



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8**

**BLUETOOTH LOW ENERGY
CERTIFICATION TEST REPORT**

FOR

Wireless ECG device

MODEL NUMBER: 30780-23

**FCC ID: 2AC8J-3078023
IC: 12344A-3078023**

REPORT NUMBER: 10463456A –Revision 1

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	11/07/14	Initial Issue	M.Ferrer
1	1/25/15	Updated with clarifications, Added RF Exposure	M.Ferrer

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Medical Components Inc
1499 Delp Dr.
Harleysville, PA, 19438

EUT DESCRIPTION: Wireless ECG device

MODEL: 30780-23

SERIAL NUMBER: Prototype

DATE TESTED: October 22, 2014 – November 7, 2014

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL LLC based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For UL By:



Bart Mucha
Staff ENGINEER
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UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/Standards/scopes/1004140.htm>

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Sample Calculations

Radiated Field Strength and Conducted Emissions data contained within this report is calculated on the following basis:

Field Strength (dBuV/m) = Meter Reading (dBuV) + AF (dB/m) - Gain (dB) + Cable Loss (dB)

Conducted Voltage (dBuV) = Meter Reading (dBuV) + Cable Loss (dB) + LISN IL (dB)

Conducted Current (dBuA) = Meter Reading (dBuV) + Cable Loss (dB) - Transducer Factor (dBohms)

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	4.27dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	4.28dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	3.33dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	3.39dB
Radiated Emissions	1-6GHz	Horn	5.02dB
Radiated Emissions	6-18GHz	Horn	5.34dB
Radiated Emissions	18-26GHz	Horn	6.60dB
Conducted Ant Port	30MHz-26GHz	Spectrum Analyzer	2.94

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is wireless ECG device that contains a BTLE transceiver.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	BLE	-7.99	0.16

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The Wireless Hub device, model 30780-23 utilizes a PCB antenna, with a maximum gain of 3.12dBi

Note: There was no antenna spec provided by client and per client's instruction, the antenna was obtained from the calculation as below;

Band (MHz)	Mode	Freq. (MHz)	Conducted Avg Power	E Field	EIRP	Antenna Gain
			(dBm)	(dBuV/m)	(dBm)	(dBi)
2.4GHz	BLE	2402	-7.10	91.22	-3.98	3.12

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was FTDI Ver 2.10.0.0

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

BLE: 1 Mbps.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Wireless Hub	MedComp	30780-23	-	2AC8J-3078023
AC Adapter	SL Power	MENB1010A0503B01	-	DoC

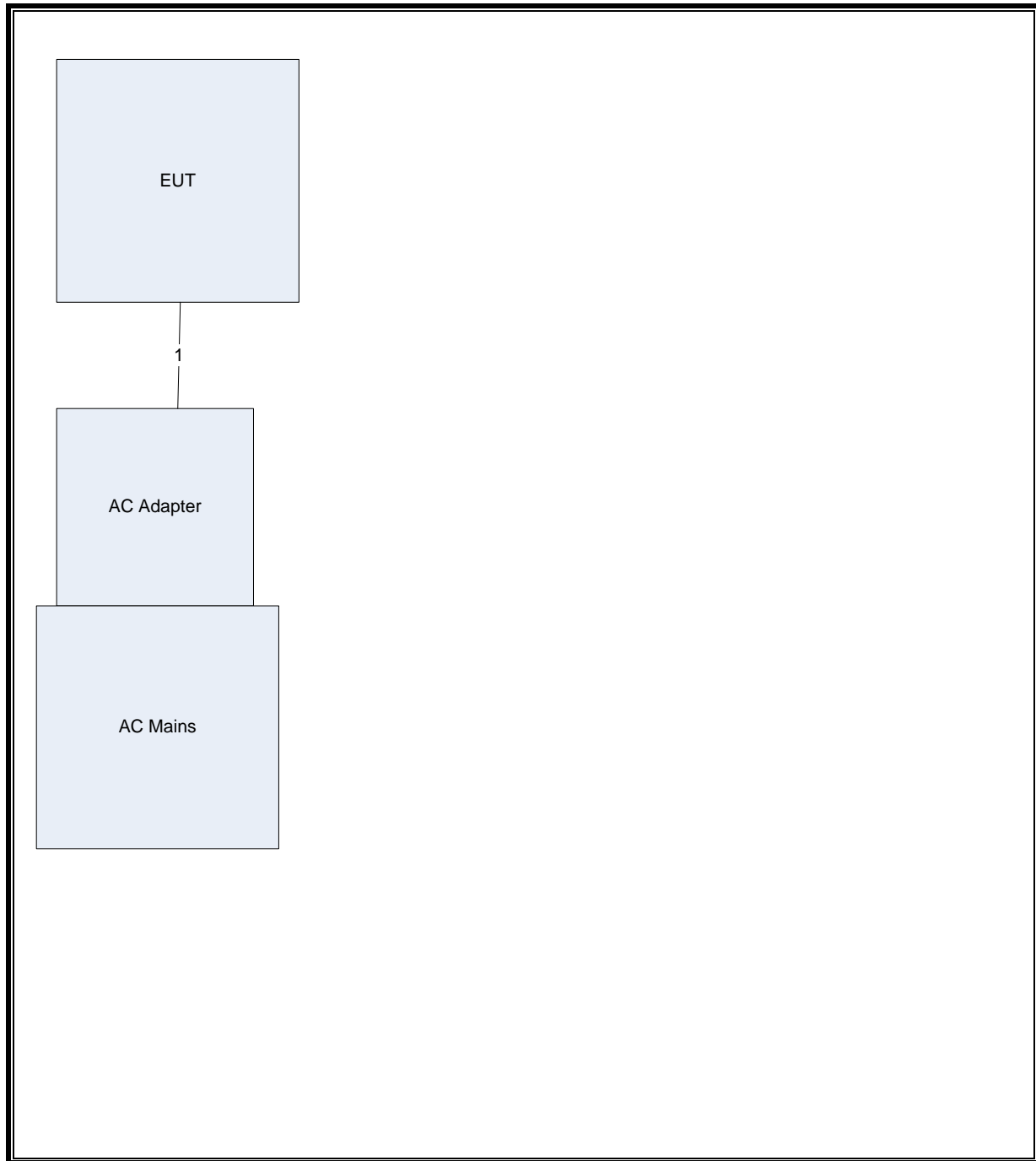
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC	1	DC	2 wire	<1m	

TEST SETUP

The EUT is a standalone device. A serial cable was used to program the device, but is removed during testing. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Description	Manufacturer	Model	Asset	Cal Date	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	20131220	20141231
Bicon Antenna	Chase	VBA6106A	EMC4078	20140401	20150401
Log-P Antenna	Schaffner	UPA6109	EMC4313	20131003	20141031
EMI Test Receiver	Rohde & Schwarz	ESU	EMC4323	20131220	20141231
Antenna Array	UL	BOMS	EMC4276	20121227	20141231
EMI Test Receiver	Agilent	N9030A	EMC4360	20131221	20141221
Power Meter	Agilent	N1912A	EMC4362	20130606	20150606
Power Sensor	Agilent	N8481A	EMC4363	20131209	20141209
EMI Test Receiver	Rohde & Schwarz	ESR3	EMC4377	20140415	20151215
LISN	Solar	8602-50-TS-50-N	EMC4052	20140115	20150116
LISN	Solar	8602-50-TS-50-N	EMC4064	20140115	20150116

7. ANTENNA PORT TEST RESULTS

8. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

8.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	2.124	2.226	0.954	95.42%	0.20	0.471

8.2. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01 v03r01, Section 8.1.

Output Power: KDB 558074 D01 v03r01, Section 9.1.1.

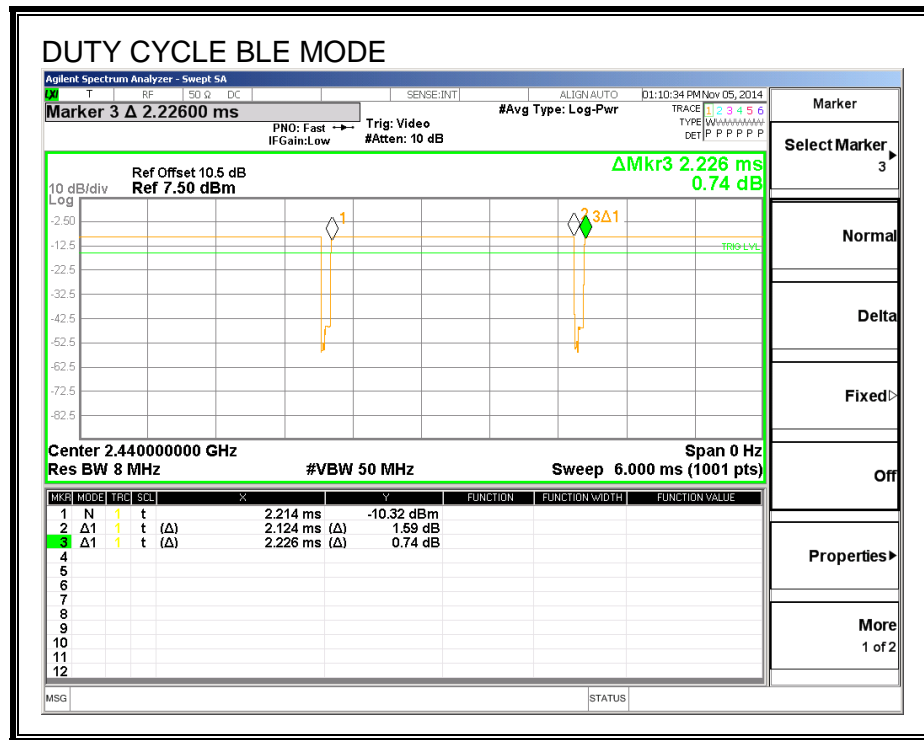
Power Spectral Density: KDB 558074 D01 v03r01, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r01, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r01, Section 12.1.

Band-edge: KDB 558074 D01 v03r01, Section 13.3.1.

8.3. DUTY CYCLE PLOTS



8.4. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

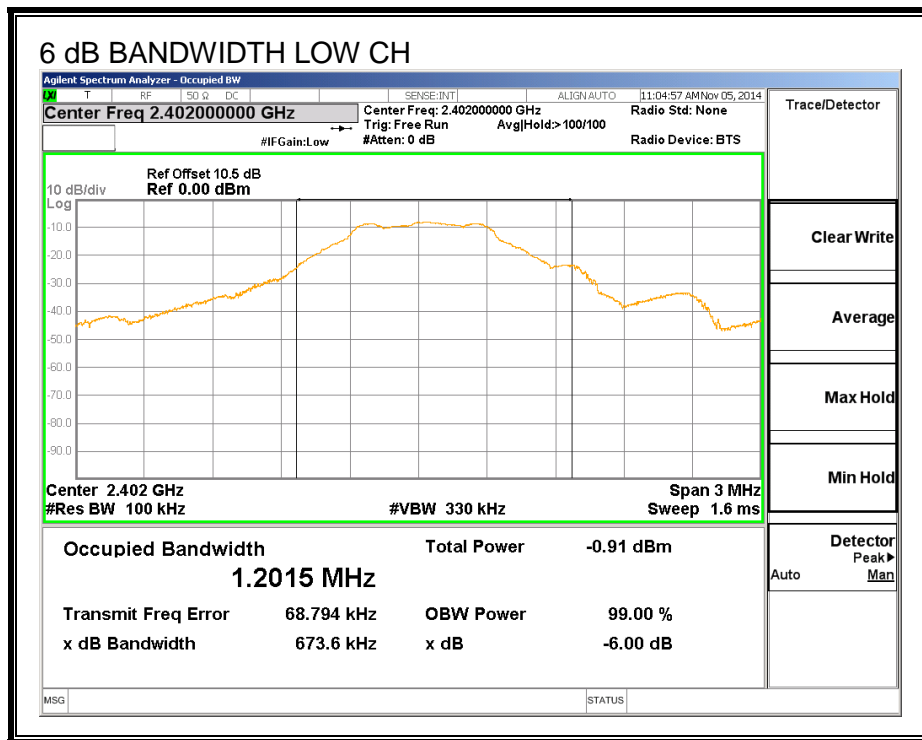
IC RSS-210 A8.2 (a)

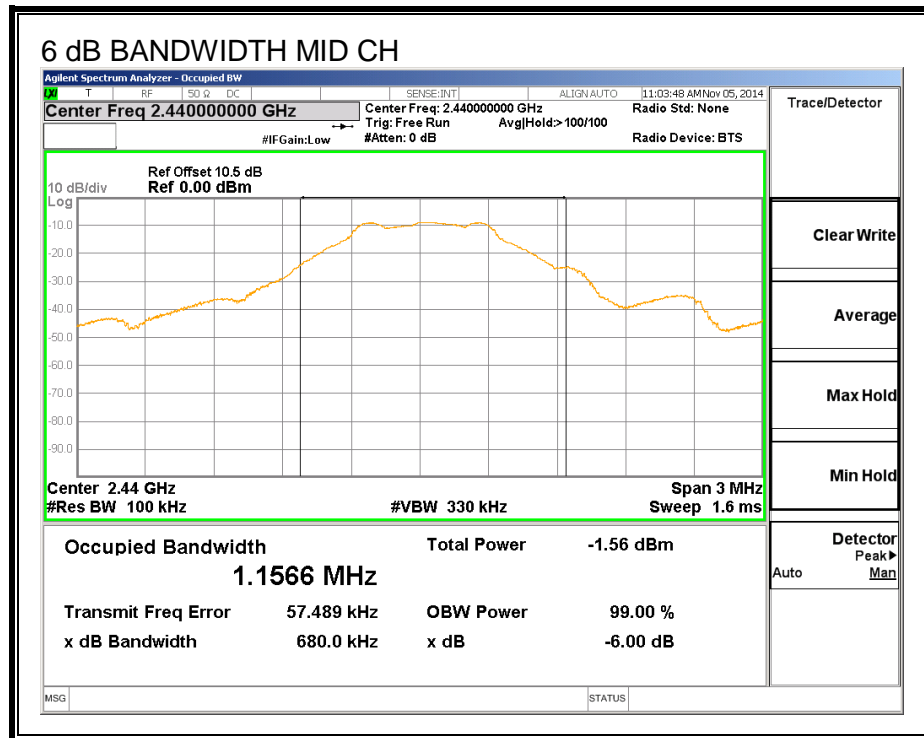
The minimum 6 dB bandwidth shall be at least 500 kHz.

