FCC PART 15 SUBPART B and C
TEST REPORT

for

W1 SENSOR

MODEL: A03

Prepared for

CONTREAL, LLC
103 AMIABLE LOOP
CARY, NORTH CAROLINA 27519

Prepared by:_____

KYLE FUJIMOTO

Approved by:_____

JAMES ROSS

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
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DATE: AUGUST 24, 2012

	REPORT	APPENDICES					TOTAL
	BODY	***A***	***B***	***C***	***D***	***E***	
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GENERAL REPORT SUMMARY

Compatible Electronics Inc. generates this electromagnetic emission test report, which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Device Tested:	W1 Sensor Model: A03
Product Description:	See Expository Statement
Modifications:	The EUT was modified in order to meet the specifications. Please see the list located in Appendix B.
Customer:	Contreal, LLC 103 Amiable Loop Cary, North Carolina 27519
Test Date(s):	August 22, 2012
Test Specifications:	Emissions requirements CFR Title 47, Part 15, Subpart B and Subpart C, Sections 15.205, 15.209, and 15.231
Test Procedure:	ANSI C63.4
Test Deviations:	The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions 150 kHz to 30 MHz	This test was not performed because the EUT operates on battery power only and cannot be plugged into the AC public mains.
2	Radiated RF Emissions 10 kHz to 4400MHz (Transmitter and Digital Portion)	Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the W1 Sensor, Model: A03. The Emissions measurements were performed according to the measurement procedure described in ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B for the digital portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.231 for the transmitter portion.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The Emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Contreal, LLC

Ritu Jain President

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer
James Ross Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the date of testing.

2.5 Disposition of the Test Sample

The test sample has not yet been returned as of the date of this report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

FCC	Federal Communications Commission
RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
ITE	Information Technology Equipment
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
N/A	Not Applicable
Ltd.	Limited
Inc.	Incorporated
NCR	No Calibration Required
R&D	Research and Development
Rx	Receive / Receiver
Tx	Transmit / Transmitter

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this Emissions Test Report.

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4: 2009	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The W1 Sensor, Model: A03 (EUT) was tested as a stand alone unit. The EUT was continuously transmitting. The EUT was tested in three orthogonal axis.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The final emissions data was taken in this mode of operation and any cables were maximized. All initial investigations were performed with the measurement receiver in manual mode scanning the frequency range continuously. Photographs of the test setup are in Appendix D of this report.

4.1.1 Cable Construction and Termination

There were no external cables connected to the EUT.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
W1 SENSOR (EUT)	CONTREAL, LLC	A03	N/A	ZA2A03

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS					
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8568B	2517A01563	May 30, 2012	May 30, 2013
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	2648A15285	May 30, 2012	May 30, 2013
Quasi-Peak Adapter	Hewlett Packard	85650A	2430A00424	May 30, 2012	May 30, 2013
EMI Receiver	Rohde & Schwarz	ESIB40	100194	November 19, 2010	November 19, 2012
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
RF RADIATED EMISSIONS TEST EQUIPMENT					
Loop Antenna	Com-Power	AL-130	17089	January 21, 2011	January 21, 2013
Biconical Antenna	Com Power	AB-900	43028	May 24, 2012	May 24, 2013
Log Periodic Antenna	Com Power	AL-100	16252	May 24, 2012	May 24, 2013
Horn Antenna	Com-Power	AH-118	071175	February 29, 2012	March 1, 2014
Preamplifier	Com-Power	PA-102	1017	December 28, 2011	December 28, 2012
Microwave Preamplifier	Com-Power	PA-118	181656	December 28, 2011	December 28, 2012
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for Emissions test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The measurement receiver was used as a measuring meter. The data was collected with the measurement receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A transient limiter was used for the protection of the measurement receiver's input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the measurement receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

Test Results:

This test was not performed because the EUT operates on battery power only and cannot be plugged into the AC public mains.

7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer, along with the quasi-peak adapter, and EMI Receiver were used as a measuring meter. Amplifiers were used to increase the sensitivity of the instrument. The Com-Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz and the Com-Power Microwave Preamplifier Model: PA-118 was used for frequencies above 1 GHz. The spectrum analyzer and EMI Receiver were used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer and EMI receiver records the highest measured reading over the sweeps.

The quasi-peak function was used only for those readings which are marked accordingly on the data sheets.

The fundamental, 2nd harmonic, and frequencies above 1 GHz were adjusted by a "duty cycle correction factor", derived from 20 log (dwell time / 100 ms).

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
10 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 4.4 GHz	1 MHz	Horn Antennas

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT by the Radiated Emission Manual Test software. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gun sight method was used when measuring with the horn antenna in order to ensure accurate results. The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.

Radiated Emissions (Spurious and Harmonics) Test (continued)

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3-meter test to obtain the final test data.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15, Subpart C, Sections 15.205, 15.209 and 15.231.

