

**FCC PART 15 SUBPART B and C
TEST REPORT***for***TRANSMITTER****MODEL: AC-TXM**

Prepared for

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DATE: SEPTEMBER 7, 2012

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	
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1	Conducted Emissions Test Setup
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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: Transmitter
Model: AC-TXM
S/N: N/A

Product Description: See Expository Statement

Modifications: The EUT was not modified in order to meet the specifications.

Customer: Nova Solutions, Inc.
421 West Industrial Avenue
Effingham, Illinois 62401

Test Date(s): September 7, 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	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and Subpart C, section 15.207
2	Radiated RF Emissions 10 kHz to 4180 MHz (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 Transmitter, Model: AC-TXM. 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

Nova Solutions, Inc.

John Lechman 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 Transmitter, Model: AC-TXM (EUT) was connected to an AC Adapter and PCB with 4 switches. 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

Cable 1 This is a 2-meter unshielded cable connecting the EUT to the AC Adapter. The cable has a 1/8 inch power connector at the EUT end and is hard wired into the AC Adapter. The cable is bundled to a length of 1-meter. The cable has a molded ferrite at the EUT end.

Cable 2 This is a 50-centimeter cable connecting the EUT to RJ-45 coupler. The cable has an RJ-45 adapter at each end.

Cable 3 This is a 50-centimeter cable connecting the RJ-45 coupler to the PCB with (4) LED's. The cable has an RJ-45 adapter at each end.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
TRANSMITTER (EUT)	NOVA SOLUTIONS, INC.	AC-TXM	N/A	PPEAC-TXM
AC ADAPTER	MEAN WELL	GS40A24-P1J	N/A	N/A
PCB WITH 4 SWITCHES	N/A	N/A	N/A	N/A

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANUFACTURER	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
CombiLog Antenna	Com Power	AC-220	61060	May 29, 2012	May 29, 2013
Horn Antenna	Com-Power	AH-118	071175	February 29, 2012	March 1, 2014
Preamplifier	Com-Power	PA-103	1582	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 is 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:

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, Section 15.207.

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, the Com-Power Microwave Preamplifier Model: PA-118 was used 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 frequencies above 1 GHz were averaged by a "duty cycle correction factor", derived from $20 \log$ (dwell time / pulse train with blanking interval).

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 4.18 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 distance from 30 MHz to 4.18 GHz to obtain the final test data. The EUT was tested at a 10-meter test distance from 10 kHz to 30 MHz to obtain the final 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
Transmitter, Model: AC-TXM

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
418 (H) (Z-Axis)	80.11 (A)	80.28	-0.17
418 (H) (Y-Axis)	79.91 (A)	80.28	-0.37
418 (V) (Z-Axis)	79.81 (A)	80.28	-0.47
418 (H) (X-Axis)	77.41 (A)	80.28	-2.87
418 (V) (Y-Axis)	74.31 (A)	80.28	-5.97
418 (V) (X-Axis)	73.21 (A)	80.28	-7.07

Notes:

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

Table 2.0 CONDUCTED EMISSION RESULTS
Transmitter, Model: AC-TXM

Frequency MHz	Emission Level* dBuV	Specification Limit dBuV	Delta dB
0.637 (White Lead)	41.92 (Average)	46.00	-4.08
0.641 (Black Lead)	41.82 (Average)	46.00	-4.18
0.634 (Black Lead)	41.77 (Average)	46.00	4.23
1.620 (Black Lead)	40.62	46.00	-5.38
1.611 (White Lead)	40.59	46.00	-5.41
1.496 (White Lead)	40.58	46.00	-5.42

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. A plot of the -20 dB bandwidth is 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 Time

The EUT checked to see that the transmission would cease within 5 seconds of activation. A plot of the transmission is 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 Transmitter, Model: AC-TXM (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, 15.207, 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>

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.

Changed R7 from 0 ohms to 820 ohms.



APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Transmitter
Model: AC-TXM
S/N: N/A

ALSO APPROVED UNDER THIS REPORT:

There were no additional models covered under this report.



APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

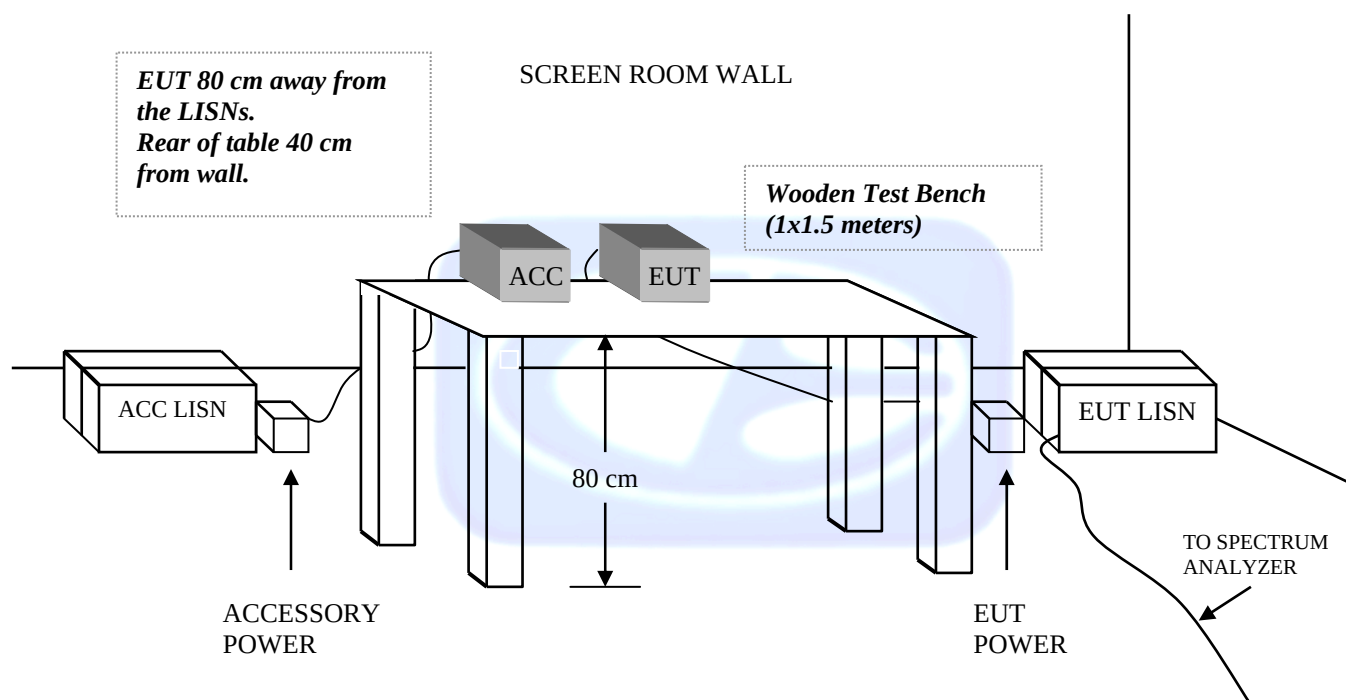
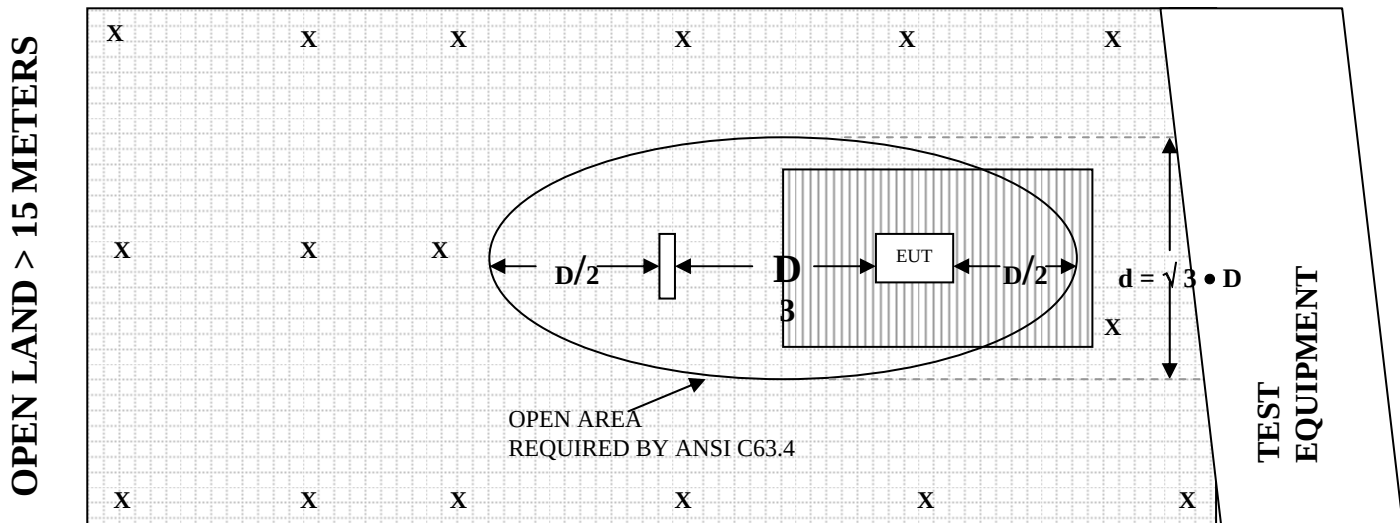


FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE – 3 METERS

OPEN LAND > 15 METERS



OPEN LAND > 15 METERS

X	= GROUND RODS		= GROUND SCREEN
D	= TEST DISTANCE (meters)		= WOOD COVER

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 AC-220

COMBILOG ANTENNA

S/N: 61060

CALIBRATION DATE: MAY 29, 2012

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	19.10	200	8.80
35	18.60	250	11.70
40	19.80	300	13.50
45	17.40	350	13.80
50	17.40	400	15.00
60	12.50	450	15.70
70	8.30	500	17.40
80	5.40	550	17.20
90	7.10	600	18.10
100	8.30	650	18.40
120	9.70	700	20.40
125	9.70	750	20.80
140	8.10	800	21.10
150	10.80	850	21.80
160	8.30	900	22.60
175	8.80	950	22.90
180	8.90	1000	23.10

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-103**PREAMPLIFIER**

S/N: 1582

CALIBRATION DATE: DECEMBER 28, 2011

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	32.98	300	32.79
40	32.99	350	32.69
50	32.91	400	32.64
60	32.94	450	32.48
70	32.90	500	32.55
80	32.90	550	32.44
90	32.92	600	32.34
100	32.84	650	32.23
125	32.83	700	32.24
150	32.83	750	32.22
175	32.84	800	32.20
200	32.71	850	32.15
225	32.80	900	31.96
250	32.81	950	32.23
275	32.80	1000	31.75

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

NOVA SOLUTIONS, INC.
TRANSMITTER
MODEL: AC-TXM
FCC SUBPART B AND C – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

NOVA SOLUTIONS, INC.
TRANSMITTER
MODEL: AC-TXM
FCC SUBPART B AND C – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



FRONT VIEW

NOVA SOLUTIONS, INC.
TRANSMITTER
MODEL: AC-TXM
FCC SUBPART B AND C – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

NOVA SOLUTIONS, INC.
TRANSMITTER
MODEL: AC-TXM
FCC SUBPART B AND C – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