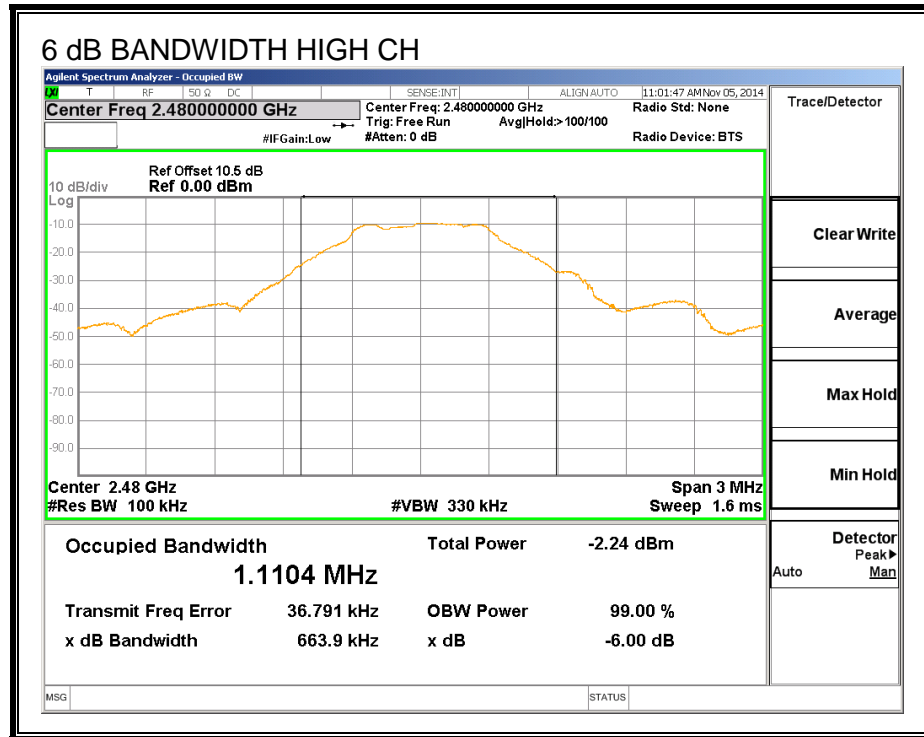
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)
Low	2402	0.6736	0.5
Middle	2440	0.6800	0.5
High	2480	0.6639	0.5

6 dB BANDWIDTH







8.5. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

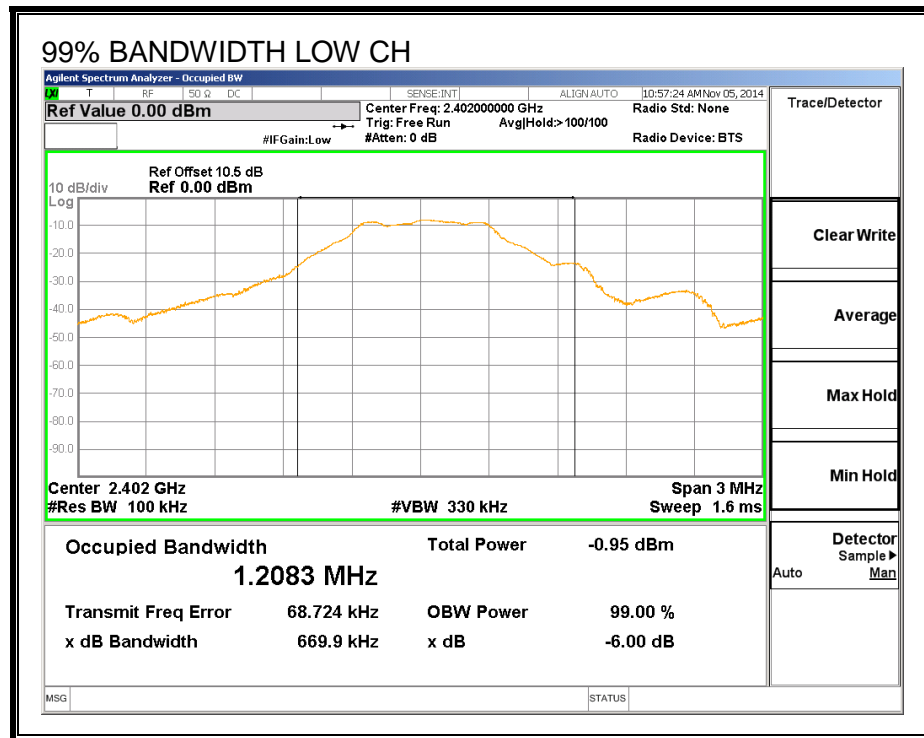
TEST PROCEDURE

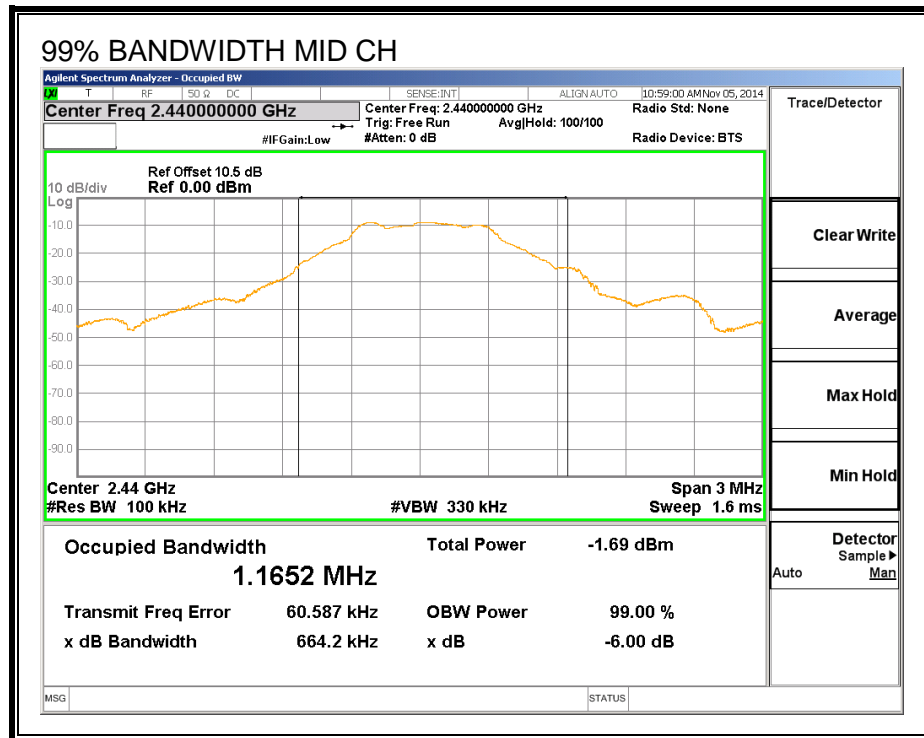
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

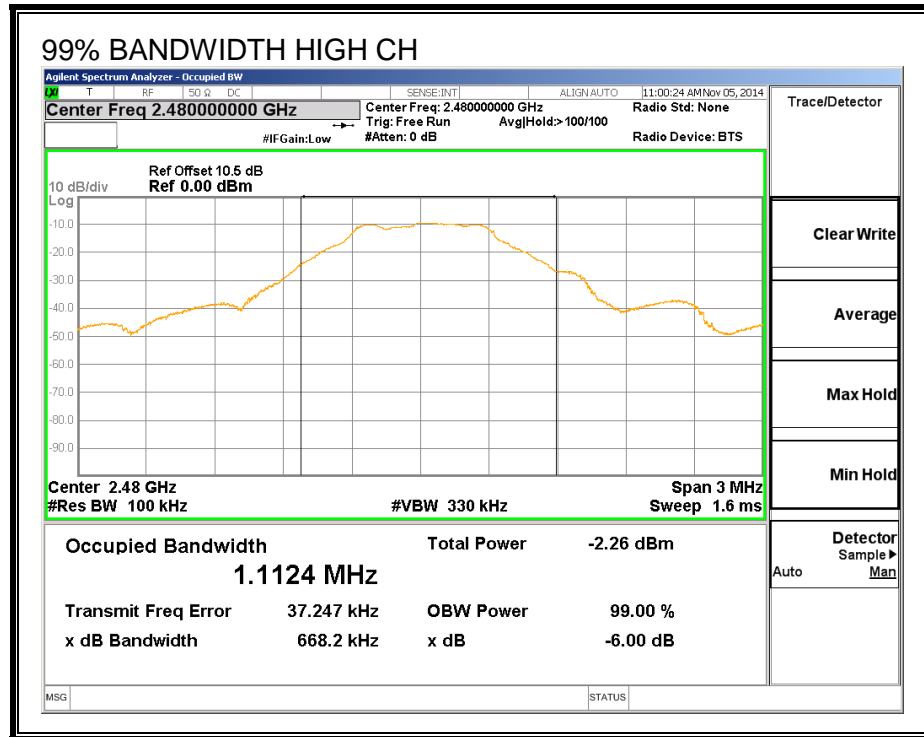
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.2083
Middle	2440	1.6520
High	2480	1.1240

99% BANDWIDTH







8.6. OUTPUT POWER

LIMITS

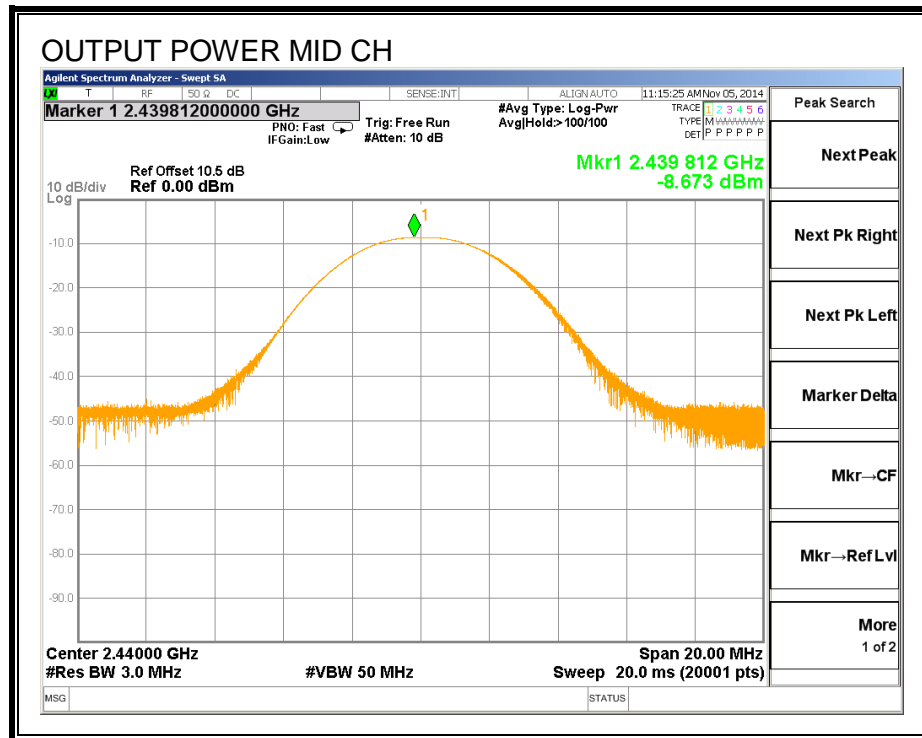
FCC §15.247 (b)

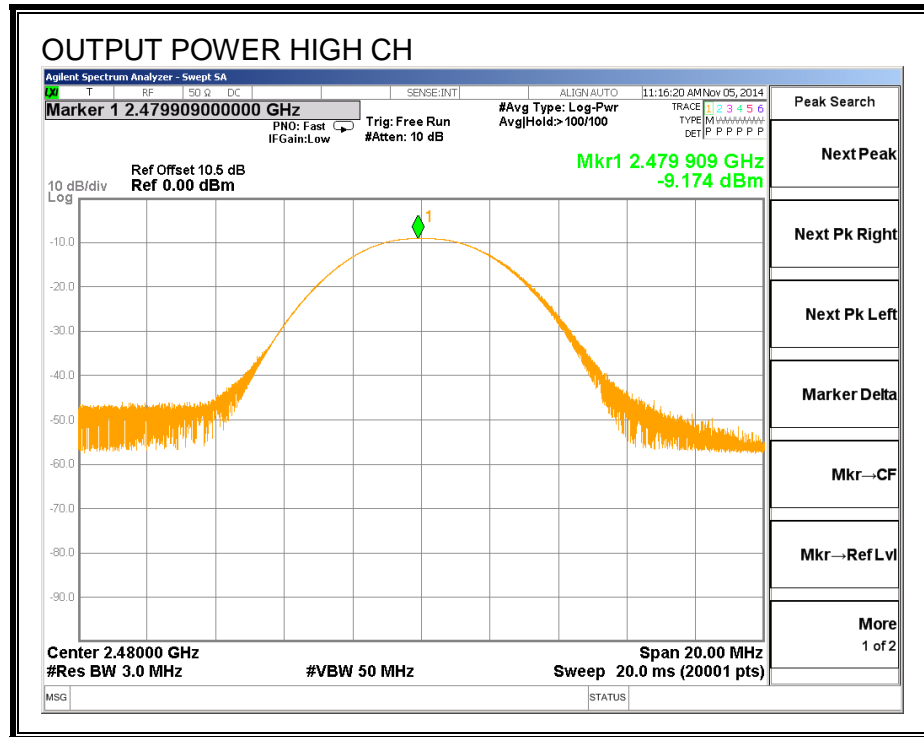
IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-7.994	30	-37.994
Middle	2440	-8.673	30	-38.673
High	2480	-9.174	30	-39.174