7.1.3 RF Emissions Test Results

Table 1.0 RADIATED EMISSION RESULTS
W1 Sensor, Model: A03

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
433.92 (H) (X-Axis)	80.4971 (A)	80.82	-0.3229
433.92 (V) (Z-Axis)	78.1971 (A)	80.82	-2.6229
3905.3 (H) (X-Axis)	50.6271 (A)	54.00	-3.3729
3905.3 (V) (Z-Axis)	50.2271 (A)	54.00	-3.7729
4339.2 (H) (X-Axis)	49.1571 (A)	54.00	-4.8429
433.92 (H) (Y-Axis)	76.0971 (A)	80.82	-4.7229

Notes:

*	The complete emissions data is given in Appendix E of this report.
A	Average Reading
V	Vertical
H	Horizontal

7.2 Bandwidth of the Fundamental

The -20 dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the EUT. Plots of the -20 dB bandwidth are located in Appendix E.

Test Results:

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.231 (c) for the -20 dB bandwidth of the fundamental. The EUT has a -20dB bandwidth that is less than 0.25% of frequency of the fundamental.

7.3 Transmission Times

The EUT checked to see that the transmission would cease within 5 seconds of activation. Plots of the transmission are located in Appendix E.

Test Results:

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.231 (a) (2) in that the EUT automatically shall cease transmission within 5 seconds of activation.

8. CONCLUSIONS

The W1 Sensor, Model: A03 (EUT), as tested, meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B for the digital portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.231 for the transmitter portion.

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP LAB CODES 200063-0, 200528-0, 200527-0

For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025. Please follow the link to the NIST/NVLAP site for each of our facilities' NVLAP certificate and scope of accreditation

NVLAP listing links

Agoura Division / **Brea Division** / **Silverado/Lake Forest Division**

.Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfillment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

ANSI listing CETCB

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for EMC under the US/EU Mutual Recognition Agreement (MRA).
US/EU MRA list NIST MRA site

Compatible Electronics has been nominated as a Conformity Assessment Body (CAB) for Taiwan/BSMI under the US/APEC (Asia-Pacific Economic Cooperation) Mutual Recognition Agreement (MRA).
APEC MRA list NIST MRA site

We are also listed for IT products by the following country/agency:

VCCI Support member: Please visit http://www.vcci.jp/vcci_e/

FCC Listing, from FCC OET site
FCC test lab search https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm

Industry Canada / Industrie Canada Compatible Electronics IC listing can be found at:
http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 and/or FCC **Class B** specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

1. Change the resistor at R1 to 200 ohms.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST W1 Sensor
Model: A03

ALSO APPROVED UNDER THIS REPORT:

1. A03D
2. A03M

The A03D is similar to the A03 except the PIR sensing component will not be populated per the manufacturer .
The A03M is similar to the A03 except the magnetic sensor will not be populated per the manufacturer.

APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

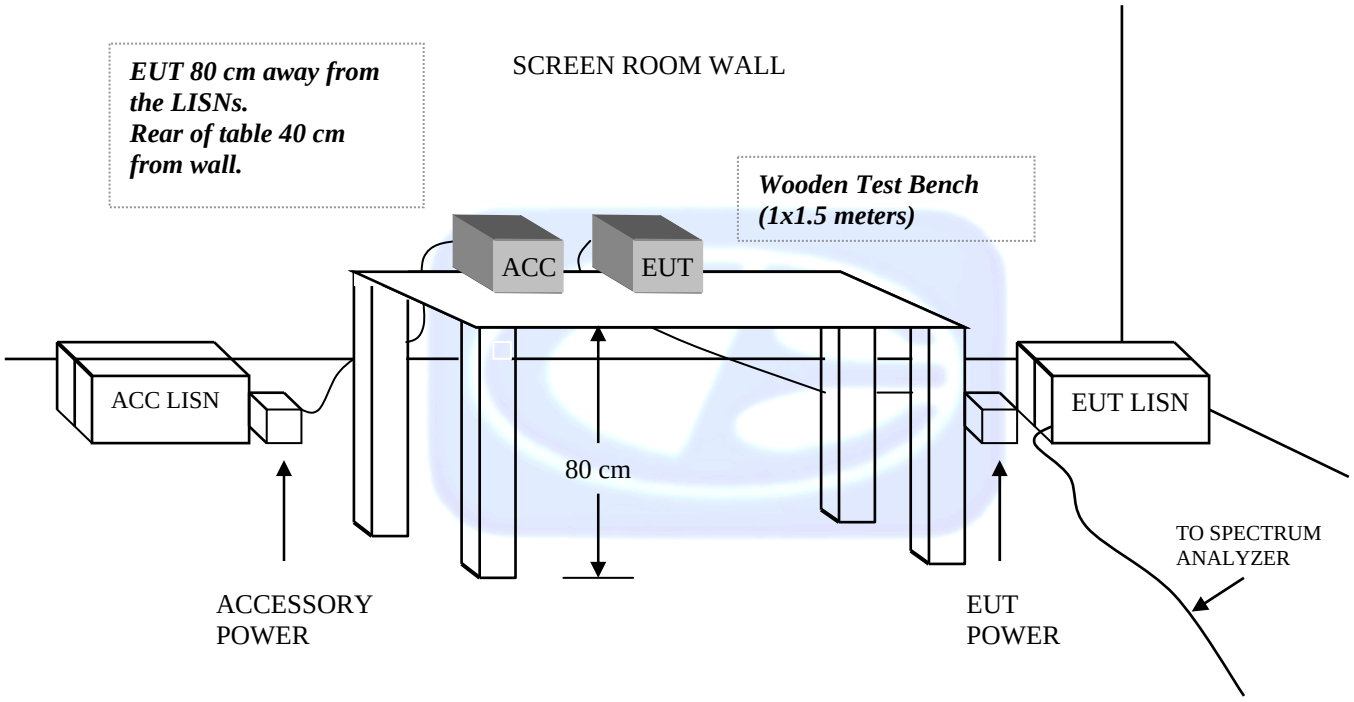
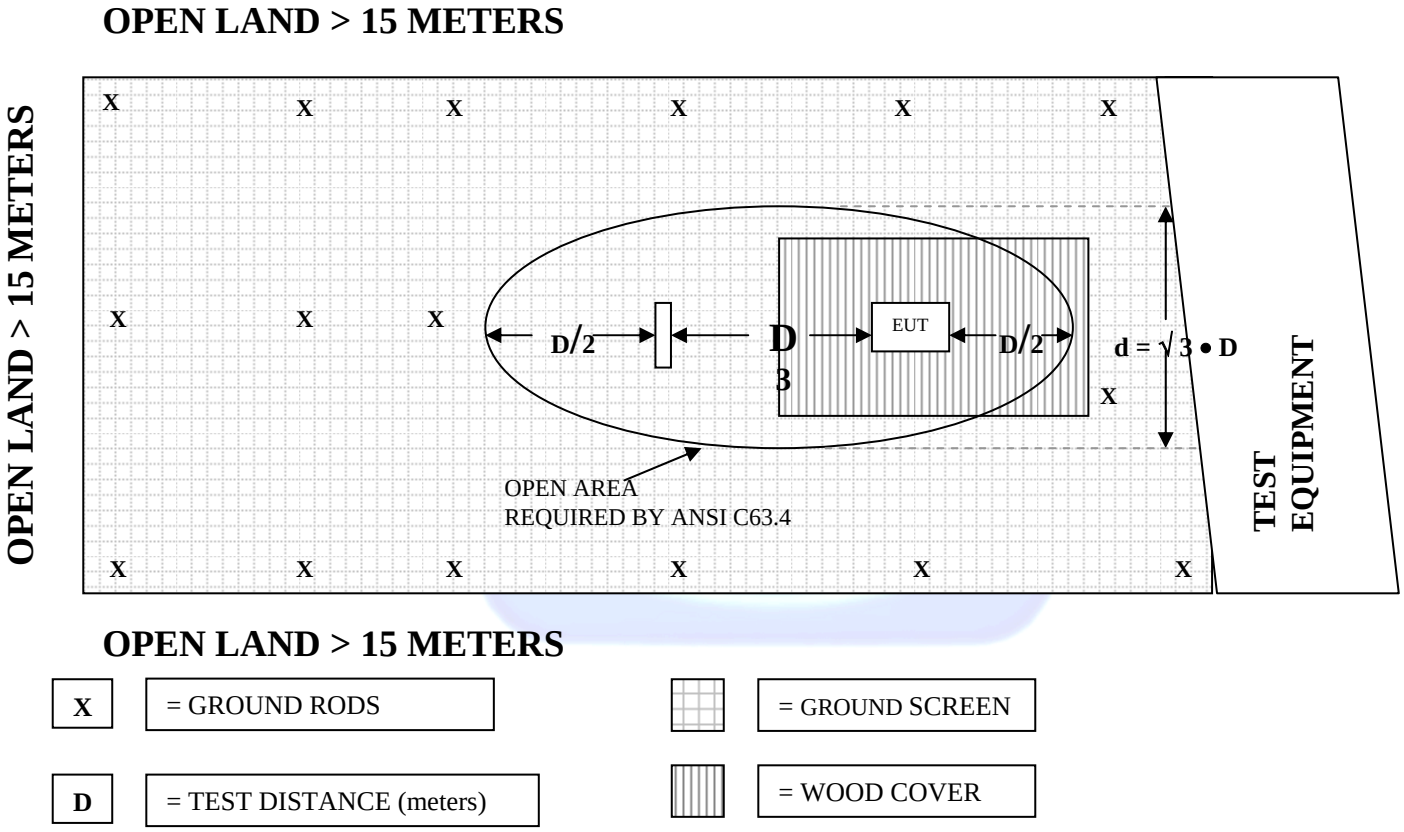


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE – 3 METERS



COM-POWER AL-130

LOOP ANTENNA

S/N: 17089

CALIBRATION DATE: JANUARY 21, 2011

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-41.9	9.6
0.01	-41.79	9.71
0.02	-41.43	10.07
0.05	-41.53	9.97
0.07	-41.47	10.03
0.1	-41.44	10.06
0.2	-41.61	9.89
0.3	-41.62	9.88
0.5	-41.66	9.84
0.7	-41.48	10.02
1	-41.13	10.37
2	-40.89	10.61
3	-41.00	10.50
4	-41.14	10.36
5	-41.02	10.48
10	-40.69	10.82
15	-40.41	11.09
20	-41.07	10.43
25	-42.10	9.40
30	-41.15	10.35