APPENDIX E

DATA SHEETS

RADIATED EMISSIONS

DATA SHEETS

FCC 15.231

Nova Solutions

Transmitter

Model: AC-TXM

Date: 09/07/2012

Labs: A and B

Tested By: Kyle Fujimoto

X-Axis

Transmit Mode

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Spec Limit (dBuV/m)	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
418	80.25	V	100.28	-20.03	Peak	1	180	
418	73.21	V	80.28	-7.07	Avg	1	180	
836	36.15	V	80.28	-44.13	Peak	1	225	
836	29.11	V	60.28	-31.17	Avg	1	225	
1254	33.86	V	74.00	-40.14	Peak	1.25	155	
1254	26.82	V	54.00	-27.18	Avg	1.25	155	
1672	33.71	V	74.00	-40.29	Peak	1.25	165	
1672	26.67	V	54.00	-27.33	Avg	1.25	165	
2090	42.12	V	80.28	-38.16	Peak	1.35	175	
2090	35.08	V	60.28	-25.20	Avg	1.35	175	
2508	42.12	V	80.28	-38.16	Peak	1.25	185	
2508	35.08	V	60.28	-25.20	Avg	1.25	185	
2926	43.81	V	80.28	-36.47	Peak	1.25	165	
2926	36.77	V	60.28	-23.51	Avg	1.25	165	
3344	41.31	V	80.28	-38.97	Peak	1.25	175	
3344	34.27	V	60.28	-26.01	Avg	1.25	175	
3762	40.93	V	74.00	-33.07	Peak	1.65	185	
3762	33.89	V	54.00	-20.11	Avg	1.65	185	
4180	43.93	V	74.00	-30.07	Peak	1.25	155	
4180	36.89	V	54.00	-17.11	Avg	1.25	155	

FCC 15.231

Nova Solutions

Transmitter

Model: AC-TXM

Date: 09/07/2012

Labs: A and B

Tested By: Kyle Fujimoto

X-Axis

Transmit Mode

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Spec Limit (dBuV/m)	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
418	84.45	H	100.28	-15.83	Peak	1	0	
418	77.41	H	80.28	-2.87	Avg	1	0	
836	45.25	H	80.28	-35.03	Peak	1.25	225	
836	38.21	H	60.28	-22.07	Avg	1.25	225	
1254	34.33	H	74.00	-39.67	Peak	1.25	225	
1254	27.29	H	54.00	-26.71	Avg	1.25	225	
1672	33.89	H	74.00	-40.11	Peak	1.35	135	
1672	26.85	H	54.00	-27.15	Avg	1.35	135	
2090	40.65	H	80.28	-39.63	Peak	1.25	155	
2090	33.61	H	60.28	-26.67	Avg	1.25	155	
2508	41.54	H	80.28	-38.74	Peak	1.35	175	
2508	34.50	H	60.28	-25.78	Avg	1.35	175	
2926	43.11	H	80.28	-37.17	Peak	1.25	185	
2926	36.07	H	60.28	-24.21	Avg	1.25	185	
3344	41.35	H	80.28	-38.93	Peak	1.35	195	
3344	34.31	H	60.28	-25.97	Avg	1.35	195	
3762	41.74	H	74.00	-32.26	Peak	1.25	180	
3762	34.70	H	54.00	-19.30	Avg	1.25	180	
4180	43.68	H	74.00	-30.32	Peak	1.15	175	
4180	36.64	H	54.00	-17.36	Avg	1.15	175	

FCC 15.231

Nova Solutions

Transmitter

Model: AC-TXM

Date: 09/07/2012

Labs: A and B

Tested By: Kyle Fujimoto

Y-Axis

Transmit Mode

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Spec Limit (dBuV/m)	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
418	81.35	V	100.28	-18.93	Peak	1	90	
418	74.31	V	80.28	-5.97	Avg	1	90	
836	45.75	V	80.28	-34.53	Peak	1	90	
836	38.71	V	60.28	-21.57	Avg	1	90	
1254	33.01	V	74.00	-40.99	Peak	1.25	155	
1254	25.97	V	54.00	-28.03	Avg	1.25	155	
1672	34.61	V	74.00	-39.39	Peak	1.35	175	
1672	27.57	V	54.00	-26.43	Avg	1.35	175	
2090	42.17	V	80.28	-38.11	Peak	1.25	165	
2090	35.13	V	60.28	-25.15	Avg	1.25	165	
2508	41.99	V	80.28	-38.29	Peak	1.35	185	
2508	34.95	V	60.28	-25.33	Avg	1.35	185	
2926	43.36	V	80.28	-36.92	Peak	1.25	195	
2926	36.32	V	60.28	-23.96	Avg	1.25	195	
3344	41.71	V	80.28	-38.57	Peak	1.25	155	
3344	34.67	V	60.28	-25.61	Avg	1.25	155	
3762	41.77	V	74.00	-32.23	Peak	1.25	145	
3762	34.73	V	54.00	-19.27	Avg	1.25	145	
4180	44.29	V	74.00	-29.71	Peak	1.15	135	
4180	37.25	V	54.00	-16.75	Avg	1.15	135	

FCC 15.231

Nova Solutions

Transmitter

Model: AC-TXM

Date: 09/07/2012

Labs: A and B

Tested By: Kyle Fujimoto

Y-Axis

Transmit Mode

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Spec Limit (dBuV/m)	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
418	86.95	H	100.28	-13.33	Peak	1	45	
418	79.91	H	80.28	-0.37	Avg	1	45	
836	50.95	H	80.28	-29.33	Peak	1	90	
836	43.91	H	60.28	-16.37	Avg	1	90	
1254	34.06	H	74.00	-39.94	Peak	1.25	225	
1254	27.02	H	54.00	-26.98	Avg	1.25	225	
1672	33.68	H	74.00	-40.32	Peak	1.35	255	
1672	26.64	H	54.00	-27.36	Avg	1.35	255	
2090	41.93	H	80.28	-38.35	Peak	1.25	165	
2090	34.89	H	60.28	-25.39	Avg	1.25	165	
2508	41.19	H	80.28	-39.09	Peak	1.35	175	
2508	34.15	H	60.28	-26.13	Avg	1.35	175	
2926	43.21	H	80.28	-37.07	Peak	1.25	185	
2926	36.17	H	60.28	-24.11	Avg	1.25	185	
3344	42.03	H	80.28	-38.25	Peak	1.15	45	
3344	34.99	H	60.28	-25.29	Avg	1.15	45	
3762	42.49	H	74.00	-31.51	Peak	1.25	155	
3762	35.45	H	54.00	-18.55	Avg	1.25	155	
4180	43.65	H	74.00	-30.35	Peak	1.15	165	
4180	36.61	H	54.00	-17.39	Avg	1.15	165	

