

**FCC PART 15, SUBPART B and C
TEST REPORT***for***TT20K SYSTEM RECEIVER****Model: RX20K**

Prepared for

BINSFELD ENGINEERING INC.
4571 WEST MacFARLANE
MAPLE CITY, MICHIGAN 49664

Prepared by: _____

THOMAS SZYNAL

Approved by: _____

KYLE FUJIMOTO

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: APRIL 19, 2019

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	17	2	2	2	13	39	75

This report shall not be reproduced except in full, without the written approval of Compatible Electronics.

**Brea Division**
114 Olinda Drive
Brea, CA 92823
(714) 579-0500**Newbury Park Division**
1050 Lawrence Drive
Newbury Park, CA 91320
(805) 480-4044**Lake Forest Division**
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
SUMMARY OF TEST RESULTS	5
1. PURPOSE	6
2. ADMINISTRATIVE DATA	7
2.1 Location of Testing	7
2.2 Traceability Statement	7
2.3 Cognizant Personnel	7
2.4 Date Test Sample was Received	7
2.5 Disposition of the Test Sample	7
2.6 Abbreviations and Acronyms	7
3. APPLICABLE DOCUMENTS	8
4. DESCRIPTION OF TEST CONFIGURATION	9
4.1 Description of Test Configuration – Emissions	9
4.1.1 Cable Construction and Termination	9
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
5.2 Emissions Test Equipment	11
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
6.3 Measurement Uncertainty	12
7. TEST PROCEDURES	13
7.1 RF Emissions	13
7.1.1 Conducted Emissions Test	13
7.1.2 Radiated Emissions Test	13
7.1.3 RF Emissions Test Results	16
8. CONCLUSIONS	17

LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations and Recognitions
B	Modifications to the EUT
C	Additional Model Covered Under This Report
D	Diagrams and Charts • Test Setup Diagrams • Antenna and Effective Gain Factors
E	Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Conducted Emissions Test Setup
2	Layout of the Semi-Anechoic Test Chamber

LIST OF TABLES

TABLE	TITLE
1	Conducted Emission Results
2	Radiated Emission Results

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., 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 certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

Device Tested: TT20K System Receiver
Model: RX20K
S/N: N/A

Product Description: The equipment under test is a wireless receiver used in a torque telemetry system.

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

Customer: Binsfeld Engineering Inc.
4571 MacFarlane
Maple City, Michigan 49664

Test Dates: April 8 – 12, 2019

Test Specifications covered by accreditation:

Test Specifications: Emissions requirements
CFR Title 47, Part 15, Subpart B; and Subpart C, Sections 15.205, 15.209, and 15.249



Test Procedures: ANSI C63.4: 2014 and ANSI C63.10: 2013

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 – 30 MHz to Class B Limits	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. Highest reading in relation to spec limit: 43.04 dBuV @ 0.182 MHz (*U = 2.72 dB)
1	Spurious Radiated RF Emissions, 9 kHz –9300 MHz (Transmitter, Receiver, and Digital portion)	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 15.205, 15.209 and 15.249 Highest reading in relation to spec limit 53.34 dBuV/m (Avg) @ 2777.61 MHz (*U = 3.67 dB)

*U = Expanded Uncertainty with a coverage factor of k=2

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the TT20K System Receiver, Model: RX20K. The emissions measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed 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 Code of Federal Regulations Title 47, Part 15 Subpart B sections 15.107, 15.109, & Part 15 Subpart C sections 15.205, 15.207, 15.209 and 15.249.



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 92823.

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

Binsfeld Engineering Inc.

Stephen Tarsa	CEO
Dave Tietz	R&D Director

Compatible Electronics Inc.

Thomas Szynal	Test Technician
Kyle Fujimoto	Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the date of this report.

2.5 Disposition of the Test Sample

The test sample has not been returned to Binsfeld Engineering Inc. as of the date of this test report.

2.6 Abbreviations and Acronyms

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

EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
ITE	Information Technology Equipment
DoC	Declaration of Conformity
N/A	Not Applicable
Tx	Transmit
Rx	Receive
Inc.	Incorporated
RF	Radio Frequency
BLE	Bluetooth Low Energy
IoT	Internet of Things
CEO	Chief Executive Officer
N/A	Not Applicable
DC	Direct Current

3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
FCC Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) –Unintentional Radiators
ANSI C63.4: 2014	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
ANSI C63.10: 2013	American National Standard of procedure for compliance testing of unlicensed wireless devices

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The TT20K System Receiver, Model: RX20K (EUT) was connected to a laptop and tachometer sensor via its USB, “Tach S” and analog out ports, respectively. The laptop was also connected to a power supply and router via its DC IN and Ethernet ports, respectively. During the testing, the EUT was continuously transmitting and receiving to and from the TT20K System Transmitter, Model: TX20K.