8.7. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS

The cable assembly insertion loss of 10 dB was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	AV power (dBm)
Low	2402	-8.62
Middle	2440	-9.26
High	2480	-9.74

8.8. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

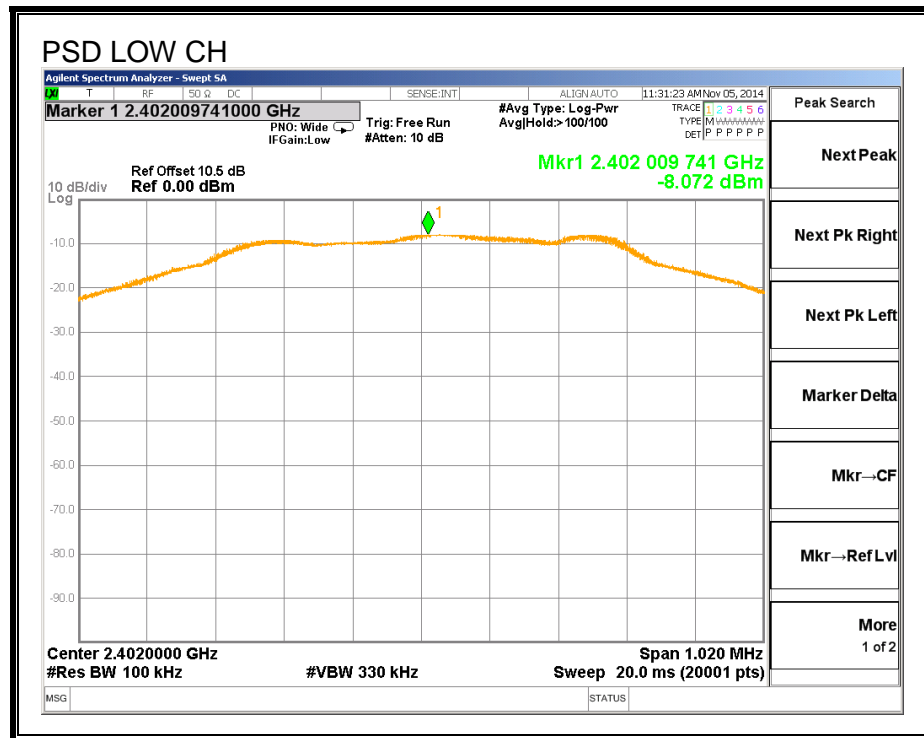
IC RSS-210 A8.2 (b)

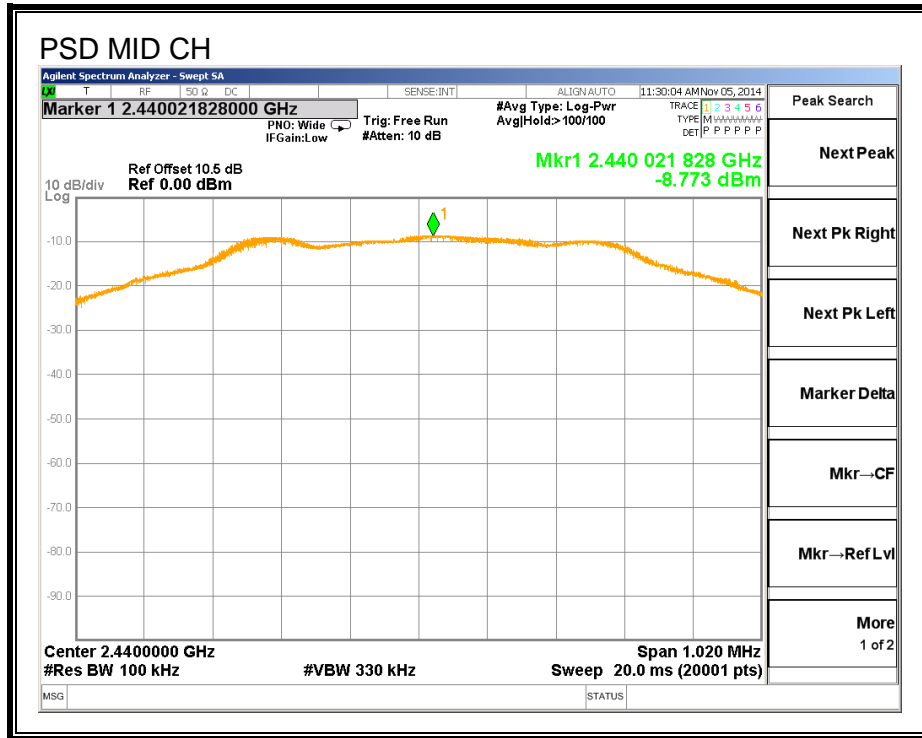
The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

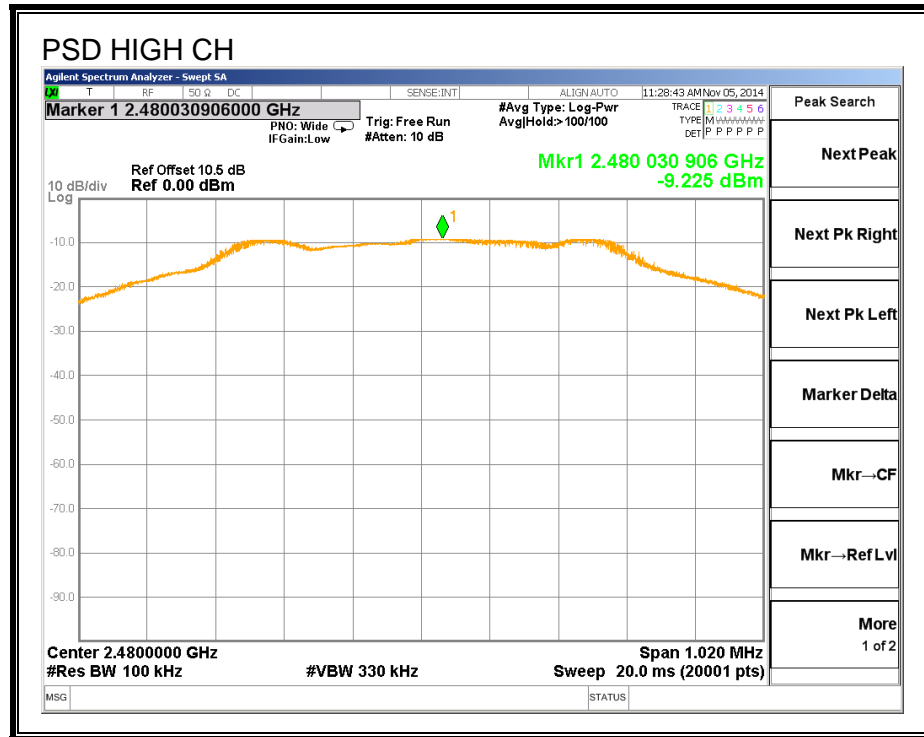
RESULTS

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-8.07	8	-16.07
Middle	2440	-8.77	8	-16.77
High	2480	-9.23	8	-17.23

POWER SPECTRAL DENSITY







8.9. CONDUCTED SPURIOUS EMISSIONS

LIMITS

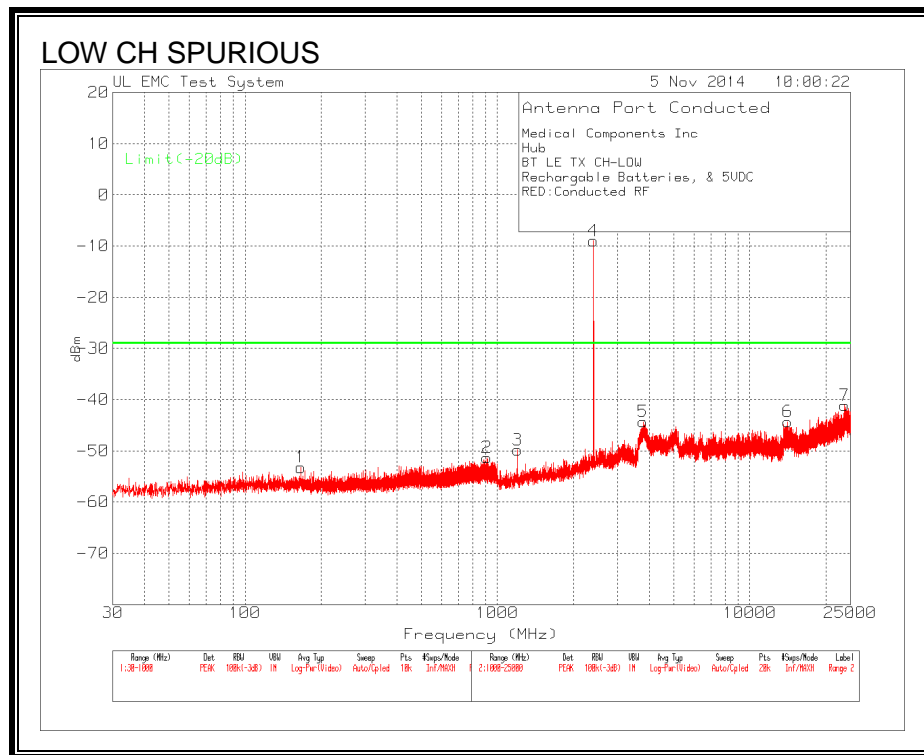
FCC §15.247 (d)

IC RSS-210 A8.5

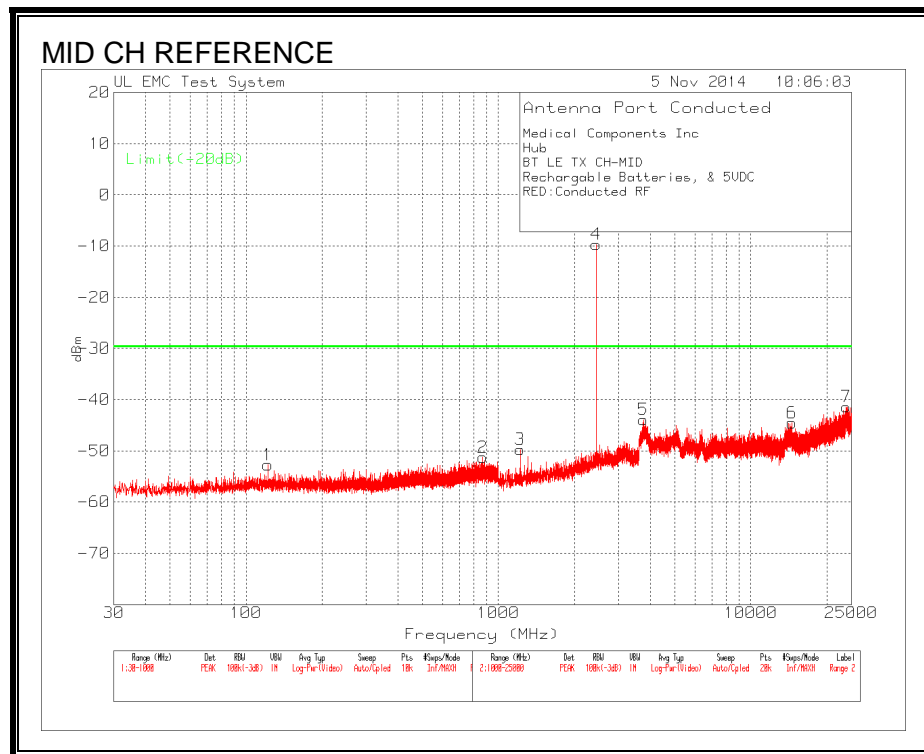
Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

Reference Level set to 5dBm

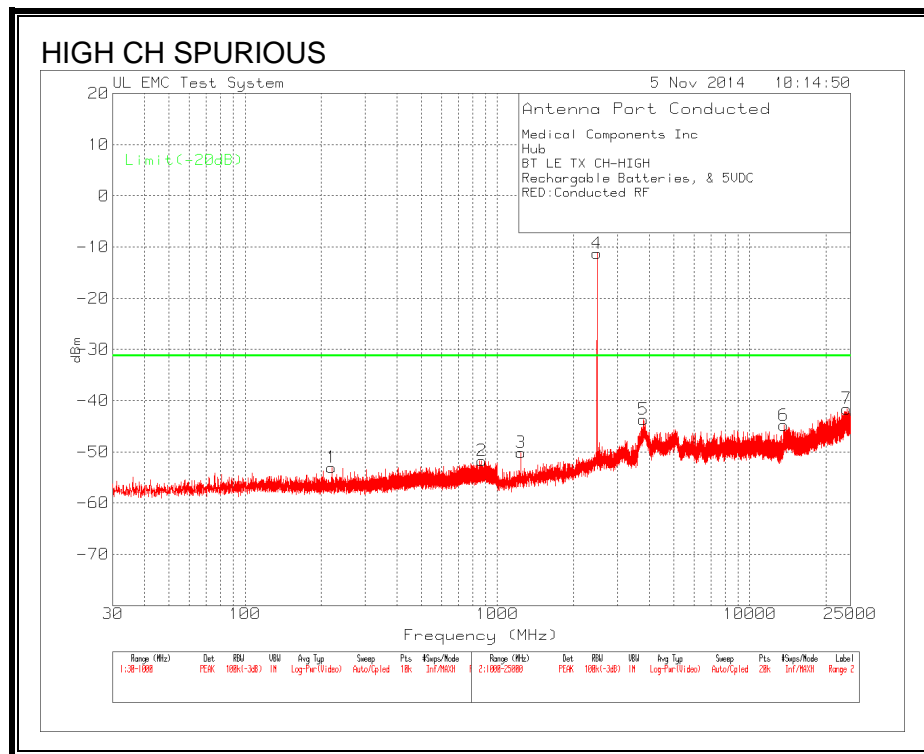
RESULTS



#4 is fundamental, no other emissions found within 6dB of the limit.