FCC 15.231

Nova Solutions

Transmitter

Model: AC-TXM

Date: 09/07/2012

Labs: A and B

Tested By: Kyle Fujimoto

Z-Axis

Transmit Mode

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Spec Limit (dBuV/m)	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
418	86.85	V	100.28	-13.43	Peak	1.25	270	
418	79.81	V	80.28	-0.47	Avg	1.25	270	
836	50.05	V	80.28	-30.23	Peak	1.25	225	
836	43.01	V	60.28	-17.27	Avg	1.25	225	
1254	33.33	V	74.00	-40.67	Peak	1.15	165	
1254	26.29	V	54.00	-27.71	Avg	1.15	165	
1672	35.43	V	74.00	-38.57	Peak	1.05	175	
1672	28.39	V	54.00	-25.61	Avg	1.05	175	
2090	42.11	V	80.28	-38.17	Peak	1.15	185	
2090	35.07	V	60.28	-25.21	Avg	1.15	185	
2508	42.71	V	80.28	-37.57	Peak	1.25	195	
2508	35.67	V	60.28	-24.61	Avg	1.25	195	
2926	44.17	V	80.28	-36.11	Peak	1.35	205	
2926	37.13	V	60.28	-23.15	Avg	1.35	205	
3344	42.21	V	80.28	-38.07	Peak	1.25	125	
3344	35.17	V	60.28	-25.11	Avg	1.25	125	
3762	42.31	V	74.00	-31.69	Peak	1.55	145	
3762	35.27	V	54.00	-18.73	Avg	1.55	145	
4180	43.92	V	74.00	-30.08	Peak	1.25	155	
4180	36.88	V	54.00	-17.12	Avg	1.25	155	

FCC 15.231

Nova Solutions

Transmitter

Model: AC-TXM

Date: 09/07/2012

Labs: A and B

Tested By: Kyle Fujimoto

Z-Axis

Transmit Mode

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Spec Limit (dBuV/m)	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
418	87.15	H	100.28	-13.13	Peak	1	45	
418	80.11	H	80.28	-0.17	Avg	1	45	
836	50.25	H	80.28	-30.03	Peak	1.25	155	
836	43.21	H	60.28	-17.07	Avg	1.25	155	
1254	33.34	H	74.00	-40.66	Peak	1.25	45	
1254	26.30	H	54.00	-27.70	Avg	1.25	45	
1672	34.41	H	74.00	-39.59	Peak	1.25	155	
1672	27.37	H	54.00	-26.63	Avg	1.25	155	
2090	41.04	H	80.28	-39.24	Peak	1.25	145	
2090	34.00	H	60.28	-26.28	Avg	1.25	145	
2508	42.43	H	80.28	-37.85	Peak	1.15	165	
2508	35.39	H	60.28	-24.89	Avg	1.15	165	
2926	43.41	H	80.28	-36.87	Peak	1.25	185	
2926	36.37	H	60.28	-23.91	Avg	1.25	185	
3344	41.86	H	80.28	-38.42	Peak	1.35	155	
3344	34.82	H	60.28	-25.46	Avg	1.35	155	
3762	42.33	H	74.00	-31.67	Peak	1.25	175	
3762	35.29	H	54.00	-18.71	Avg	1.25	175	
4180	44.23	H	74.00	-29.77	Peak	1.15	185	
4180	37.19	H	54.00	-16.81	Avg	1.15	185	

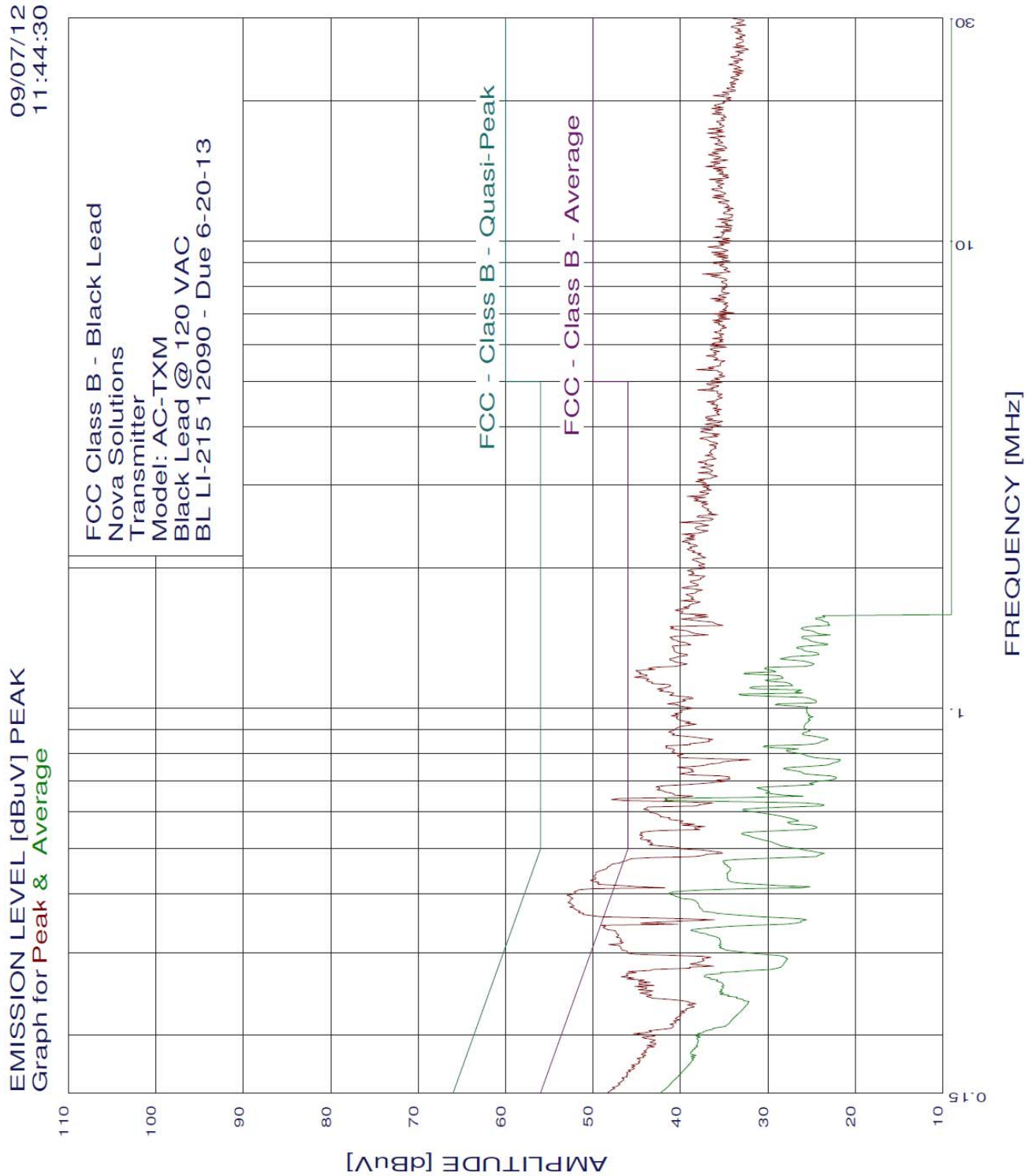
Test Location	: Compatible Electronics	Page	: 1/1
Customer	: Nova Solutions	Date	: 09 / 07 / 2012
Manufacturer	: Nova Solutions	Time	: 11:12:30 AM
Eut name	: Transmitter	Lab	: A
Model	: AC-TXM	Test Distance	: 3.00
Serial #	: RM2		
Specification	: FCC B		
Distance correction factor (20 * log(test/spec))			: 0.00
Test Mode	: Test Type: Radiated Emissions Qualification Test Range: 10 kHz to 1 GHz (Vertical and Horizontal) Temperature 29 Degrees Celsius, 55% Relative Humidity Test Engineer: Kyle Fujimoto		