COM-POWER AB-900

BICONICAL ANTENNA

S/N: 43028

CALIBRATION DATE: MAY 24, 2012

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	11.80	120	13.20
35	11.20	125	13.30
40	11.90	140	11.60
45	10.70	150	11.80
50	11.40	160	12.70
60	10.30	175	14.80
70	7.60	180	15.70
80	5.70	200	15.80
90	7.90	250	14.80
100	10.7	300	19.80

COM-POWER AL-100

LOG PERIODIC ANTENNA

S/N: 16252

CALIBRATION DATE: MAY 24, 2012

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
300	13.00	700	20.30
350	13.20	750	20.80
400	14.50	800	21.00
450	15.40	850	23.70
500	15.80	900	21.70
550	16.60	950	24.20
600	18.90	1000	24.30
650	19.10		

COM POWER AH-118

HORN ANTENNA

S/N: 071175

CALIBRATION DATE: FEBRUARY 29, 2012

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.6	10.0	37.7
1.5	22.0	10.5	38.4
2.0	28.7	11.0	38.0
2.5	29.3	11.5	38.2
3.0	30.6	12.0	39.0
3.5	30.4	12.5	42.4
4.0	31.1	13.0	40.8
4.5	33.4	13.5	40.0
5.0	35.3	14.0	39.7
5.5	35.1	14.5	43.5
6.0	36.9	15.0	42.7
6.5	37.4	15.5	39.7
7.0	37.6	16.0	39.2
7.5	36.2	16.5	39.7
8.0	38.4	17.0	42.2
8.5	39.3	17.5	47.6
9.0	37.4	18.0	51.2
9.5	38.0		

COM-POWER PA-102

PREAMPLIFIER

S/N: 1017

CALIBRATION DATE: DECEMBER 28, 2011

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	38.54	300	38.45
40	38.53	350	38.47
50	38.57	400	38.36
60	38.54	450	38.07
70	38.54	500	38.31
80	38.54	550	38.37
90	38.54	600	38.28
100	38.53	650	38.19
125	38.51	700	38.24
150	38.43	750	37.88
175	38.56	800	37.94
200	38.50	850	37.65
225	38.46	900	37.50
250	38.57	950	37.47
275	38.45	1000	36.86

COM-POWER PA-118

PREAMPLIFIER

S/N: 181656

CALIBRATION DATE: DECEMBER 28, 2011

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.22	10.0	24.66
1.5	26.31	10.5	25.22
2.0	27.40	11.0	25.17
2.5	26.52	11.5	24.47
3.0	27.35	12.0	25.29
3.5	29.02	12.5	26.03
4.0	28.51	13.0	24.11
4.5	26.62	13.5	24.28
5.0	27.13	14.0	25.81
5.5	27.29	14.5	25.45
6.0	26.72	15.0	25.36
6.5	25.62	15.5	26.76
7.0	25.25	16.0	28.09
7.5	24.23	16.5	23.23
8.0	23.72	17.0	26.58
8.5	24.91	17.5	27.45
9.0	25.73	18.0	27.53
9.5	24.79		

FRONT VIEW

CONTREAL, LLC
W1 SENSOR
MODEL: A03
FCC SUBPART B AND C – RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

CONTREAL, LLC
W1 SENSOR
MODEL: A03
FCC SUBPART B AND C – RADIATED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

DATA SHEETS

RADIATED EMISSIONS

DATA SHEETS

FCC 15.231

Contreal, LLC
W1 Sensor
Model: A03

Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

X-Axis
Transmit Mode
Duty Cycle: 52.705%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	76.56	V	100.82	-24.26	Peak	1.25	135	
433.92	70.9971	V	80.82	-9.8229	Avg	1.25	135	
867.84	50.82	V	80.82	-30	Peak	1.08	125	
867.84	45.2571	V	60.82	-15.563	Avg	1.08	125	
1301.76	45.76	V	74	-28.24	Peak	1	180	
1301.76	40.1971	V	54	-13.803	Avg	1	180	
1735.68	47.24	V	80.82	-33.58	Peak	1	135	
1735.68	41.6771	V	60.82	-19.143	Avg	1	135	
2169.6	51.31	V	80.82	-29.51	Peak	1	180	
2169.6	45.7471	V	60.82	-15.073	Avg	1	180	
2603.5	58.74	V	80.82	-22.08	Peak	1	90	
2603.5	53.1771	V	60.82	-7.6429	Avg	1	90	
3037.4	56.69	V	80.82	-24.13	Peak	1	225	
3037.4	51.1271	V	60.82	-9.6929	Avg	1	225	
3471.3	52.38	V	80.82	-28.44	Peak	1	135	
3471.3	46.8171	V	60.82	-14.003	Avg	1	135	
3905.3	49.41	V	74	-24.59	Peak	1.1	315	
3905.3	43.8471	V	54	-10.153	Avg	1.1	315	
4339.2	48.21	V	74	-25.79	Peak	1.2	225	
4339.2	42.6471	V	54	-11.353	Avg	1.2	225	

