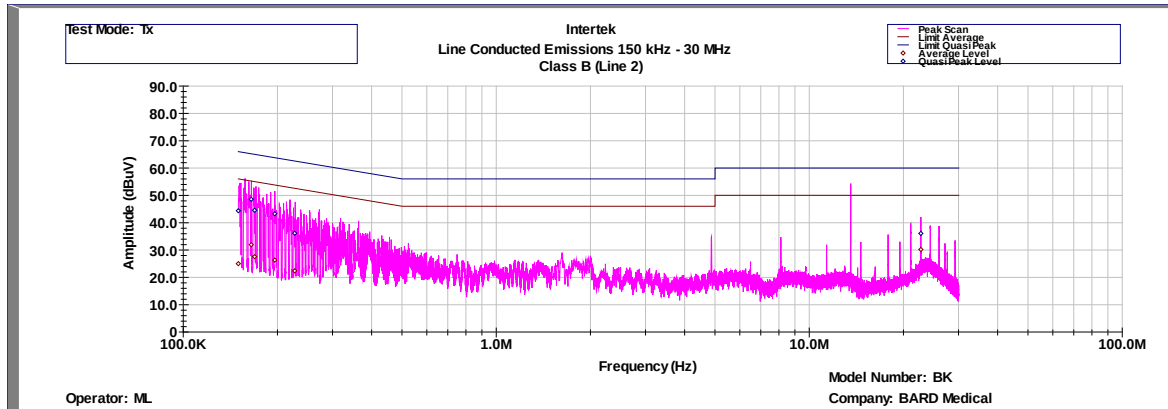


Intertek Testing Services						
Line Conducted Emissions 150 kHz - 30 MHz						
QP and Ave Detector Class B (Line 1)						
Operator: ML			Model Number: BK			
Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
157000	19.8	44.0	55.8	65.8	-36.0	-21.8
160000	18.8	43.3	55.7	65.7	-37.0	-22.5
169000	21.2	43.9	55.5	65.5	-34.3	-21.5
188000	19.9	40.0	54.9	64.9	-35.0	-25.0
198000	18.6	38.9	54.6	64.6	-36.0	-25.7
291000	18.2	31.6	52.0	62.0	-33.8	-30.4
2.27E+07	18.6	24.9	50.0	60.0	-31.4	-35.1

Test with Antenna removed and terminated



120VAC 60 Hz – Line 2
FCC 15.207



Intertek Testing Services

Line Conducted Emissions 150 kHz - 30 MHz

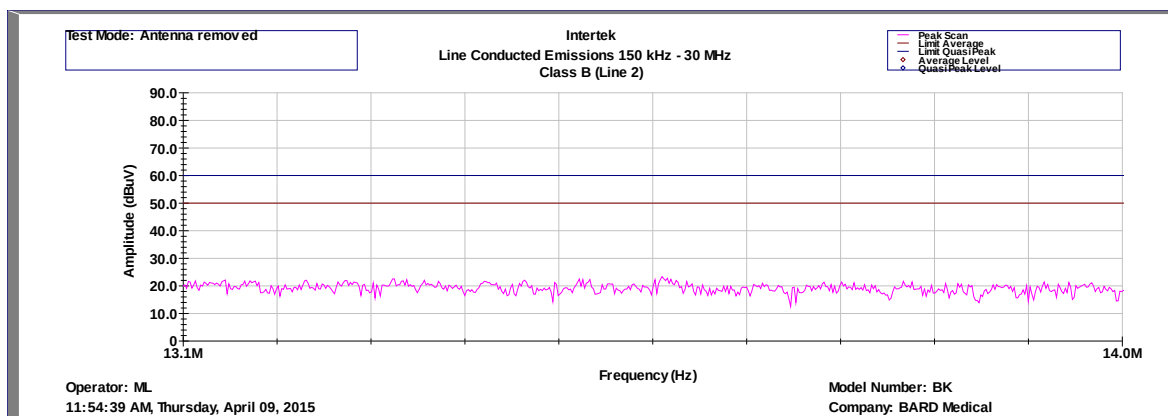
QP and Ave Detector Class B (Line 2)