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	Limit = L dBuV/m	Delta R-L dB
1V	76.010	46.30	1.06	6.56	32.90	21.02	40.00	-18.98
2V	82.900	45.50	1.13	5.89	32.91	19.62	40.00	-20.38
3V	110.615	56.30	1.40	9.04	32.84	33.91	43.50	-9.59
4V	140.476	47.80	1.52	8.23	32.83	24.72	43.50	-18.78
5V	149.474	47.50	1.60	10.66	32.83	26.92	43.50	-16.58
6V	247.900	46.60	2.28	11.58	32.81	27.65	46.00	-18.35



CONDUCTED EMISSIONS

DATA SHEETS



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09/07/12 11:44:30

FCC Class B - Black Lead
Nova Solutions
Transmitter
Model: AC-TXM
Black Lead @ 120 VAC
BL LI-215 12090 - Due 6-20-13
Test Engineer : Kyle Fujimoto

45 highest peaks above -50.00 dB of FCC - Class B - Average limit line

Peak criteria : 1.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.398	52.98	47.90	5.08**
2	0.428	50.27	47.28	2.99**
3	0.637	47.88	46.00	1.88**
4	0.343	49.05	49.13	-0.08**
5	1.166	45.27	46.00	-0.73**
6	1.204	45.08	46.00	-0.92**
7	0.535	44.67	46.00	-1.33**
8	0.312	48.22	49.92	-1.71**
9	0.608	44.19	46.00	-1.81**
10	0.679	42.77	46.00	-3.23**
11	1.100	42.66	46.00	-3.34**
12	0.822	41.65	46.00	-4.35**
13	0.347	44.56	49.04	-4.49**
14	0.266	46.74	51.24	-4.50**
15	1.021	41.45	46.00	-4.55**
16	0.890	41.35	46.00	-4.65**
17	1.496	41.19	46.00	-4.81**
18	1.419	41.19	46.00	-4.81**
19	1.276	41.18	46.00	-4.82**
20	0.963	41.05	46.00	-4.95**
21	1.359	40.89	46.00	-5.11**
22	1.620	40.62	46.00	-5.38
23	0.747	40.36	46.00	-5.64**
24	2.501	40.11	46.00	-5.89
25	0.724	40.07	46.00	-5.93**
26	1.699	39.93	46.00	-6.07
27	1.552	39.90	46.00	-6.10**
28	1.810	39.86	46.00	-6.14
29	2.358	39.81	46.00	-6.19
30	2.274	39.81	46.00	-6.19
31	0.561	39.78	46.00	-6.22**
32	0.254	45.22	51.64	-6.42**
33	2.310	39.41	46.00	-6.59
34	0.258	44.73	51.51	-6.78**
35	2.840	39.22	46.00	-6.78
36	2.190	39.20	46.00	-6.80
37	1.971	39.19	46.00	-6.81
38	0.246	44.61	51.90	-7.29**
39	2.077	38.60	46.00	-7.40
40	2.811	38.42	46.00	-7.58
41	2.436	38.31	46.00	-7.69
42	1.577	38.31	46.00	-7.69**
43	3.059	38.22	46.00	-7.78
44	2.568	38.11	46.00	-7.89
45	3.192	38.01	46.00	-7.99