FCC 15.231

Contreal, LLC
W1 Sensor
Model: A03

Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

X-Axis
Transmit Mode
Duty Cycle: 52.705%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	86.06	H	100.82	-14.76	Peak	1	135	
433.92	80.4971	H	80.82	-0.3229	Avg	1	135	
867.84	56.62	H	80.82	-24.2	Peak	1	45	
867.84	51.0571	H	60.82	-9.7629	Avg	1	45	
1301.76	42.73	H	74	-31.27	Peak	1.5	45	
1301.76	37.1671	H	54	-16.833	Avg	1.5	45	
1735.68	41.98	H	80.82	-38.84	Peak	1	135	
1735.68	36.4171	H	60.82	-24.403	Avg	1	135	
2169.6	43.31	H	80.82	-37.51	Peak	1	150	
2169.6	37.7471	H	60.82	-23.073	Avg	1	150	
2603.5	54.86	H	80.82	-25.96	Peak	1	125	
2603.5	49.2971	H	60.82	-11.523	Avg	1	125	
3037.4	53.02	H	80.82	-27.8	Peak	1	150	
3037.4	47.4571	H	60.82	-13.363	Avg	1	150	
3471.3	40.91	H	80.82	-39.91	Peak	1	135	
3471.3	35.3471	H	60.82	-25.473	Avg	1	135	
3905.3	56.19	H	74	-17.81	Peak	1	150	
3905.3	50.6271	H	54	-3.3729	Avg	1	150	
4339.2	54.72	H	74	-19.28	Peak	1.25	180	
4339.2	49.1571	H	54	-4.8429	Avg	1.25	180	

FCC 15.231

Contreal, LLC
W1 Sensor
Model: A03

Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

Y-Axis
Transmit Mode
Duty Cycle: 52.705%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	80.96	V	100.82	-19.86	Peak	1	135	
433.92	75.3971	V	80.82	-5.4229	Avg	1	135	
867.84	54.32	V	80.82	-26.5	Peak	1	45	
867.84	48.7571	V	60.82	-12.063	Avg	1	45	
1301.76	40.55	V	74	-33.45	Peak	2.05	135	
1301.76	34.9871	V	54	-19.013	Avg	2.05	135	
1735.68	40.32	V	80.82	-40.5	Peak	1.57	45	
1735.68	34.7571	V	60.82	-26.063	Avg	1.57	45	
2169.6	42.66	V	80.82	-38.16	Peak	2.25	135	
2169.6	37.0971	V	60.82	-23.723	Avg	2.25	135	
2603.5	52.55	V	80.82	-28.27	Peak	1.56	135	
2603.5	46.9871	V	60.82	-13.833	Avg	1.56	135	
3037.4	51.35	V	80.82	-29.47	Peak	2.16	135	
3037.4	45.7871	V	60.82	-15.033	Avg	2.16	135	
3471.3	42.15	V	80.82	-38.67	Peak	1.31	135	
3471.3	36.5871	V	60.82	-24.233	Avg	1.31	135	
3905.3	53.86	V	74	-20.14	Peak	1.14	135	
3905.3	48.2971	V	54	-5.7029	Avg	1.14	135	
4339.2	48.51	V	74	-25.49	Peak	1.96	135	
4339.2	42.9471	V	54	-11.053	Avg	1.96	135	

FCC 15.231

Contreal, LLC
W1 Sensor
Model: A03

Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

Y-Axis
Transmit Mode
Duty Cycle: 52.705%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	81.66	H	100.82	-19.16	Peak	1	180	
433.92	76.0971	H	80.82	-4.7229	Avg	1	180	
867.84	55.22	H	80.82	-25.6	Peak	1	315	
867.84	49.6571	H	60.82	-11.163	Avg	1	315	
1301.76	43.04	H	74	-30.96	Peak	1.22	315	
1301.76	37.4771	H	54	-16.523	Avg	1.22	315	
1735.68	42.28	H	80.82	-38.54	Peak	1.55	315	
1735.68	36.7171	H	60.82	-24.103	Avg	1.55	315	
2169.6	44.81	H	80.82	-36.01	Peak	1	180	
2169.6	39.2471	H	60.82	-21.573	Avg	1	180	
2603.5	43.41	H	80.82	-37.41	Peak	1.26	225	
2603.5	37.8471	H	60.82	-22.973	Avg	1.26	225	
3037.4	54.03	H	80.82	-26.79	Peak	1.15	215	
3037.4	48.4671	H	60.82	-12.353	Avg	1.15	215	
3471.3	41.93	H	80.82	-38.89	Peak	1.35	225	
3471.3	36.3671	H	60.82	-24.453	Avg	1.35	225	
3905.3	50.42	H	74	-23.58	Peak	1.35	315	
3905.3	44.8571	H	54	-9.1429	Avg	1.35	315	
4339.2	49.56	H	74	-24.44	Peak	1.15	225	
4339.2	43.9971	H	54	-10.003	Avg	1.15	225	