#4 is fundamental, no other emissions found within 6dB of the limit.



#4 is fundamental, no other emissions found within 6dB of the limit.

9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

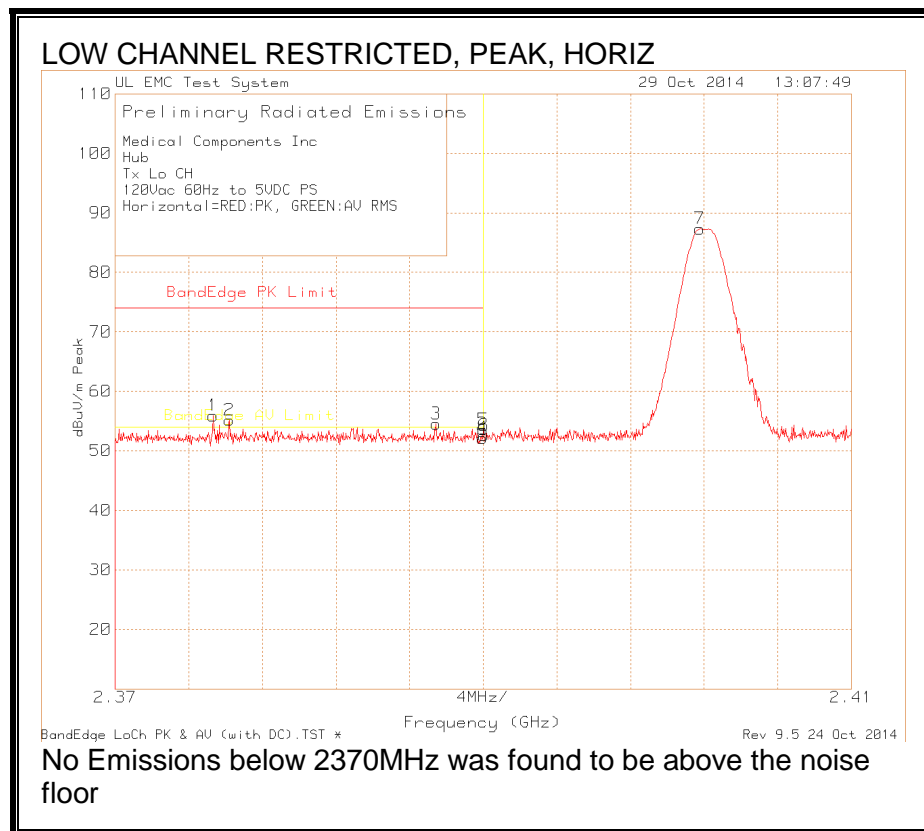
Frequency Range (MHz)	Field Strength Limit ($\mu\text{V/m}$) at 3 m	Field Strength Limit (dB $\mu\text{V/m}$) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

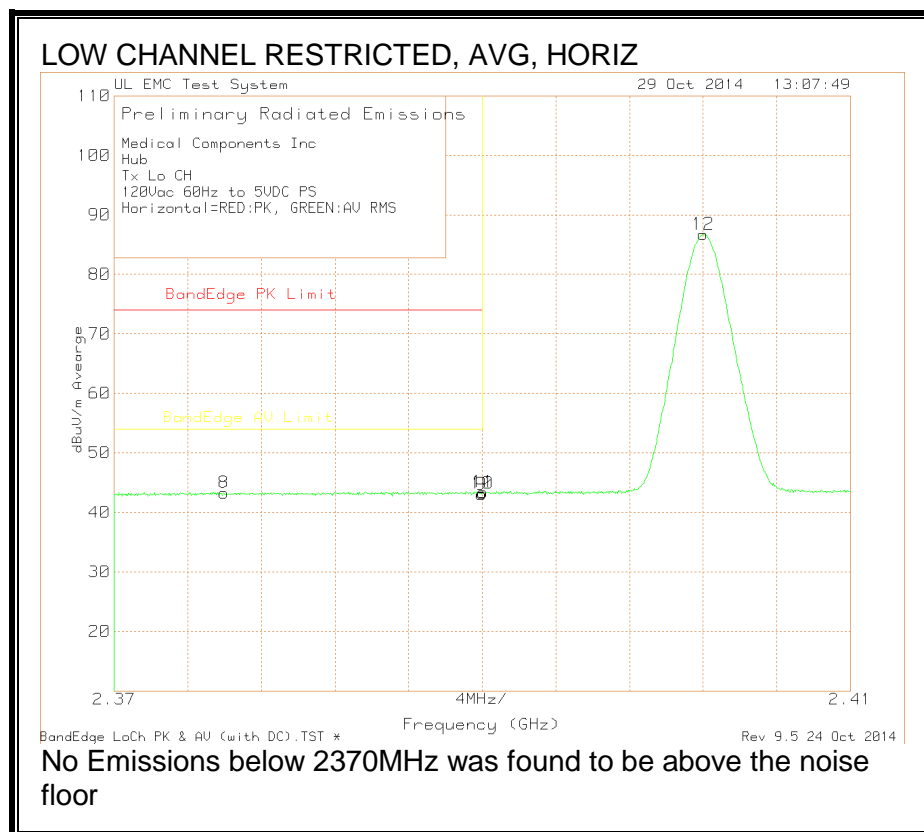
Peak and RMS Avg used for measurements

9.2. TRANSMITTER ABOVE 1 GHz

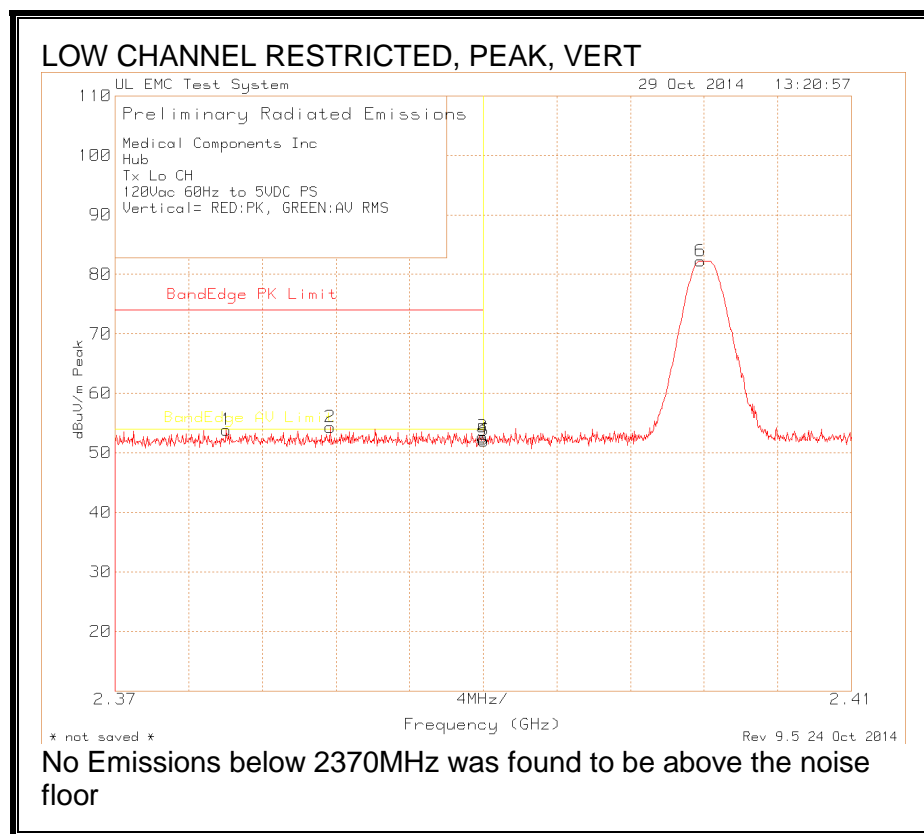
9.3. TX ABOVE 1 GHz FOR BLUETOOTH LOW ENERGY MODE IN THE 2.4 GHz BAND

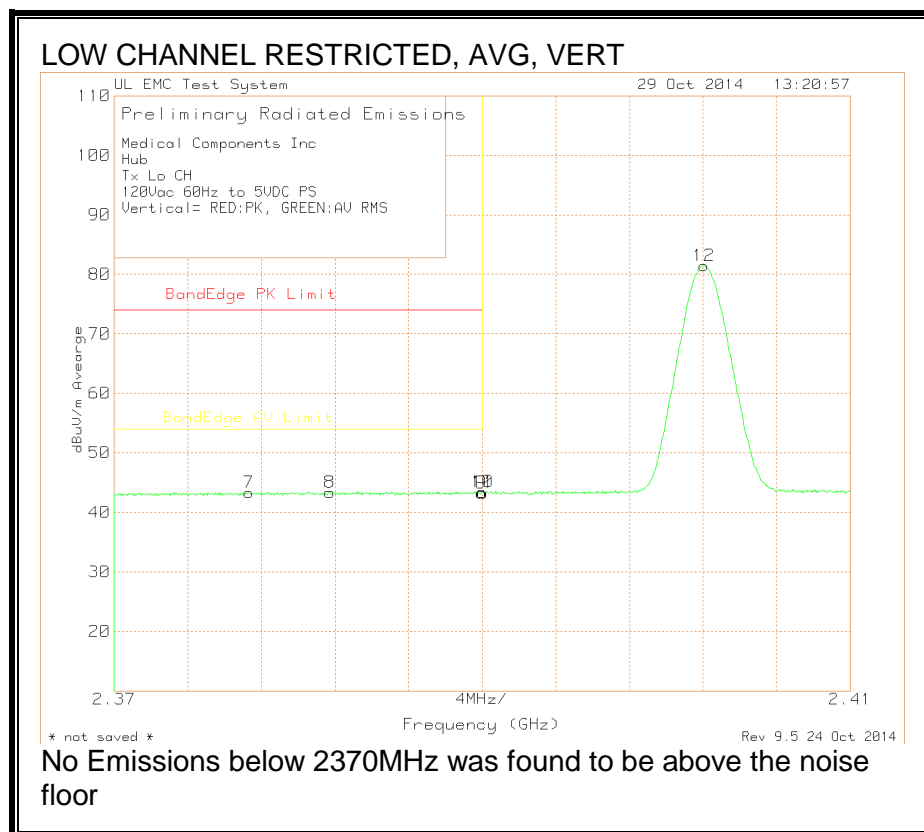
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