**Please See the Average Readings on the Next Page and on the Plot

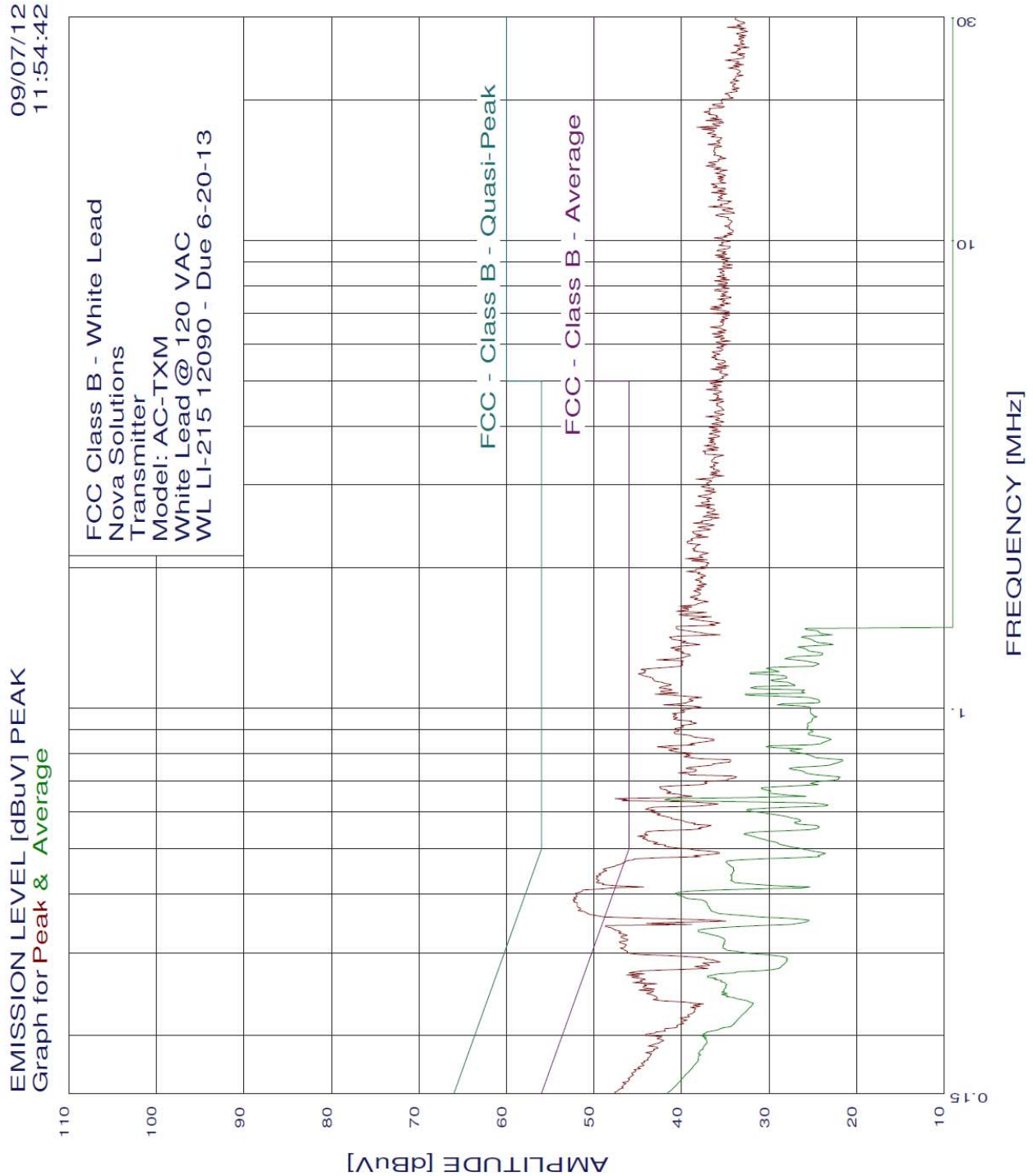
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FCC Class B - Black Lead
Nova Solutions
Transmitter
Model: AC-TXM
Black Lead @ 120 VAC
BL LI-215 12090 - Due 6-20-13
Test Engineer : Kyle Fujimoto

45 highest peaks above -50.00 dB of FCC - Class B - Average limit line
Peak criteria : 0.00 dB, Curve : Average

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.641	41.82	46.00	-4.18
2	0.634	41.77	46.00	-4.23
3	0.402	41.28	47.81	-6.53
4	0.377	37.90	48.34	-10.44
5	0.334	38.78	49.35	-10.57
6	0.469	35.13	46.53	-11.41
7	0.464	34.99	46.62	-11.64
8	0.459	34.64	46.71	-12.07
9	0.442	34.68	47.02	-12.34
10	0.438	34.64	47.11	-12.47
11	0.433	34.66	47.19	-12.53
12	0.452	34.29	46.85	-12.56
13	1.072	33.32	46.00	-12.68
14	0.538	32.97	46.00	-13.03
15	0.605	32.87	46.00	-13.13
16	1.184	32.74	46.00	-13.26
17	1.106	32.08	46.00	-13.92
18	0.266	37.26	51.24	-13.98
19	0.310	35.60	49.97	-14.36
20	0.313	35.50	49.88	-14.38
21	0.307	35.52	50.05	-14.53
22	0.263	36.58	51.33	-14.75
23	0.676	31.24	46.00	-14.76
24	0.199	38.22	53.67	-15.45
25	0.183	38.84	54.33	-15.49
26	0.826	30.51	46.00	-15.49
27	0.201	38.03	53.58	-15.55
28	0.260	35.86	51.42	-15.56
29	0.185	38.64	54.24	-15.60
30	1.217	30.38	46.00	-15.62
31	0.197	38.10	53.75	-15.65
32	0.272	35.37	51.07	-15.69
33	1.148	30.30	46.00	-15.70
34	0.180	38.78	54.50	-15.72
35	0.187	38.41	54.15	-15.74
36	0.658	30.21	46.00	-15.79
37	0.178	38.72	54.59	-15.87
38	0.189	38.19	54.06	-15.87
39	0.192	38.04	53.97	-15.93
40	0.247	35.53	51.86	-16.33
41	0.254	35.27	51.64	-16.37
42	0.250	35.38	51.77	-16.39
43	0.244	35.48	51.95	-16.47
44	1.016	29.12	46.00	-16.88
45	0.206	36.28	53.35	-17.08



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FCC Class B - White Lead
Nova Solutions
Transmitter
Model: AC-TXM
White Lead @ 120 VAC
WL LI-215 12090 - Due 6-20-13
Test Engineer : Kyle Fujimoto