FCC 15.231

Contreal, LLC
W1 Sensor
Model: A03

Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

Z-Axis
Transmit Mode
Duty Cycle: 52.705%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	83.76	V	100.82	-17.06	Peak	1	135	
433.92	78.1971	V	80.82	-2.6229	Avg	1	135	
867.84	55.92	V	80.82	-24.9	Peak	2	225	
867.84	50.3571	V	60.82	-10.463	Avg	2	225	
1301.76	42.72	V	74	-31.28	Peak	1.81	180	
1301.76	37.1571	V	54	-16.843	Avg	1.81	180	
1735.68	44.92	V	80.82	-35.9	Peak	1.59	135	
1735.68	39.3571	V	60.82	-21.463	Avg	1.59	135	
2169.6	44.24	V	80.82	-36.58	Peak	1.89	155	
2169.6	38.6771	V	60.82	-22.143	Avg	1.89	155	
2603.5	55.88	V	80.82	-24.94	Peak	1.69	135	
2603.5	50.3171	V	60.82	-10.503	Avg	1.69	135	
3037.4	51.68	V	80.82	-29.14	Peak	1.59	135	
3037.4	46.1171	V	60.82	-14.703	Avg	1.59	135	
3471.3	42.33	V	80.82	-38.49	Peak	1.22	135	
3471.3	36.7671	V	60.82	-24.053	Avg	1.22	135	
3905.3	55.79	V	74	-18.21	Peak	1.98	225	
3905.3	50.2271	V	54	-3.7729	Avg	1.98	225	
4339.2	50.76	V	74	-23.24	Peak	1.61	135	
4339.2	45.1971	V	54	-8.8029	Avg	1.61	135	

FCC 15.231

Contreal, LLC
W1 Sensor
Model: A03

Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

Z-Axis
Transmit Mode
Duty Cycle: 52.705%

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	78.16	H	100.82	-22.66	Peak	1	135	
433.92	72.5971	H	80.82	-8.2229	Avg	1	135	
867.84	44.72	H	80.82	-36.1	Peak	1	45	
867.84	39.1571	H	60.82	-21.663	Avg	1	45	
1301.76	42.39	H	74	-31.61	Peak	1.25	45	
1301.76	36.8271	H	54	-17.173	Avg	1.25	45	
1735.68	41.78	H	80.82	-39.04	Peak	2.25	315	
1735.68	36.2171	H	60.82	-24.603	Avg	2.25	315	
2169.6	42.11	H	80.82	-38.71	Peak	1.25	180	
2169.6	36.5471	H	60.82	-24.273	Avg	1.25	180	
2603.5	50.31	H	80.82	-30.51	Peak	1.22	125	
2603.5	44.7471	H	60.82	-16.073	Avg	1.22	125	
3037.4	48.52	H	80.82	-32.3	Peak	1.23	150	
3037.4	42.9571	H	60.82	-17.863	Avg	1.23	150	
3471.3	41.64	H	80.82	-39.18	Peak	1.98	135	
3471.3	36.0771	H	60.82	-24.743	Avg	1.98	135	
3905.3	48.45	H	74	-25.55	Peak	1.25	315	
3905.3	42.8871	H	54	-11.113	Avg	1.25	315	
4339.2	50.22	H	74	-23.78	Peak	1.36	125	
4339.2	44.6571	H	54	-9.3429	Avg	1.36	125	