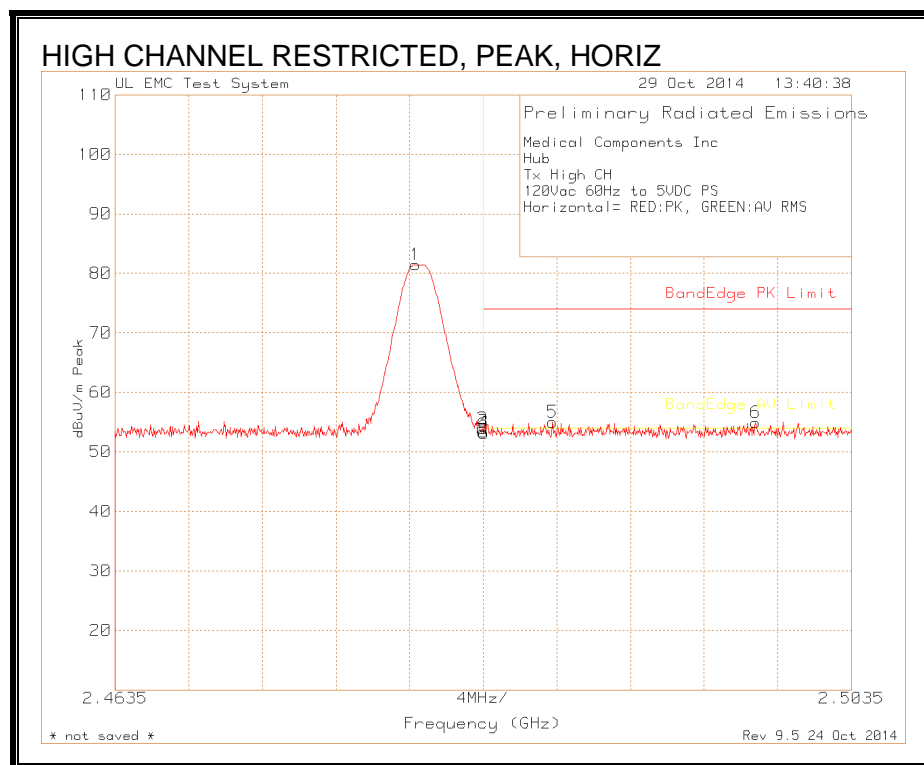


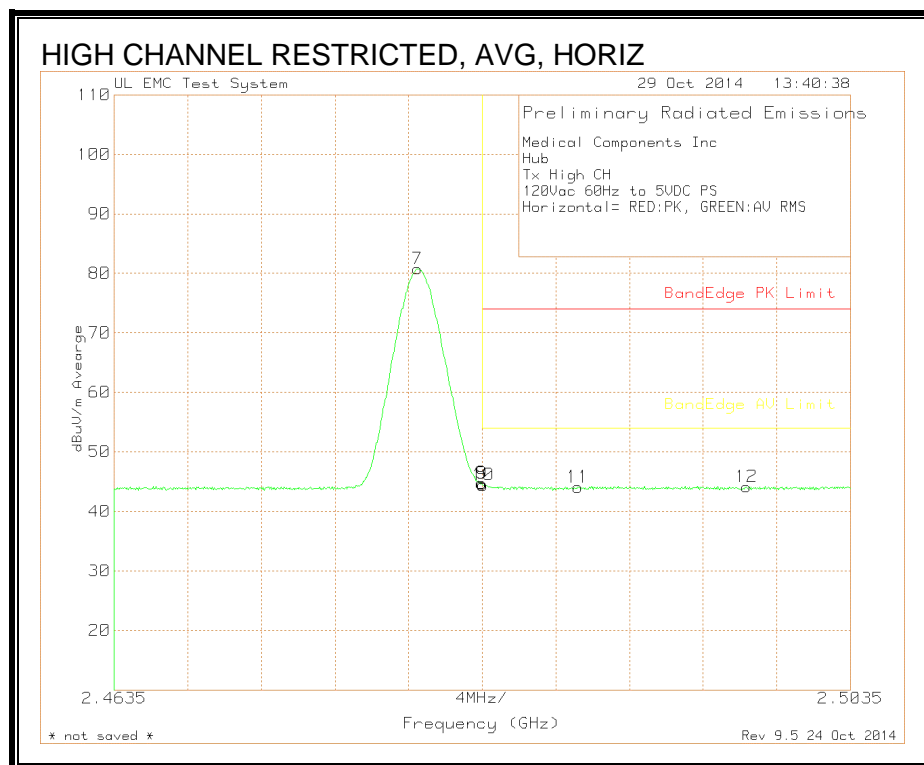
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



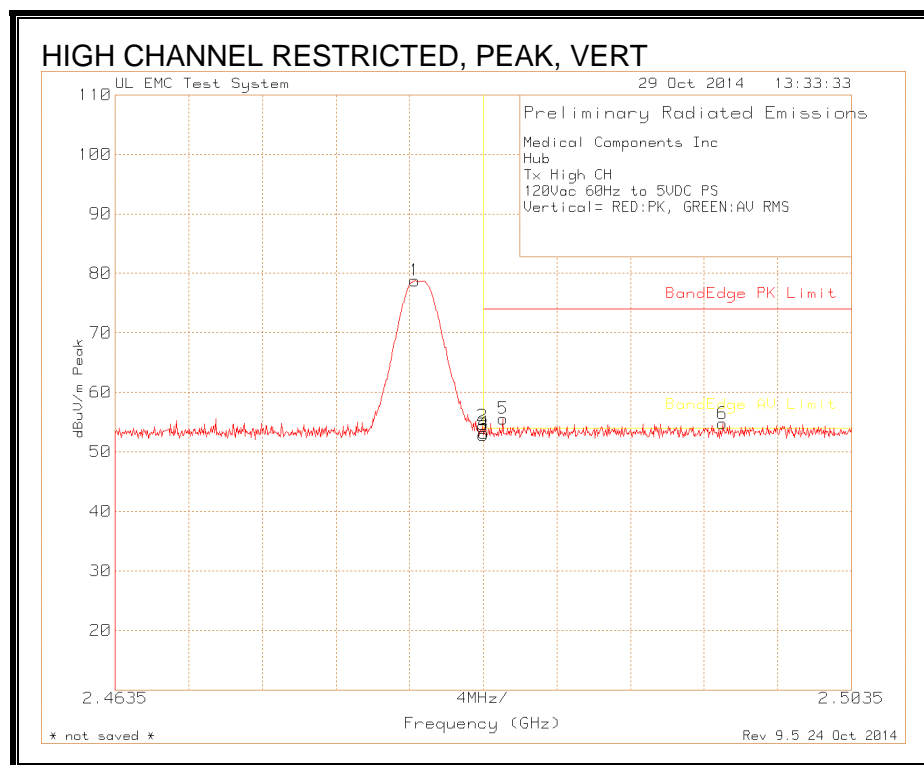


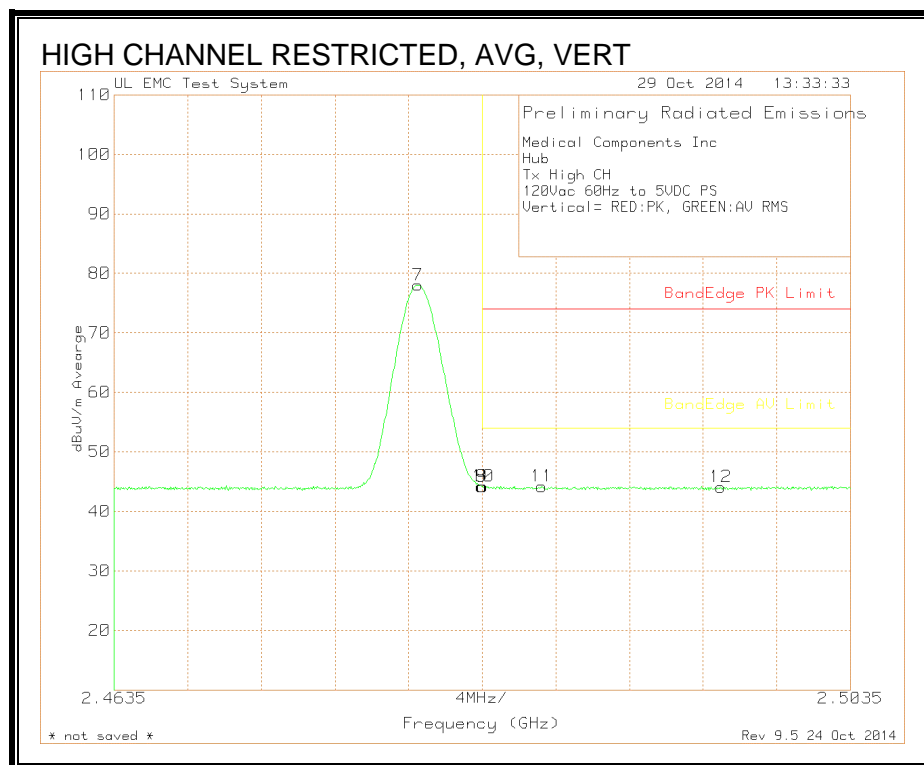
RESTRICTED BANEDGE (HIGH CHANNEL, HORIZONTAL)