45 highest peaks above -50.00 dB of FCC - Class B - Average limit line

Peak criteria : 1.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.389	52.41	48.08	4.33**
2	0.438	49.71	47.11	2.61**
3	0.641	47.59	46.00	1.59**
4	0.341	48.70	49.18	-0.48**
5	0.532	45.01	46.00	-0.99**
6	1.184	44.94	46.00	-1.06**
7	0.608	44.10	46.00	-1.90**
8	1.072	43.03	46.00	-2.97**
9	1.269	42.85	46.00	-3.15**
10	0.826	42.75	46.00	-3.25**
11	1.106	42.54	46.00	-3.46**
12	0.679	42.48	46.00	-3.52**
13	1.089	42.33	46.00	-3.67**
14	1.016	42.03	46.00	-3.97**
15	0.814	41.46	46.00	-4.54**
16	1.419	41.37	46.00	-4.63**
17	1.345	41.26	46.00	-4.74**
18	0.269	46.28	51.15	-4.88**
19	0.974	41.03	46.00	-4.97**
20	0.347	44.00	49.04	-5.05**
21	0.272	45.98	51.07	-5.09**
22	0.885	40.84	46.00	-5.16**
23	1.611	40.59	46.00	-5.41
24	1.496	40.58	46.00	-5.42
25	0.728	40.37	46.00	-5.63**
26	1.586	40.29	46.00	-5.71
27	1.654	40.20	46.00	-5.80
28	0.259	45.58	51.47	-5.89**
29	0.788	39.76	46.00	-6.24**
30	2.089	39.53	46.00	-6.47
31	0.743	39.47	46.00	-6.53**
32	1.960	39.43	46.00	-6.57
33	2.262	39.33	46.00	-6.67
34	0.250	44.88	51.77	-6.89**
35	1.552	39.09	46.00	-6.91
36	1.726	39.00	46.00	-7.00
37	2.066	38.83	46.00	-7.17
38	0.254	44.38	51.64	-7.26**
39	2.384	38.73	46.00	-7.27
40	2.488	38.63	46.00	-7.37
41	2.707	38.43	46.00	-7.57
42	1.879	38.42	46.00	-7.58
43	3.091	38.34	46.00	-7.66
44	2.840	38.14	46.00	-7.86
45	2.436	38.13	46.00	-7.87

**Please See the Average Readings on the Next Page and on the Plot

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09/07/12 11:54:42

FCC Class B - White Lead
Nova Solutions
Transmitter
Model: RM2
White Lead @ 120 VAC
WL LI-215 12090 - Due 6-20-13
Test Engineer : Kyle Fujimoto

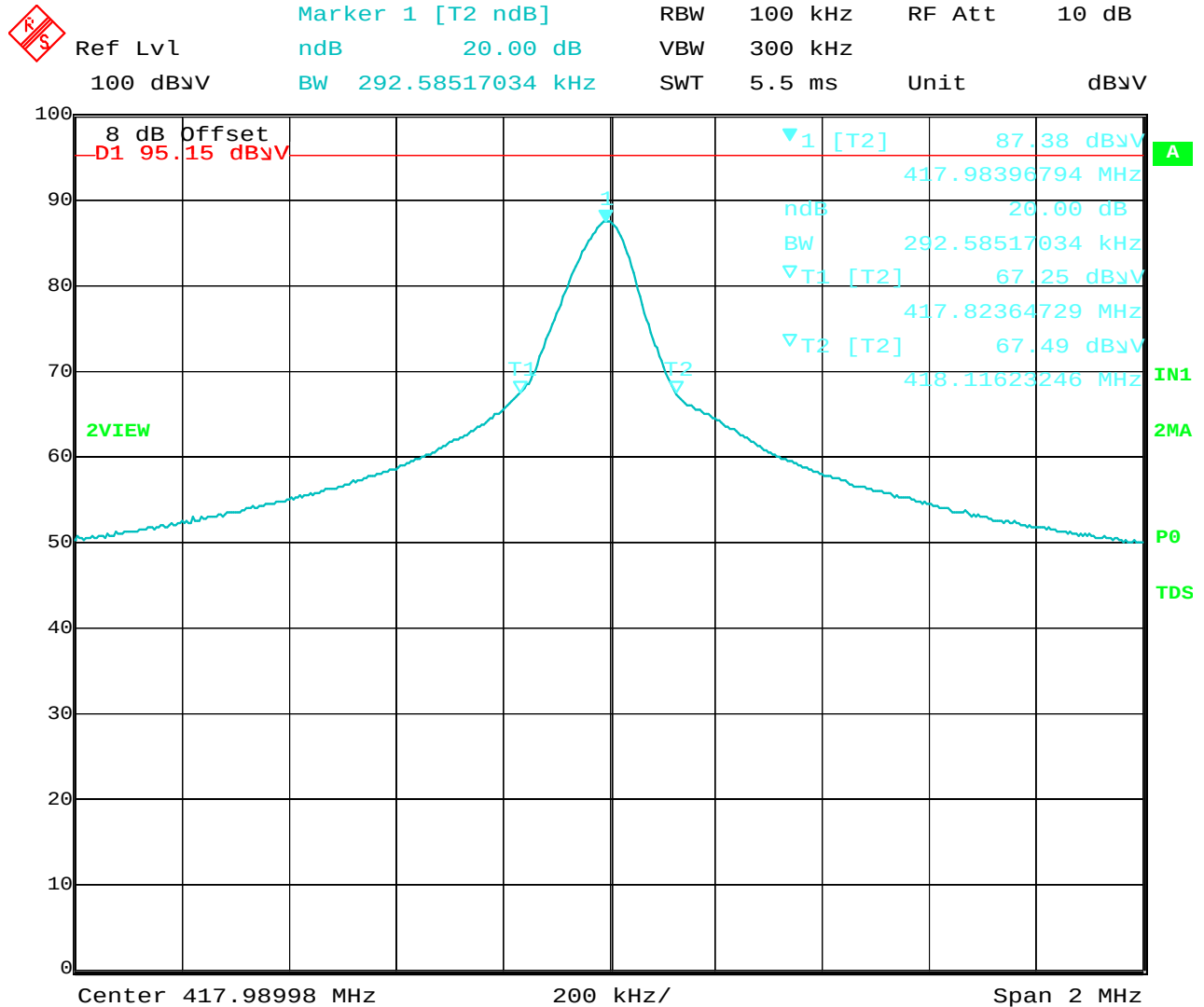
45 highest peaks above -50.00 dB of FCC - Class B - Average limit line