Operator: ML

Model Number: BK

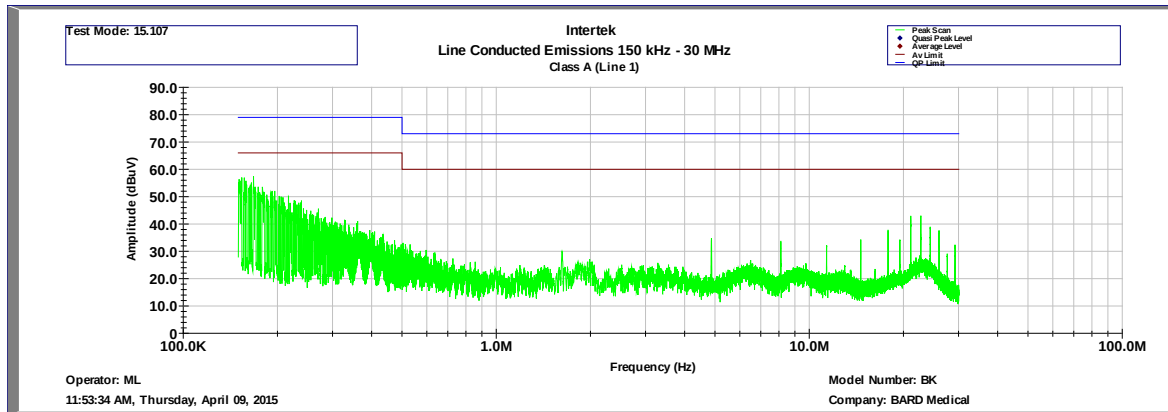
Frequency	Av Level	QP Level	Av Limit	QP Limit	Av Margin	QP Margin
Hz	dBuV	dBuV	dBuV	dBuV	dB	dB
150000	25.0	44.4	56.0	66.0	-31.0	-21.6
165000	31.9	48.6	55.6	65.6	-23.6	-17.0
169000	27.6	44.5	55.5	65.5	-27.9	-20.9
196000	26.3	43.3	54.7	64.7	-28.4	-21.4
227000	22.4	36.1	53.8	63.8	-31.4	-27.7
2.27E+07	30.2	36.1	50.0	60.0	-19.8	-23.9