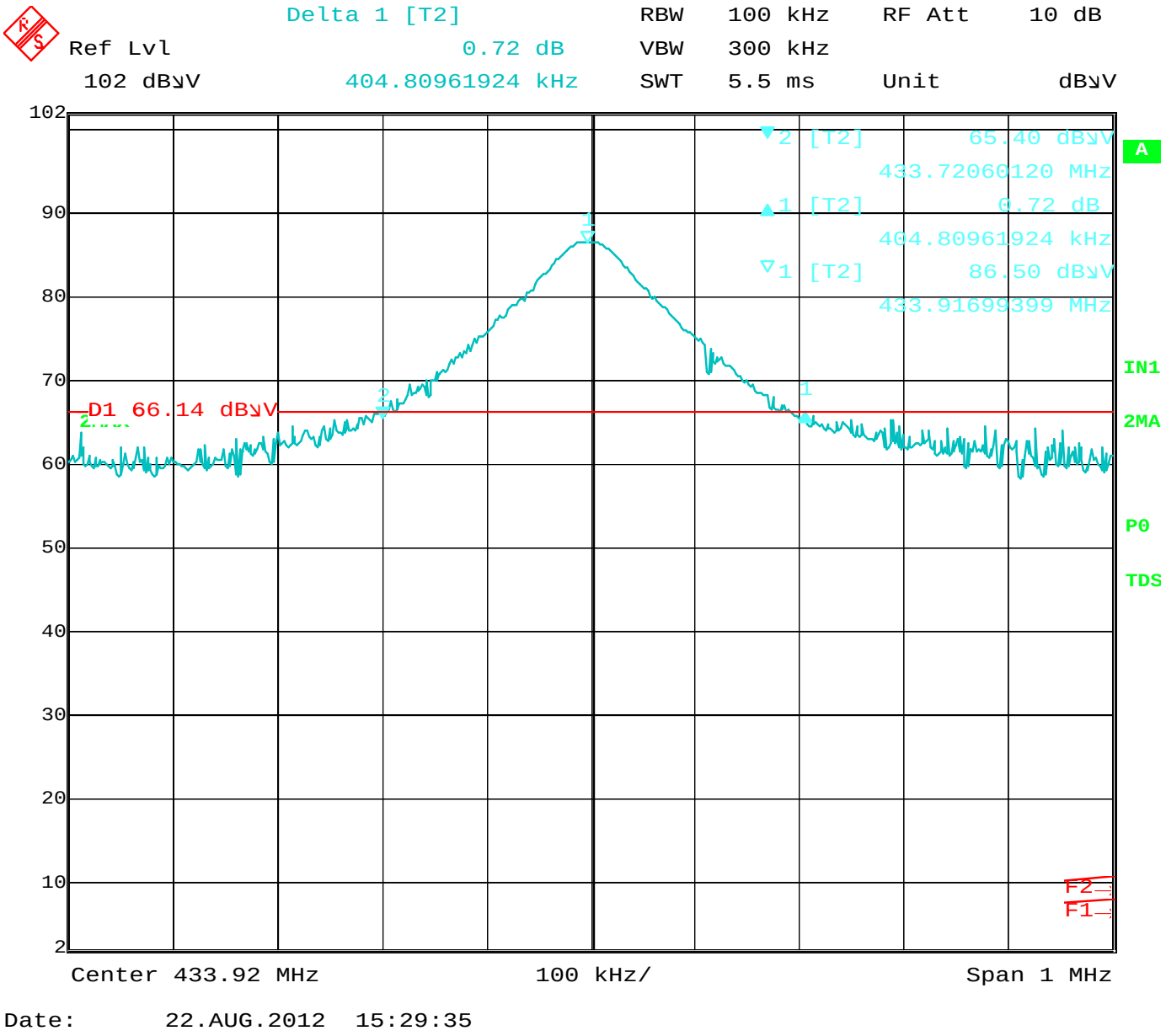
FCC 15.231 and FCC Class B

Contreal, LLC
W1 Sensor
Model: A03

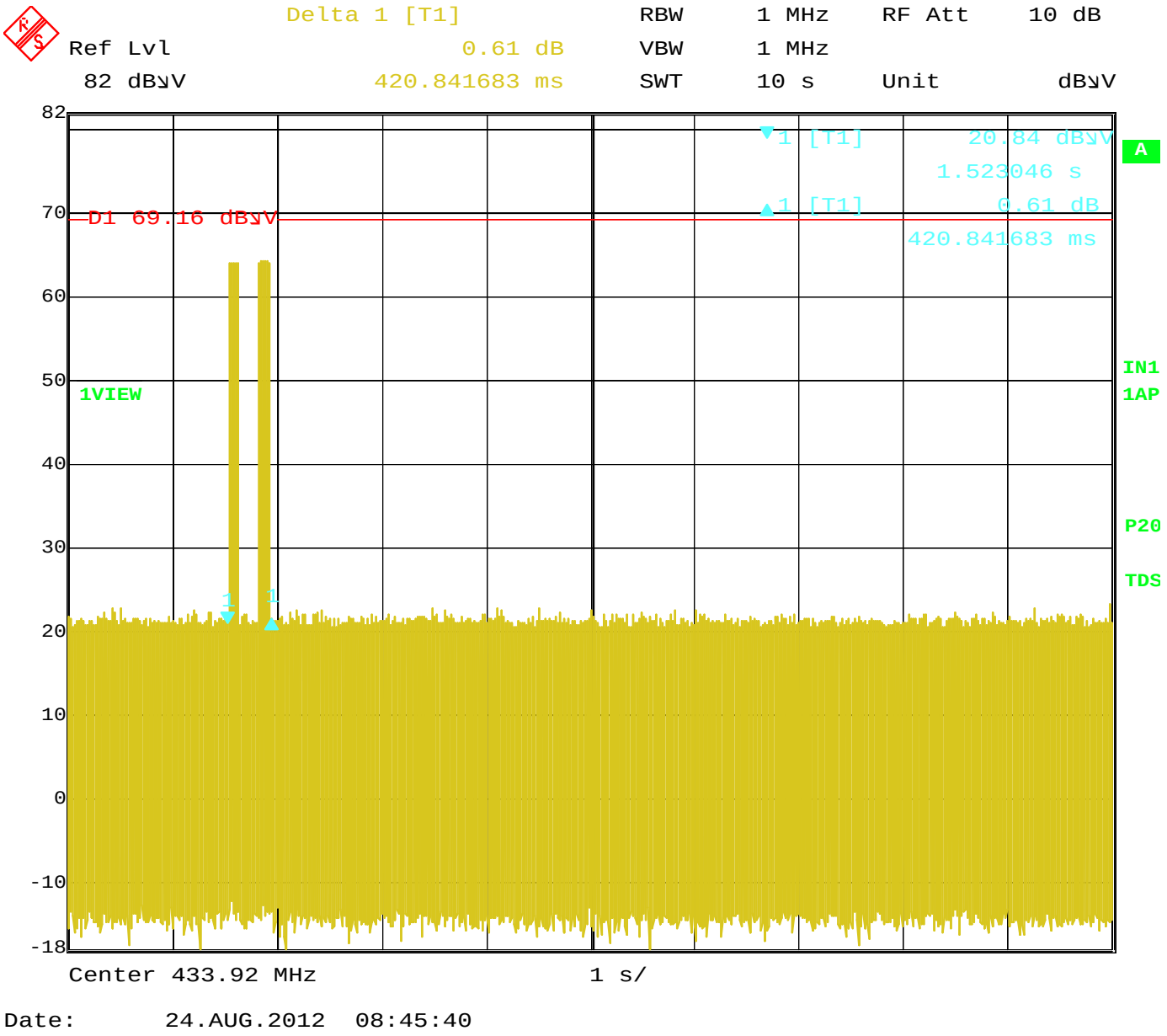
Date: 08/22/2012
Labs: B and D
Tested By: Kyle Fujimoto