Peak criteria : 0.00 dB, Curve : Average

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.637	41.92	46.00	-4.08
2	0.402	40.69	47.81	-7.12
3	0.334	38.11	49.35	-11.24
4	0.379	37.03	48.29	-11.26
5	0.373	36.83	48.43	-11.59
6	0.469	34.90	46.53	-11.64
7	0.369	36.66	48.52	-11.85
8	0.440	34.38	47.06	-12.68
9	0.452	34.07	46.85	-12.77
10	0.435	34.30	47.15	-12.85
11	0.428	34.38	47.28	-12.90
12	0.538	32.86	46.00	-13.14
13	1.072	32.71	46.00	-13.29
14	0.605	32.53	46.00	-13.47
15	1.184	32.19	46.00	-13.81
16	1.106	32.11	46.00	-13.89
17	0.266	37.01	51.24	-14.23
18	0.315	35.15	49.84	-14.69
19	0.312	35.22	49.92	-14.71
20	0.309	35.26	50.01	-14.75
21	0.263	36.25	51.33	-15.08
22	0.672	30.85	46.00	-15.15
23	0.826	30.31	46.00	-15.69
24	1.217	30.30	46.00	-15.70
25	0.260	35.52	51.42	-15.91
26	0.658	30.02	46.00	-15.98
27	0.199	37.61	53.67	-16.06
28	0.201	37.51	53.58	-16.07
29	1.148	29.80	46.00	-16.20
30	0.183	38.07	54.37	-16.30
31	0.197	37.38	53.75	-16.38
32	0.180	38.04	54.50	-16.46
33	0.247	35.38	51.86	-16.48
34	0.178	38.09	54.59	-16.50
35	0.244	35.42	51.95	-16.53
36	0.187	37.57	54.15	-16.57
37	0.250	35.16	51.77	-16.61
38	0.189	37.42	54.06	-16.64
39	0.195	37.14	53.84	-16.70
40	0.254	34.94	51.64	-16.70
41	1.016	29.05	46.00	-16.95
42	0.242	34.87	52.04	-17.17
43	1.276	28.18	46.00	-17.82
44	0.743	27.69	46.00	-18.31
45	0.809	27.55	46.00	-18.45

-20 dB BANDWIDTH

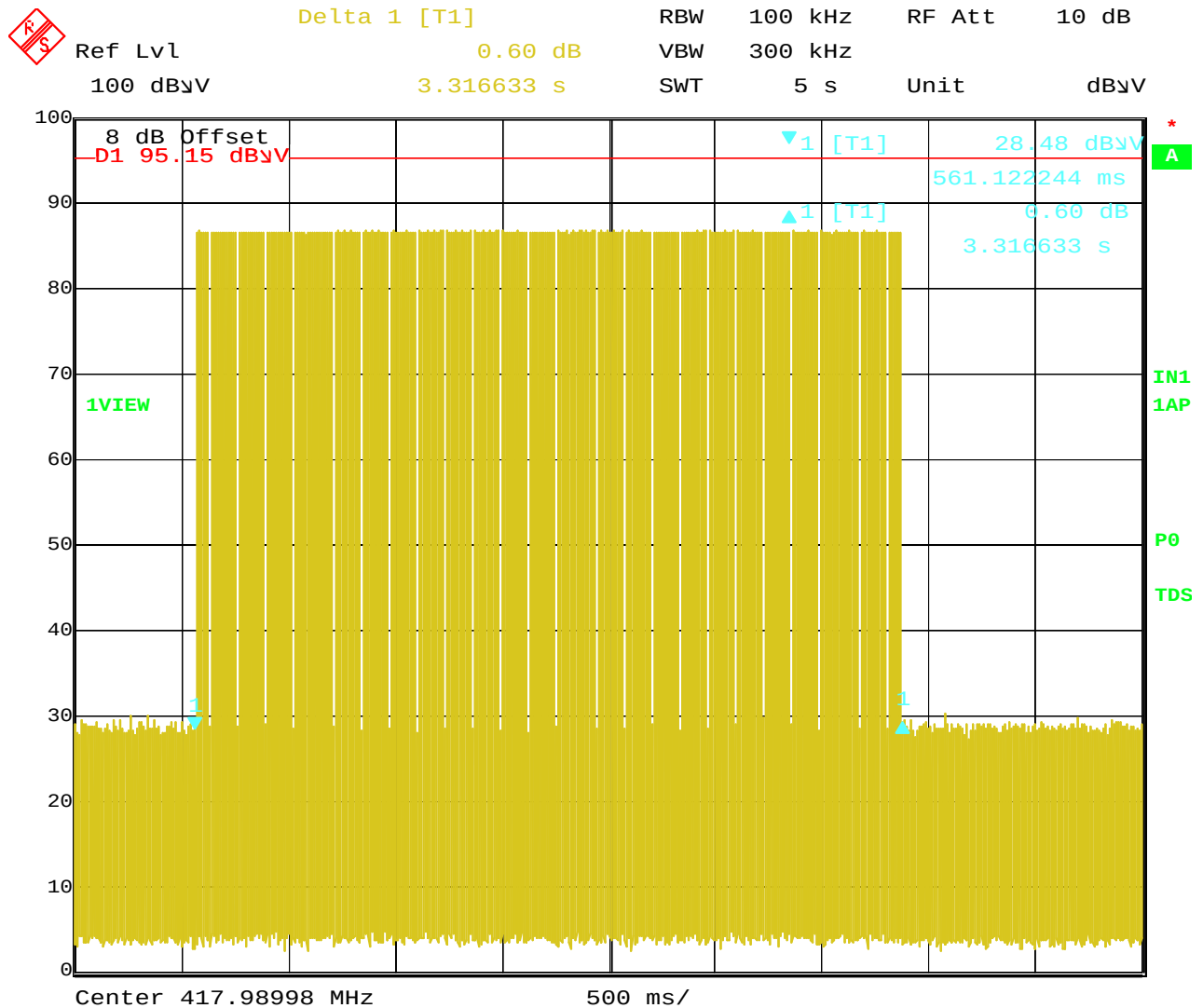
DATA SHEET



Date: 10.SEP.2012 14:43:20

TRANSMISSION TIME

DATA SHEET



Date: 10.SEP.2012 14:44:17

5 Second Rule – The Transmitter shuts off within 5 seconds of being activated