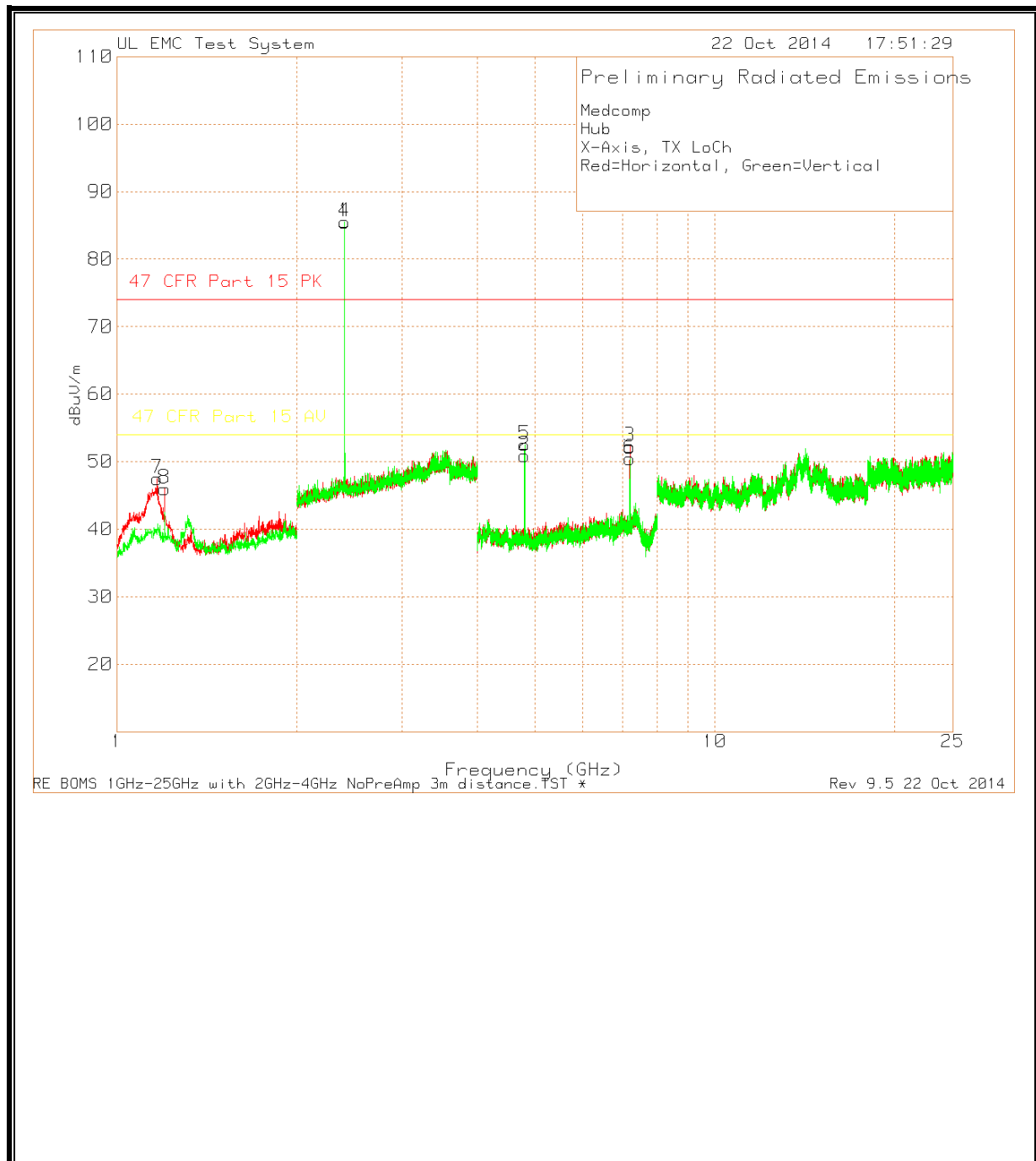


RESTRICTED BANEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS



Medcomp

Hub

X-Axis, TX LoCh

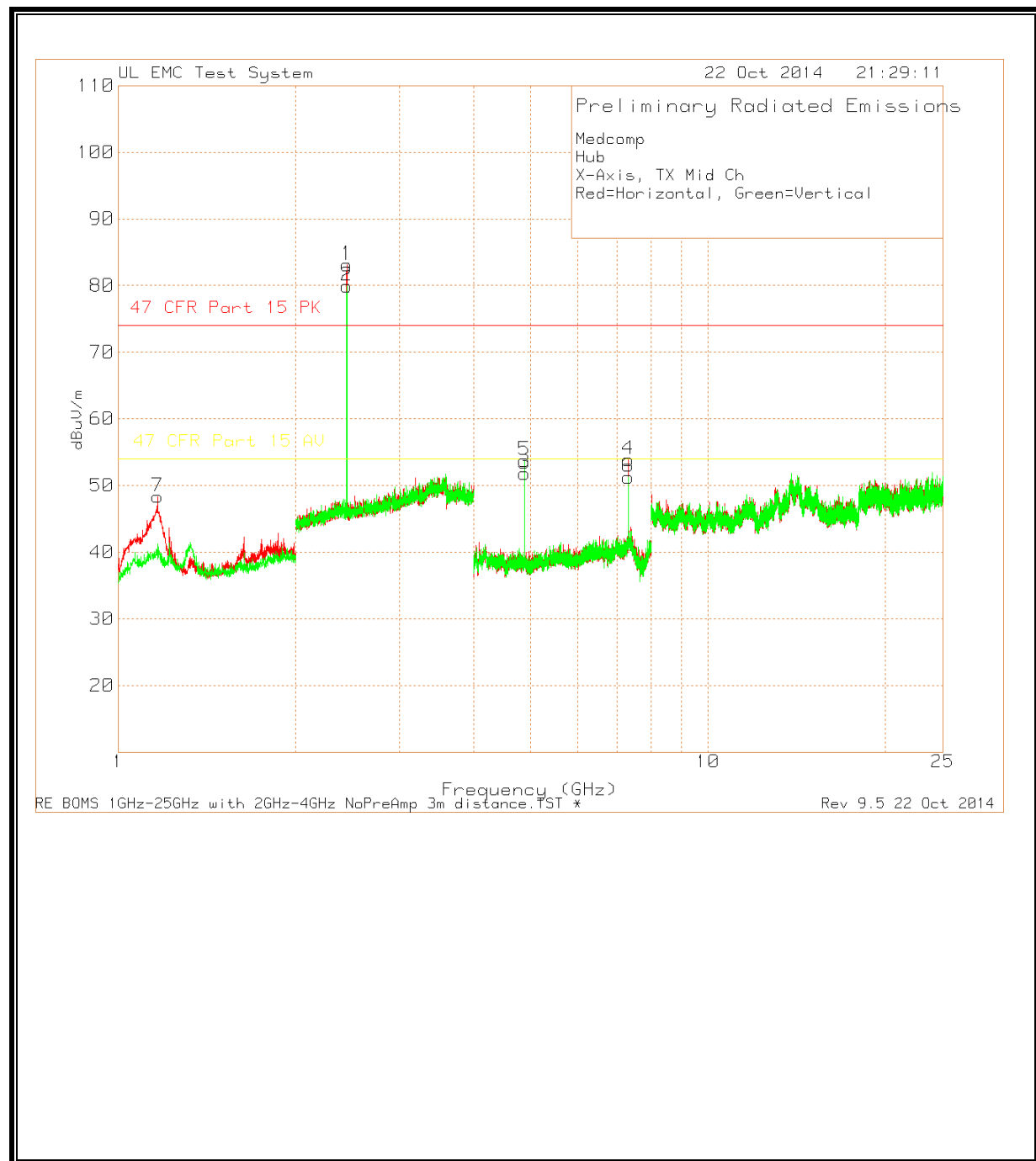
Red=Horizontal, Green=Vertical

Test	Meter	Antenna	Corrected		47 CFR		47 CFR		47 CFR		47 CFR		47 CFR	
Frequency	Reading	Gain	Gain/Loss	Reading	47 CFR	Margin	Part 15	Margin	Azimuth	Height				
(GHz)	(dBuV)	Detector	dB/m	(dB)	dBuV/m	Part 15 PK (dB)	AV	(dB)	[Degs]	[cm]	Polarity	Notes		
4.8041	71.17	AV	27.7	-50.46	48.41	74	-25.59	54	-5.59	117	100 H	1		
4.8034	77.32	Pk	27.7	-50.46	54.56	74	-19.44	-	-	117	100 H	2		
4.8034	79.63	Pk	27.7	-50.46	56.87	74	-17.13	-	-	109	105 V	2		
4.8041	73.9	AV	27.7	-50.46	51.14	74	-22.86	54	-2.86	109	105 V	1		
7.2052	68.45	Pk	29.7	-46.34	51.81	74	-22.19	-	-	96	100 V	2		
7.2061	61.7	AV	29.7	-46.34	45.06	74	-28.94	54	-8.94	96	100 V	1		
7.2058	70.7	Pk	29.7	-46.34	54.06	74	-19.94	-	-	181	100 H	2		
7.2061	64.53	AV	29.7	-46.34	47.89	74	-26.11	54	-6.11	181	100 H	1		

Notes:

1 - RMS AV

2 - PK



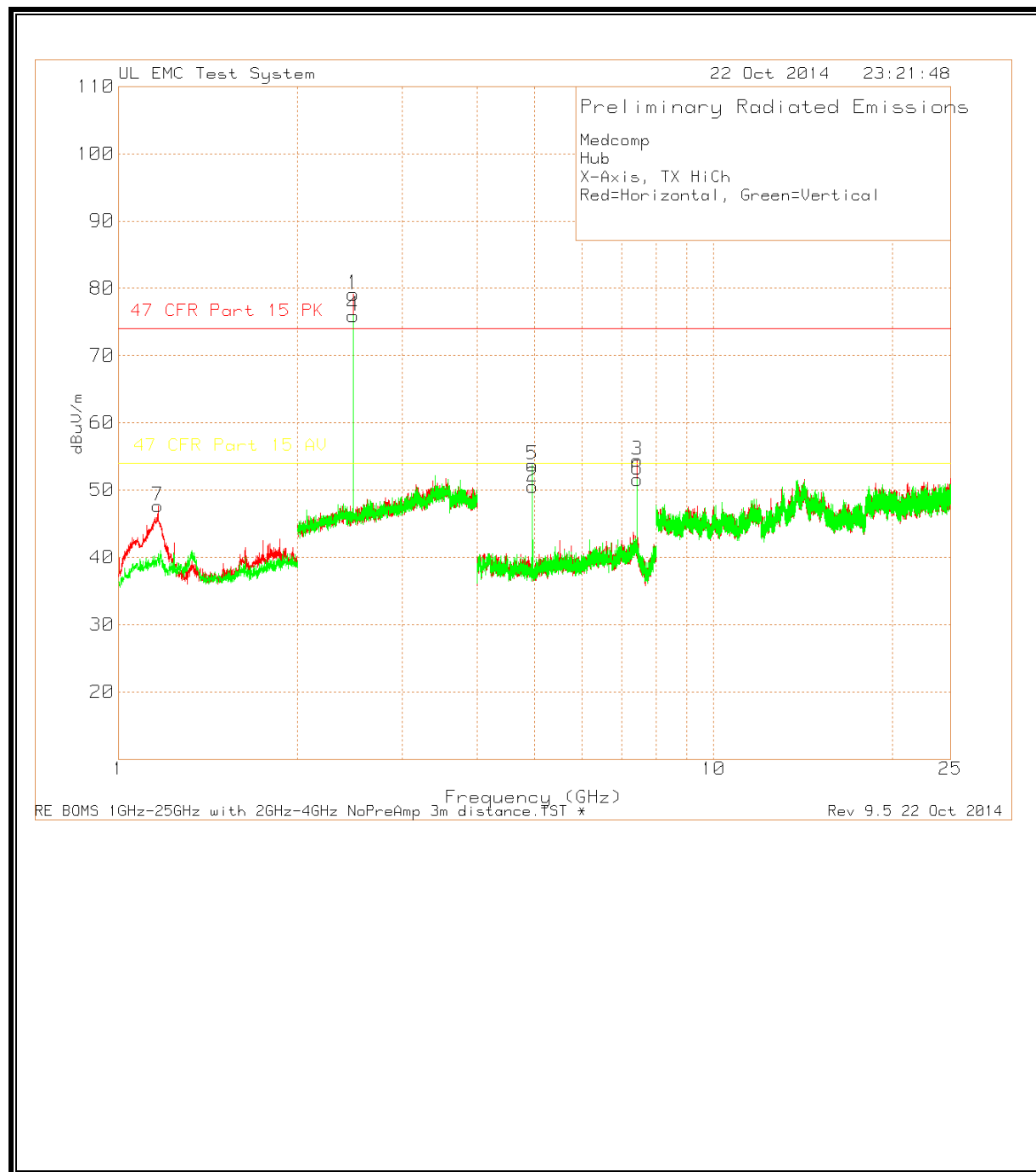
Medcomp
Hub
X-Axis, TX Mid Ch
Red=Horizontal, Green=Vertical

Test	Meter	Antenna	Corrected		47 CFR		47 CFR		47 CFR		47 CFR		47 CFR	
Frequenc	Reading	Gain	Gain/Loss	Reading	47 CFR	Margin	Part 15	Margin	Azimuth	Height	Polarity	Notes		
y (GHz)	(dBuV)	Detector	dB/m	(dB)	dBuV/m	Part 15 PK (dB)	AV	(dB)	[Degs]	[cm]				
1.166	78.62 Pk		25.1	-55.83	47.89	74	-26.11	-	0	140 H		2		
1.1658	70.35 Av		25	-55.83	39.52	74	-34.48	54	-14.48	0	140 H	1		
4.8798	78.33 Pk		27.7	-50.11	55.92	74	-18.08	-	188	100 H		2		
4.88	71.34 AV		27.7	-50.11	48.93	74	-25.07	54	-5.07	188	100 H	1		
4.8797	80.72 Pk		27.7	-50.11	58.31	74	-15.69	-	115	103 V		2		
4.88	74.16 AV		27.7	-50.11	51.75	74	-22.25	54	-2.25	115	103 V	1		
7.3194	69.11 Pk		30.6	-45.71	54	74	-20	-	184	103 V		2		
7.32	63.11 AV		30.6	-45.71	48	74	-26	54	-6	184	103 V	1		
7.3202	70.49 Pk		30.6	-45.71	55.38	74	-18.62	-	182	100 H		2		
7.32	64.77 AV		30.6	-45.71	49.66	74	-24.34	54	-4.34	182	100 H	1		

Notes:

1 - RMS AV

2 - PK



Medcomp
Hub
X-Axis, TX HiCh
Red=Horizontal, Green=Vertical

Test	Meter	Antenna	Corrected	47 CFR								
Frequenc	Reading	Gain	Gain/Loss	Reading	47 CFR	Margin	Part 15	Margin	Azimuth	Height		
y (GHz)	(dBuV)	Detector	dB/m	(dB)	dBuV/m	Part 15 PK (dB)	AV	(dB)	[Degs]	[cm]	Polarity	Notes
1.1644	76.95 Pk		25	-55.83	46.12	74	-27.88	-		334	140 H	2
1.1644	71.02 Av		25	-55.83	40.19	74	-33.81	54	-13.81	334	140 H	3
4.9598	78.44 Pk		27.8	-50.5	55.74	74	-18.26	-		95	102 H	2
4.9601	70.89 AV		27.8	-50.5	48.19	74	-25.81	54	-5.81	95	102 H	1
4.9597	82.07 Pk		27.8	-50.5	59.37	74	-14.63	-		111	101 V	2
4.9602	73.46 AV		27.8	-50.5	50.76	74	-23.24	54	-3.24	111	101 V	1
7.44	70.91 Pk		30.6	-46.7	54.81	74	-19.19	-		182	101 V	2
7.4404	65.58 AV		30.6	-46.7	49.48	74	-24.52	54	-4.52	182	101 V	1
7.4401	71.76 Pk		30.6	-46.7	55.66	74	-18.34	-		180	100 H	2
7.4404	66.81 AV		30.6	-46.7	50.71	74	-23.29	54	-3.29	180	100 H	1

Notes:

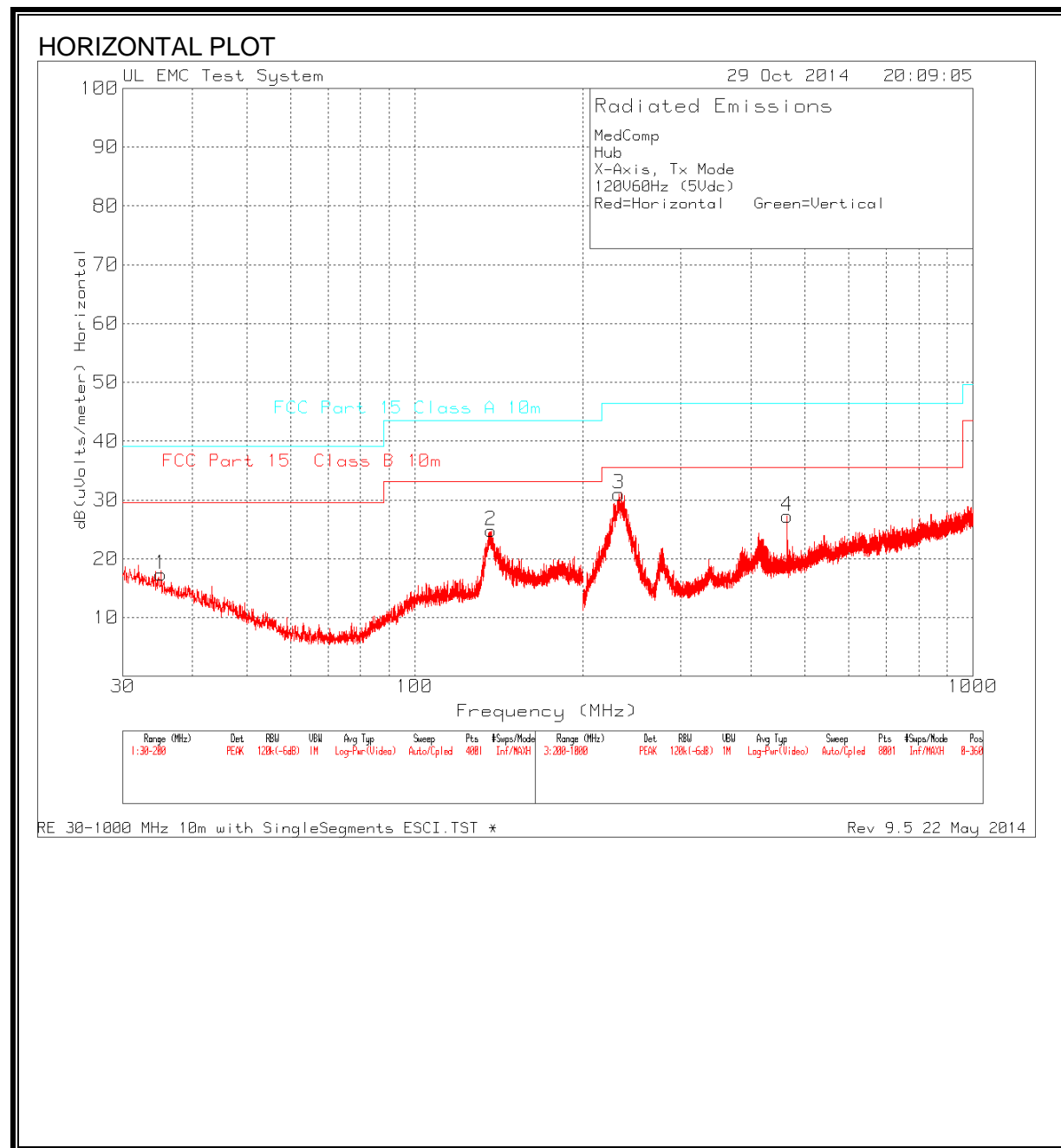
1 - RMS AV

2 - PK

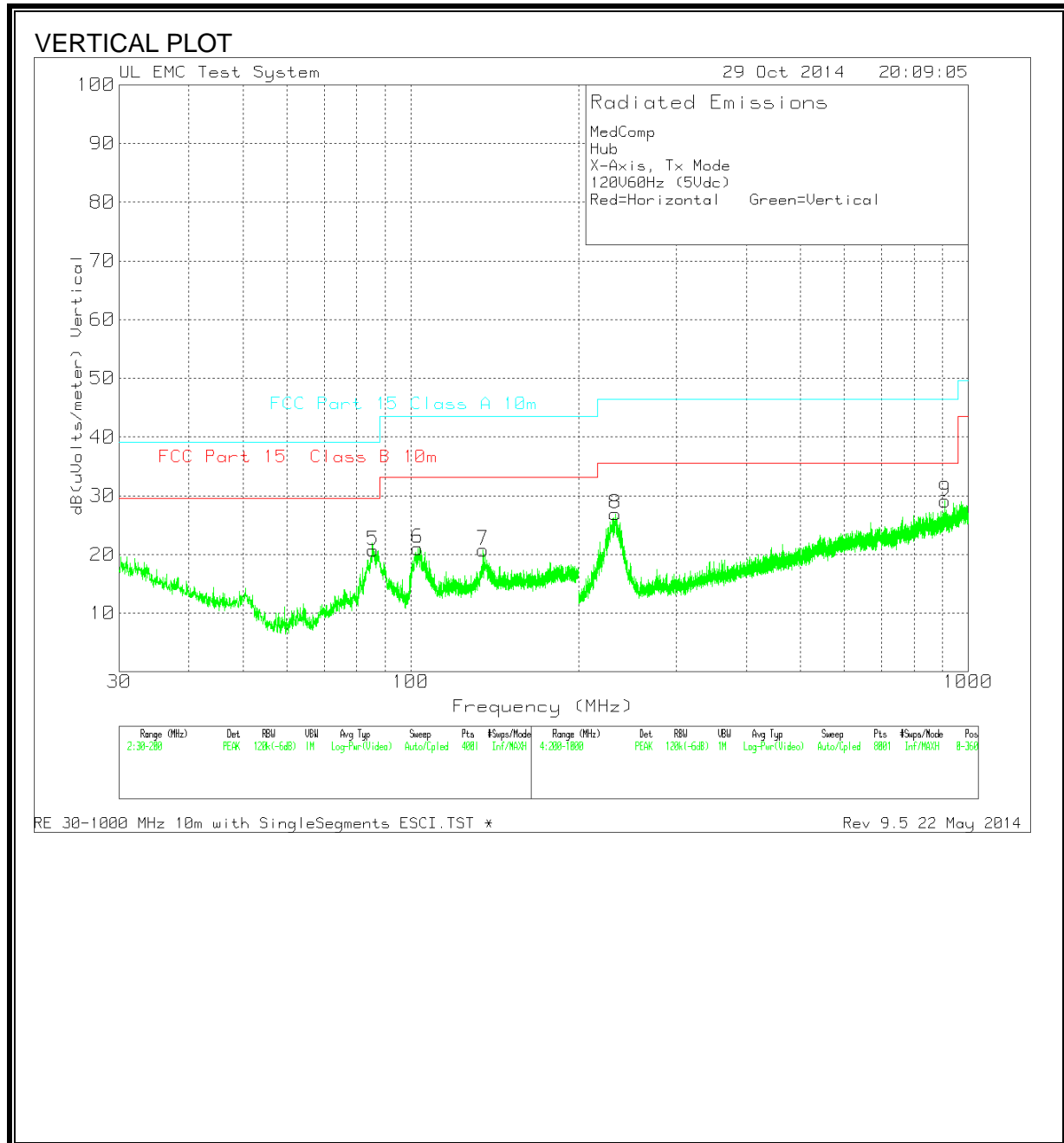
3 - AV

9.4. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



MedComp
Hub
X-Axis, Tx Mode
120V60Hz (5Vdc)
Red=Horizontal Green=Vertical

Marker No.	Test Frequency (MHz)	Corrected											
		Meter		Antenna		Reading dB(uVolts /meter)	FCC Part		FCC Part		Azimuth [Degs]	Height [cm]	Polarity
		Reading (dBuV)	Detector	Factor dB/m	Cable factor dB		15 Class A Margin (dB)	15 Class B Margin (dB)					
1	35.1	31.57	PK	15.8	-30	17.37	39.08	-21.71	29.55	-12.18	0-360	99	H
2	137.1	40.31	PK	14.2	-29.7	24.81	43.52	-18.71	33.07	-8.26	0-360	400	H
5	85.6325	42.41	PK	8.2	-29.9	20.71	39.08	-18.37	29.55	-8.84	0-360	400	V
6	102.93	39.63	PK	11.2	-29.8	21.03	43.52	-22.49	33.07	-12.04	0-360	99	V
7	134.89	36.24	PK	14.2	-29.7	20.74	43.52	-22.78	33.07	-12.33	0-360	99	V
3	232.3	46.72	PK	10.9	-26.6	31.02	46.44	-15.42	35.57	-4.55	0-360	399	H
4	465.1	35.64	PK	16.8	-25.2	27.24	46.44	-19.2	35.57	-8.33	0-360	199	H
8	233.1	42.61	PK	10.9	-26.6	26.91	46.44	-19.53	35.57	-8.66	0-360	299	V
9	909.5	30.51	PK	23.3	-24.7	29.11	46.44	-17.33	35.57	-6.46	0-360	99	V

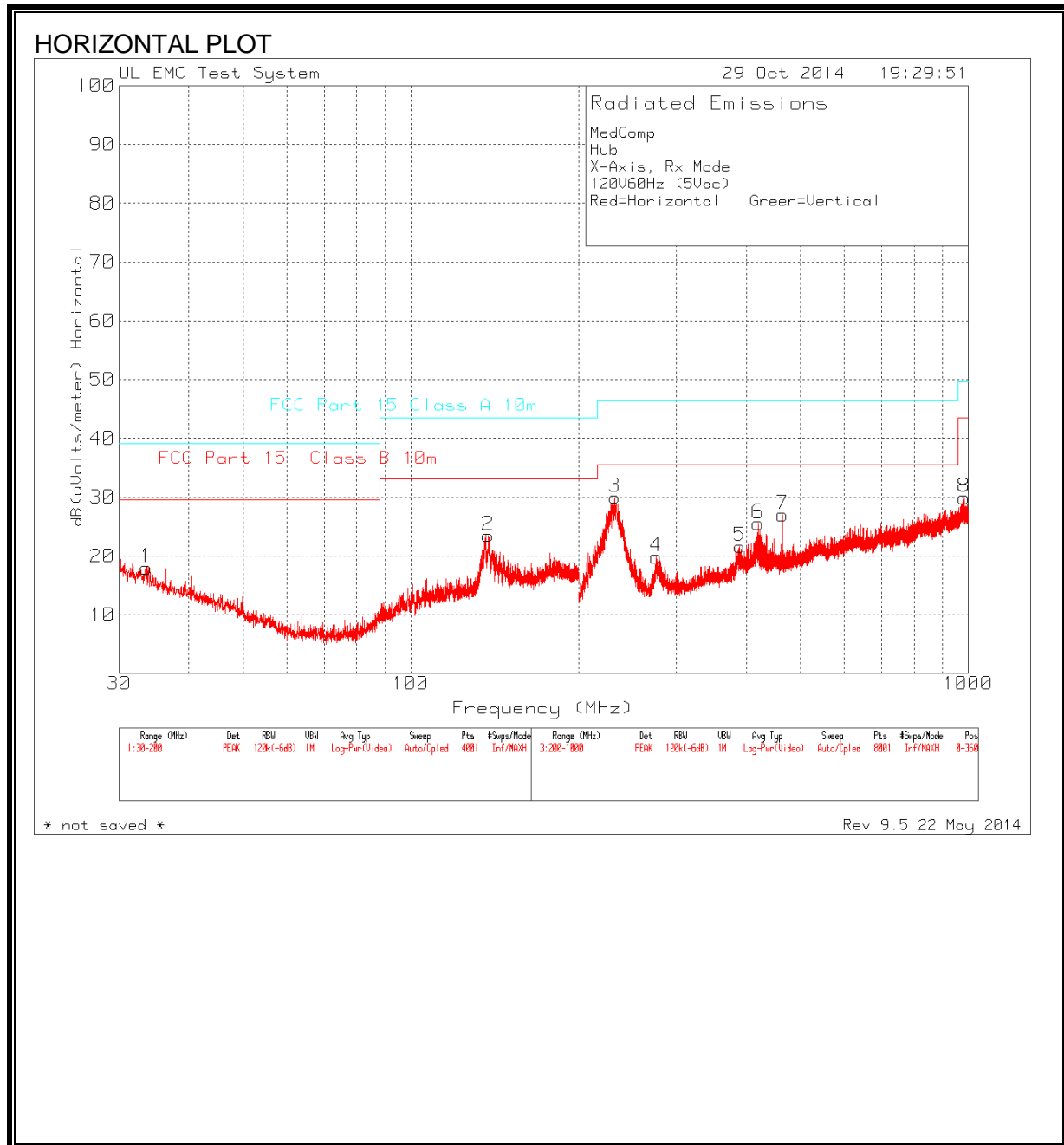
PK - Peak detector

Test	Meter		Antenna	Corrected								
	Reading	Detector		Factor	Cable	dB(uVolts	FCC Part	FCC Part				
Frequency (MHz)	Reading (dBuV)	Detector	Factor dB/m	Cable factor dB	dB(uVolts /meter)	15 Class A 10m	Margin (dB)	15 Class B 10m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
231.5631	43.36	QP	10.9	-26.6	27.66	46.44	-18.78	35.57	-7.91	151	398	H

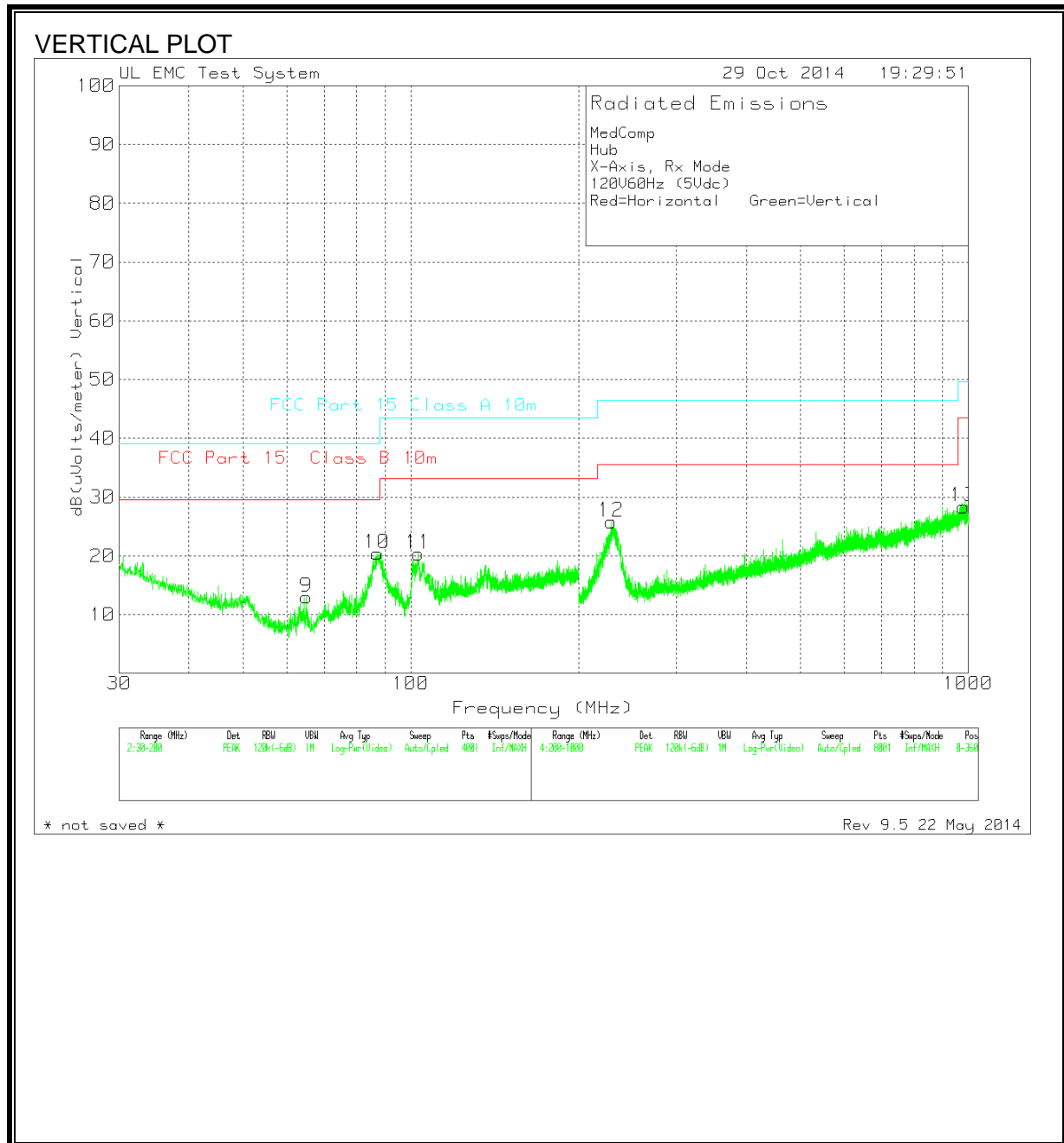
QP - Quasi-Peak detector

9.5. DIGITAL DEVICE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (DIGITAL DEVICE, HORIZONTAL)



SPURIOUS EMISSIONS 30 TO 1000 MHz (DIGITAL DEVICE, VERTICAL)



MedComp

Hub

X-Axis, Rx Mode

120V60Hz (5Vdc)