Test with Antenna removed and terminated

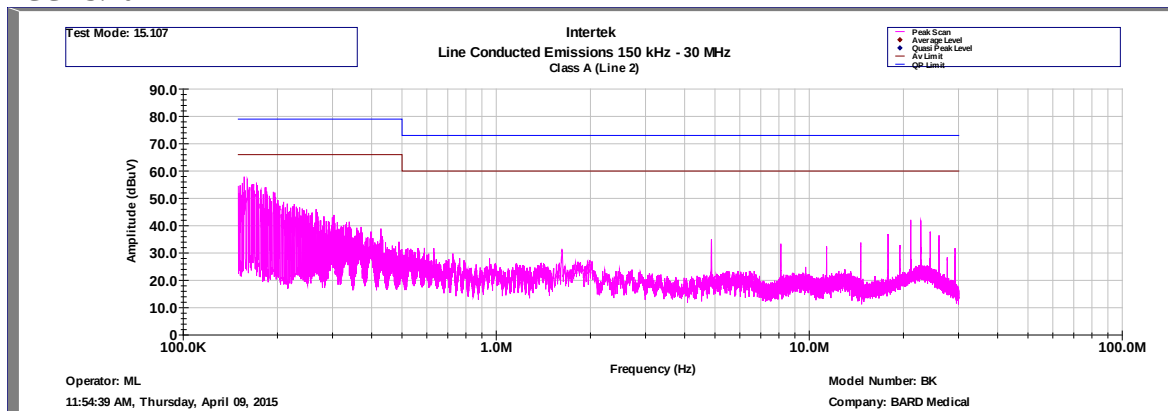


Result: Complies by 17.0dB

120VAC 60 Hz – Line 1
FCC 15.107



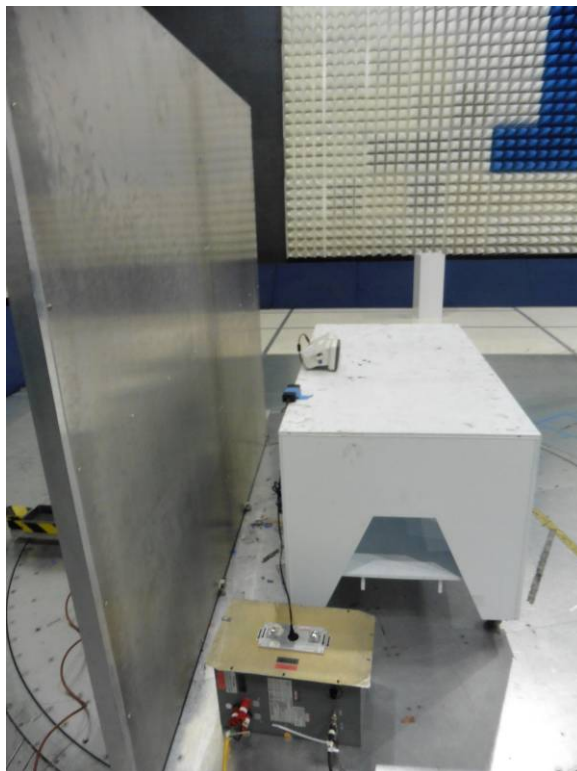
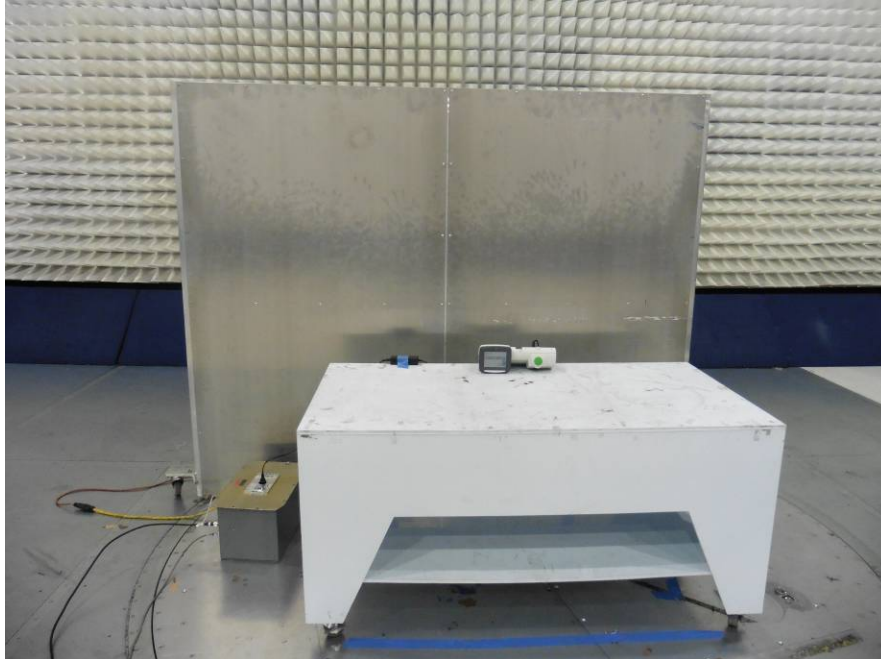
120VAC 60 Hz – Line 2
FCC 15.107



Result: Complies by 8.0dB

4.4.4 Test Configuration Photographs

The following photographs show the testing configurations used.



4.5 Radiated Emissions on Digital Parts and Receiver

FCC Ref: 15.109, ICES 003, RSS Gen

4.5.1 Test Limit

Limits for Electromagnetic Radiated Emissions FCC Section 15.109(b), ICES 003*, RSS GEN

Frequency (MHz)	Class A at 10m dB(μV/m)	Class B at 3m dB(μV/m)
30-88	39	40.0
88-216	43.5	43.5
216-960	46.4	46.0
Above 960	49.5	54.0

* According to FCC Part 15.109(g) an alternative to the radiated emission limits shown above, digital devices may be shown to comply with the limit of CISPR Pub. 22