10 kHz to 4400 MHz
Digital Portion and non Harmonic Emissions of the Transmitter
Vertical and Horizontal Polarizations

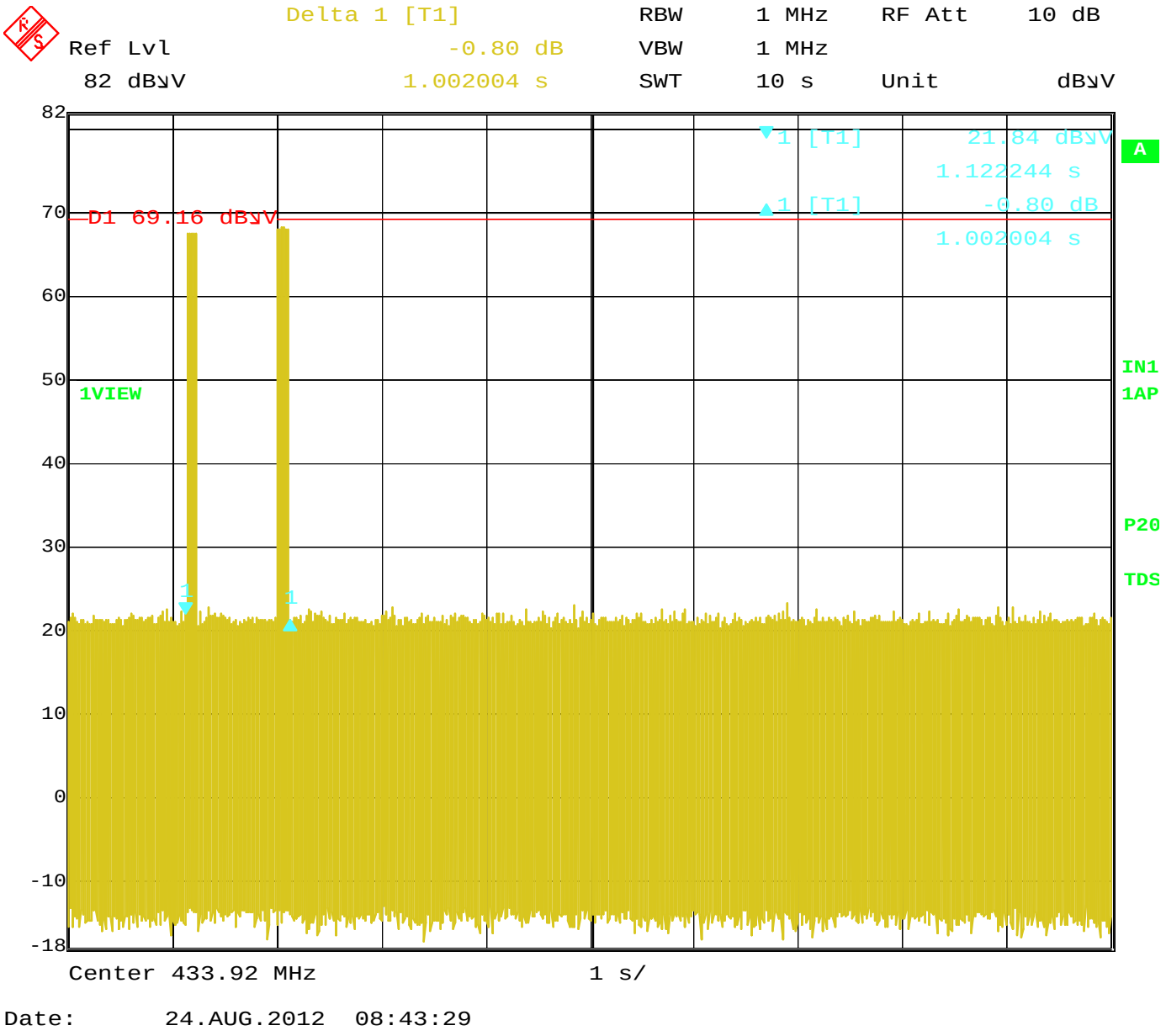
Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
								No Emissions from the
								EUT for the Digital Portion
								No Emissions from the EUT
								for the non-Harmonic Emissions
								of the Transmitter
								Tested in the X-Axis, Y-Axis,
								and Z-Axis



-20 dB Bandwidth of the Fundamental



Plot Showing the EUT turns off within 5 seconds of being activated



Plot of the A03D showing it turns off within 5 seconds of being activated