Red=Horizontal Green=Vertical

Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Cable factor dB	Corrected		FCC Part 15 Class A Margin (dB)	FCC Part 15 Class B Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
					Reading dB(uVolts /meter)	FCC Part					
1	33.57	31.69 PK	16.4	-30.1	17.99	39.08	-21.09	29.55	-11.56	0-360	99 H
2	137.652	38.89 PK	14.3	-29.7	23.49	43.52	-20.03	33.07	-9.58	0-360	400 H
9	65.02	36.69 PK	6.3	-30	12.99	39.08	-26.09	29.55	-16.56	0-360	400 V
10	87.0775	41.8 PK	8.4	-29.8	20.4	39.08	-18.68	29.55	-9.15	0-360	400 V
11	103.142	38.93 PK	11.2	-29.8	20.33	43.52	-23.19	33.07	-12.74	0-360	99 V
3	232.5	45.69 PK	10.9	-26.6	29.99	46.44	-16.45	35.57	-5.58	0-360	399 H
4	275.7	33.53 PK	12.7	-26.4	19.83	46.44	-26.61	35.57	-15.74	0-360	299 H
5	389.6	31.73 PK	15.4	-25.5	21.63	46.44	-24.81	35.57	-13.94	0-360	199 H
6	420	35.11 PK	15.8	-25.4	25.51	46.44	-20.93	35.57	-10.06	0-360	199 H
7	464.8	35.43 PK	16.8	-25.2	27.03	46.44	-19.41	35.57	-8.54	0-360	199 H
8	984.6	29.46 PK	24.2	-23.7	29.96	49.54	-19.58	43.52	-13.56	0-360	100 H
12	229	41.68 PK	10.8	-26.7	25.78	46.44	-20.66	35.57	-9.79	0-360	199 V
13	980.7	27.95 PK	24.4	-24	28.35	49.54	-21.19	43.52	-15.17	0-360	199 V

PK - Peak detector

Test Frequency (MHz)	Meter Reading (dBuV)	Antenna Factor dB/m	Cable factor dB	Corrected		FCC Part 15 Class A Margin (dB)	FCC Part 15 Class B Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
				Reading dB(uVolts /meter)	FCC Part					
232.38938	43.96 QP	10.9	-26.6	28.26	46.44	-18.18	35.57	-7.31	149	395 H

QP - Quasi-Peak detector

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 [*]	56 to 46 [*]
0.5-5	56	46
5-30	60	50

^{*} Decreases with the logarithm of the frequency.

TEST PROCEDURE

ANSI C63.4

RESULTS

6 WORST EMISSIONS

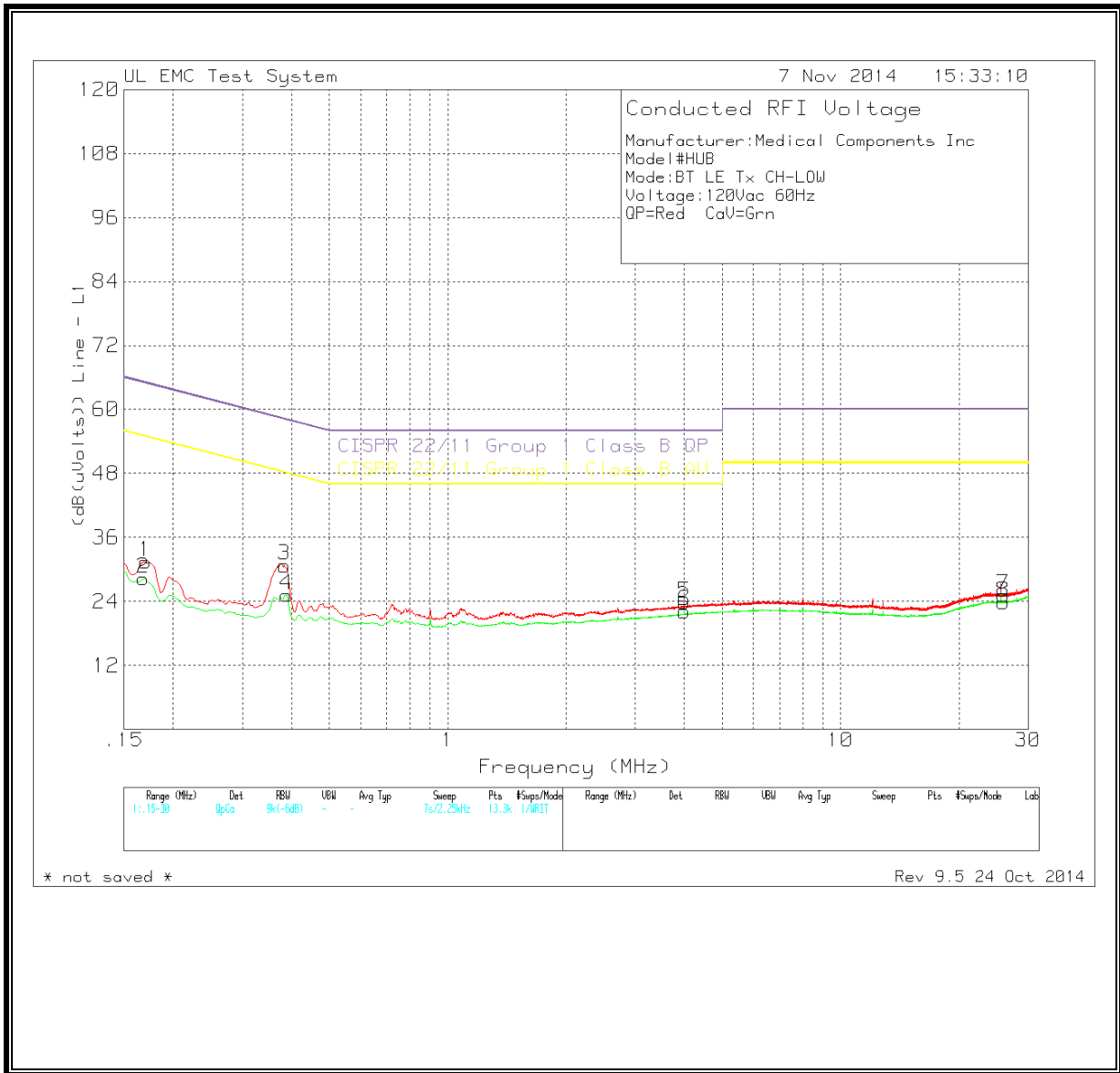
Manufacturer: Medical Components Inc
Model# HUB
Mode: BT LE Tx CH-LOW
Voltage: 120Vac 60Hz
QP=Red CaV=Grn

Trace Markers											
No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dB(uVolts))	Limit:1	2	3	4	5	6
=====											
Line - L1 .15 - 30MHz -----											
1	.17025	18.34dBuV Qp	.1	13	31.44	-	-	64.95	54.95	-	-
					Margin (dB)	-	-	-33.51	-23.51	-	-
2	.168	15.1dBuV Ca	.1	13.1	28.3	-	-	65.06	55.06	-	-
					Margin (dB)	-	-	-36.76	-26.76	-	-
3	.384	19.88dBuV Qp	.1	10.8	30.78	-	-	58.19	48.19	-	-
					Margin (dB)	-	-	-27.41	-17.41	-	-
4	.3885	14.41dBuV Ca	.1	10.7	25.21	-	-	58.1	48.1	-	-
					Margin (dB)	-	-	-32.89	-22.89	-	-
5	3.99975	12.99dBuV Qp	.1	10.7	23.79	-	-	56	46	-	-
					Margin (dB)	-	-	-32.21	-22.21	-	-
6	3.99975	11.39dBuV Ca	.1	10.7	22.19	-	-	56	46	-	-
					Margin (dB)	-	-	-33.81	-23.81	-	-
7	25.93275	13.22dBuV Qp	.3	11.7	25.22	-	-	60	50	-	-
					Margin (dB)	-	-	-34.78	-24.78	-	-
8	25.94738	11.82dBuV Ca	.3	11.7	23.82	-	-	60	50	-	-
					Margin (dB)	-	-	-36.18	-26.18	-	-
Line - L2 .15 - 30MHz -----											
9	.168	17.18dBuV Qp	.1	13.2	30.48	-	-	65.06	55.06	-	-
					Margin (dB)	-	-	-34.58	-24.58	-	-
10	.17025	14.58dBuV Ca	.1	13	27.68	-	-	64.95	54.95	-	-
					Margin (dB)	-	-	-37.27	-27.27	-	-
11	.37725	24.7dBuV Qp	.1	10.8	35.6	-	-	58.34	48.34	-	-
					Margin (dB)	-	-	-22.74	-12.74	-	-
12	.3885	19dBuV Ca	.1	10.8	29.9	-	-	58.1	48.1	-	-
					Margin (dB)	-	-	-28.2	-18.2	-	-
13	4.86375	12.53dBuV Qp	.1	10.8	23.43	-	-	56	46	-	-
					Margin (dB)	-	-	-32.57	-22.57	-	-
14	4.86375	11.07dBuV Ca	.1	10.8	21.97	-	-	56	46	-	-
					Margin (dB)	-	-	-34.03	-24.03	-	-
15	28.33125	13.44dBuV Qp	.3	11.9	25.64	-	-	60	50	-	-
					Margin (dB)	-	-	-34.36	-24.36	-	-
16	28.30875	12.04dBuV Ca	.3	11.9	24.24	-	-	60	50	-	-
					Margin (dB)	-	-	-35.76	-25.76	-	-

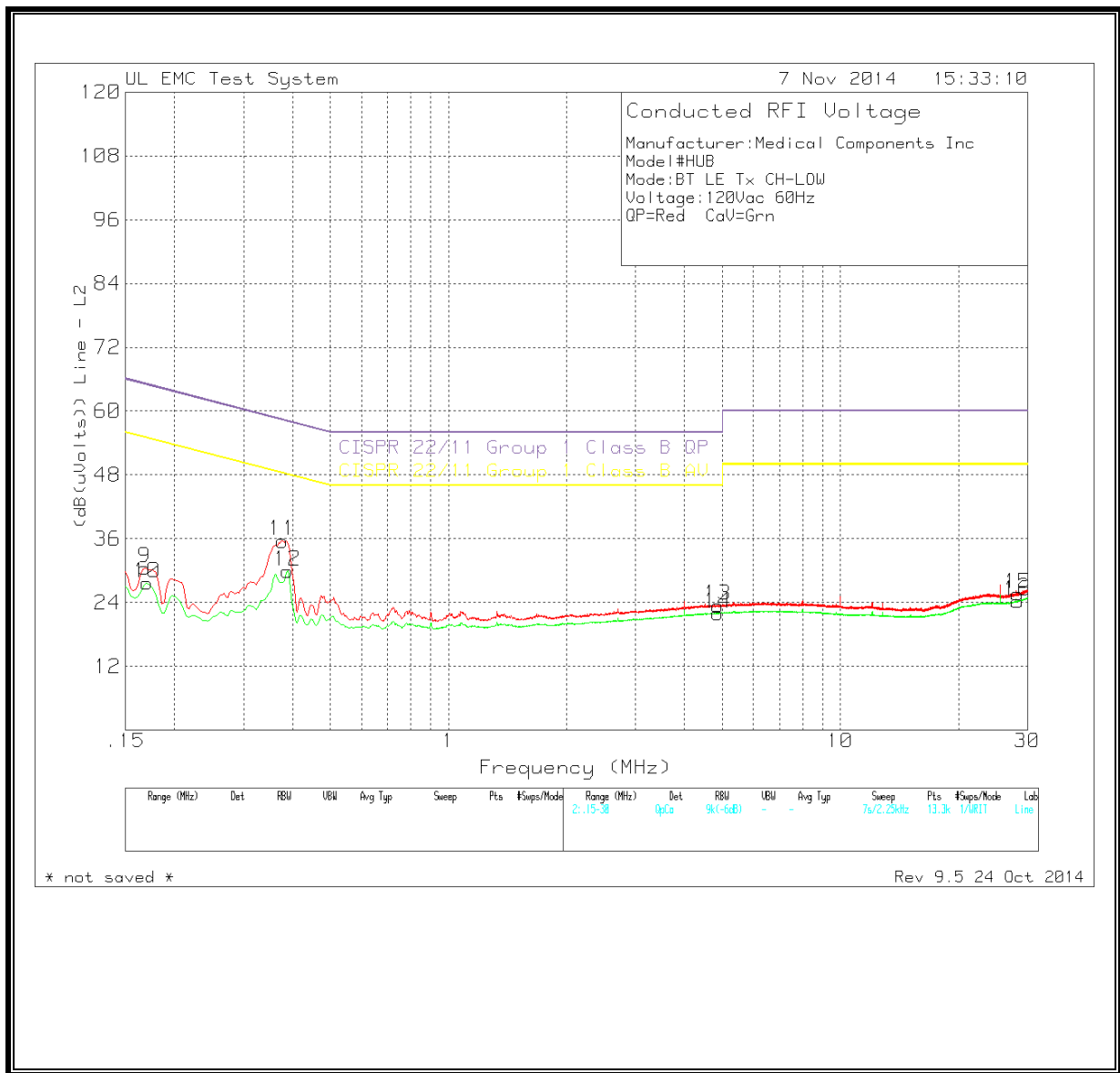
LIMIT 3: CISPR 22/11 Group 1 Class B QP
LIMIT 4: CISPR 22/11 Group 1 Class B AV

Qp - Quasi-Peak detector
Ca - CISPR Average detection

LINE 1 RESULTS



LINE 2 RESULTS



11. RF EXPOSURE

FCC Part 15

Per KDB 447498 section 4.3.1 #(1), exclusion calculation for 2.45GHz at 5mm separation at 1-g SAR.

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR}$$

$$[(0.2\text{mW})/(5\text{mm})] \cdot \sqrt{2.54\text{GHz}} = 0.064 < 3.0 \text{ therefore SAR is excluded}$$