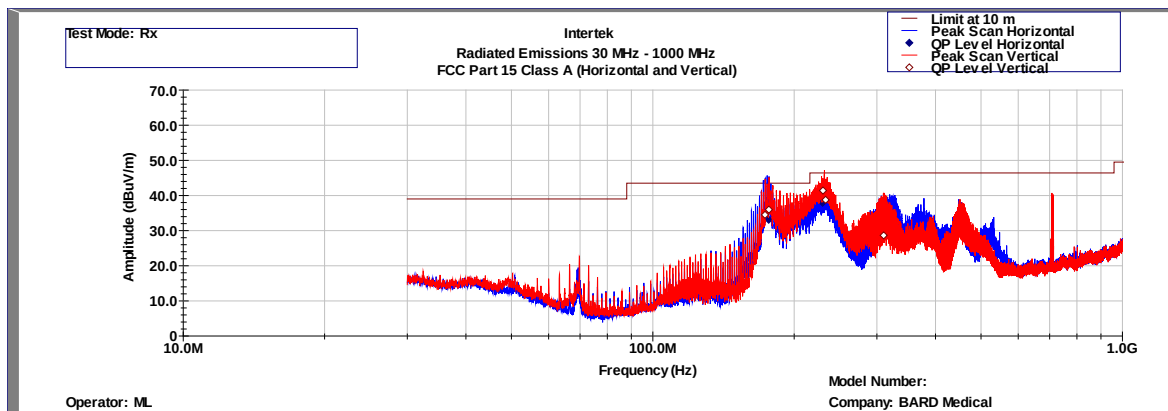
4.5.2 Procedures

The EUT was set for receive mode only. Radiated measurements were taken. 120 kHz resolution bandwidth was used from 30 MHz - 1 GHz. 1 MHz resolution bandwidth was used for measurements done above 1 GHz. All plots are corrected for cable loss, antenna factor, and preamp.

4.5.3 Test Results

The highest clock frequency used in the EUT is 8MHz. Radiated emission measurements were performed from 30 MHz to 1000 MHz. The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Test Results: Radiated Emissions 30 MHz - 1000 MHz



Intertek Testing Services

Radiated Emissions 30 MHz - 1000 MHz

FCC Part 15 Class A (15.109)

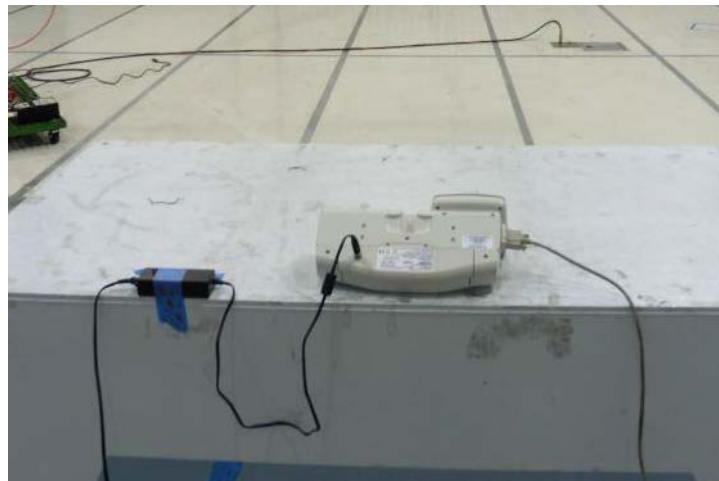
Company: BARD Medical

Model Number: BK

Frequency	Polarity	Quasi Pk FS	Limit@10m	Margin	RA	CF	AG	AF
Hz	H/V	dB(uV/m)	dB(uV/m)	dB	dB(uV)	dB	dB	dB(1/m)
173.330	V	34.5	43.5	-9.0	55.5	1.2	32.0	9.7
176.720	V	36.0	43.5	-7.5	57.2	1.2	32.0	9.5
230.350	V	41.4	46.4	-5.0	60.1	1.4	32.0	11.8
233.350	V	38.7	46.4	-7.7	57.3	1.4	32.0	11.9
310.200	V	28.6	46.4	-17.8	45.6	1.8	32.0	13.2
176.520	H	33.1	43.5	-10.4	54.3	1.2	32.0	9.5
230.000	H	37.9	46.4	-8.5	56.7	1.4	32.0	11.8

Result: Complies by 5.0dB

4.5.4 Test Configuration Photographs



Electromagnetic Radiated Disturbance Setup Photograph

5.0 List of test equipment

Measurement equipment used for emission compliance testing utilized the equipment on the following list:

Equipment	Manufacturer	Model/Type	Serial No.	Calibration Interval	Cal Due
EMI Test Receiver 40GHz	Rohde & Schwarz	ESU40	0961	12	11/07/15
Bi-Log Antenna	ARA	LPB-2513/A	1154	12	08/21/15
Pre-Amplifier	Sonoma Instrument	310	293620	12	11/26/15
LISN	FCC	FCC-LISN-50-50-M-H	0551	12	05/05/15
Environmental Test Chamber	Thermotron	WS-512-CHM-25-25	939/11463RF	12	11/12/15
Ant-Passive Loop	EMCO	6512	1029	12	08/22/15
Ant-Passive Loop	Solar Electronics Co.	7334-1	1608	12	08/19/15
Spectrum Analyzer	Rohde & Schwarz	FSU	200482	12	12/16/15

* Calibration performed by ITS prior to the test. # Calibration not required



6.0 Document History

Revision/ Job Number	Writer Initials	Reviewer Initials	Date	Change
1.0 / G101986270	ML	KV	April 27, 2015	Original document
1.1 / G101986270	ML	KV	September 02, 2015	Added FCC ID information.