The EUT gets its power from the 5 Volts provided by the laptop’s USB port.

The EUT was tested for emissions at the low, middle, and high channels while in the X, Y and Z axis. The X orientation is when the EUT is parallel to the ground. The Y orientation is when the EUT is perpendicular to the ground mounted vertically. The Z orientation is when the EUT is perpendicular to the ground mounted horizontally.

The final emissions data was taken in the worst case mode described above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

- Cable 1** This is a 5-meter braid shielded cable connecting the EUT to the antenna. The cable has a reverse polarity SMA connector at the EUT end and is hard wired into the antenna. The cable was bundled to a length of 1-meter. The shield of the cable was grounded to the chassis via the connector.
- Cable 2** This is a 2-meter braid shielded cable connecting the EUT to the laptop. The cable has a type ‘B’ USB connector at the EUT and a type ‘A’ connector at the laptop end. The cable was bundled to a length of 1-meter. The shield of the cable was grounded to the chassis via the connector.
- Cable 3** This is a 1-meter unshielded cable connecting the EUT to the tachometer sensor. The cable has a 3-pin terminal block at the EUT end and is hard wired to the tachometer sensor.
- Cable 4** This is a 2-meter unshielded cable connecting the laptop to the power supply. The cable has a one pin connector at the laptop end and is hard wired into the power supply.
- Cable 5** This is a 17-meter unshielded cable connecting the laptop to the router. The cable has a RJ-45 connector at each end.
- Cable 6** This is a 10mm unterminated two conductor cable. The cable has a 2-pin terminal block at the EUT end.



5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
TT20K SYSTEM RECEIVER (EUT)	BINSFELD ENGINEERING INC.	RX20K	N/A	HWN-RX20K
TT20K SYSTEM TRANSMITTER	BINSFELD ENGINEERING INC.	TX20K	N/A	HWN-TX20K
ANTENNA	ANTENNA FACTOR	ANT-MAG-B50-RPS	N/A	N/A
TACHOMETER SENSOR	BINSFELD ENGINEERING, INC.	N/A	N/A	N/A
LAPTOP	DELL	PP41L	F72YPL1	DoC
POWER SUPPLY FOR LAPTOP	DELL	HA65NS5-00	N/A	N/A
ROUTER	D-LINK	DSR-150	0L00B02399	DoC



5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
RF RADIATED EMISSIONS TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
EMI Receiver, 20 Hz – 26.5 GHz	Keysight Technologies	N9038A	MY51210150	July 26, 2018	1 Year
System Controller	Sunol Sciences Corporation	SC110V	112213-1	N/A	N/A
Turntable	Sunol Sciences Corporation	2011VS	N/A	N/A	N/A
Antenna-Mast	Sunol Sciences Corporation	TWR95-4	112213-3	N/A	N/A
Loop Antenna	Com-Power	AL-130R	121090	February 5, 2019	2 Year
CombiLog Antenna	Com-Power	AC-220	61060	July 27, 2017	2 Year
Horn Antenna	Com-Power	AH-118	071175	February 22, 2018	2 Year
Preamplifier	Com-Power	PAM-118A	551024	May 10, 2018	1 Year
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
RF CONDUCTED EMISSIONS TEST EQUIPMENT					
EMI Receiver, 20 Hz – 26.5 GHz	Keysight Technologies	N9038A	MY51210150	July 26, 2018	1 Year
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
LISN	Com-Power	LI-215A	191951	June 28, 2018	1 Year
Attenuator 10dB	SureCall	SC-ATT-10	17100025	November 27, 2018	1 Year

Brea Division
 114 Olinda Drive
 Brea, CA 92823
 (714) 579-0500

Newbury Park Division
 1050 Lawrence Drive
 Newbury Park, CA 91320
 (805) 480-4044

Lake Forest Division
 20621 Pascal Way
 Lake Forest, CA 92630
 (949) 587-0400

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 of this report for emissions test location.

6.2 EUT Mounting, Bonding and Grounding

For frequencies 1 GHz and below: The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz: The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 1.5 meters above the ground plane.

The EUT was not grounded.

6.3 Measurement Uncertainty

The uncertainty values are in the table below.

The uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level, using a coverage factor of $k=2$

MEASUREMENT TYPE	PARTICULAR CONFIGURATION	UNCERTAINTY VALUES
RADIATED EMISSIONS	3-METER CHAMBER, COMBILOG ANTENNA	3.26 dB (Vertical) 3.19 dB (Horizontal)
RADIATED EMISSIONS	3-METER CHAMBER, HORN ANTENNA	3.67 dB (Both Vertical and Horizontal)
AC LINE CONDUCTED EMISSIONS	3-METER CHAMBER, COM-POWER LISN	2.72 dB

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 EMI Receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. A 10 dB attenuator was used for the protection of the EMI Receiver input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the EMI 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 63:4. 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 computer software. The final qualification data is located in Appendix E.

The six highest emissions are listed in Table 1 of this report.

Test Results:

The EUT complies with the Class B limits of CFR Title 47, Part 15, Subpart B and Subpart C, section 15.207 for conducted emissions.

7.1.2 Radiated Emissions Test

The EMI Receiver was used as the measuring meter. Preamplifiers were used to increase the sensitivity of the instrument. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured.

The frequencies below 1 GHz were quasi-peaked using the quasi-peak detector of the EMI Receiver.

All frequencies above 1 GHz were averaged using the average detector of the EMI Receiver.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with 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. 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 EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 2.

Radiated Emissions Test (Continued)

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

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	CombiLog Antenna
1 GHz to 9.3 GHz	1 MHz	Horn Antenna

Test Results:

The EUT complies with the **Class B** limits of **CFR** Title 47, Part 15, Subpart B; and Subpart C sections 15.205, 15.209 and 15.249 for radiated emissions.



7.1.3 RF Emissions Test Results

Table 1: CONDUCTED EMISSION RESULTS
TT20K SYSTEM RECEIVER
Model: RX20K

Frequency (MHz)	Average Corrected Reading* (dBuV)	Average Specification Limit (dBuV)	Margin Delta (Cor. Reading – Spec. Limit) (dB)
0.182 (BL) (Rx)	43.04	53.96	-10.92
0.186 (BL) (Tx)	43.02	54.05	-11.02
0.178 (BL) (Rx)	43.00	54.09	-11.10
0.178 (WL) (Rx)	42.75	54.02	-11.28
0.182 (WL) (Rx)	42.70	54.00	-11.30
0.182 (BL) (Tx)	42.79	54.11	-11.32

Notes:

- * The complete emissions data is given in Appendix E of this report.
- (BL) Black Lead
- (WL) White Lead
- (Tx) Transmitting Mode
- (Rx) Receiving Mode



Table 2 RADIATED EMISSION RESULTS
TT20K SYSTEM RECEIVER
Model: RX20K

Frequency (MHz)	EMI Reading (dBuV/m)	Specification Limit (dBuV/m)	Delta (Cor. Reading – Spec. Limit) (dB)
2777.61 (V) (Z-Axis) (High Channel)	53.34 (AV)	53.97	-0.63
903.37 (V) (X-Axis) (Low Channel)	93.31 (QP)	93.97	-0.66
925.87 (V) (X-Axis) (High Channel)	93.25 (QP)	93.97	-0.72
913.78 (V) (X-Axis) (Middle Channel)	93.11 (QP)	93.97	-0.86
7310.24 (H) (X-Axis) (Middle Channel)	52.98 (AV)	53.97	-0.99
7310.24 (V) (Y-Axis) (Middle Channel)	52.75 (AV)	53.97	-1.22

Notes:

- * The complete emissions data is given in Appendix E of this report.
- (V) Vertical Polarization
- (H) Horizontal Polarization
- (AV) Average Reading
- (QP) Quasi-Peak Reading

8. CONCLUSIONS

The TT20K System Receiver, Model: RX20K (EUT), as tested, meets all of the specification limits defined in the **Class B** specification limits defined in FCC Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209 and 15.249.

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Newbury Park Division
1050 Lawrence Drive
Newbury Park, CA 91320
(805) 480-4044

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

LABORATORY ACCREDITATIONS AND RECOGNITIONS



For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025.

For the most up-to-date version of our scopes and certificates please visit
<http://celectronics.com/quality/scope/>

Quote from ISO-ILAC-IAF Communiqué on 17025:

"A laboratory's fulfilment 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."

Innovation, Science and Economic Development Canada
Lab Code 2154A



APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and FCC 15.249 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.

No modifications were made to the EUT during the testing.



APPENDIX C

***ADDITIONAL MODEL COVERED
UNDER THIS REPORT***

ADDITIONAL MODEL COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

TT20K SYSTEM RECEIVER
Model: RX20K
S/N: N/A

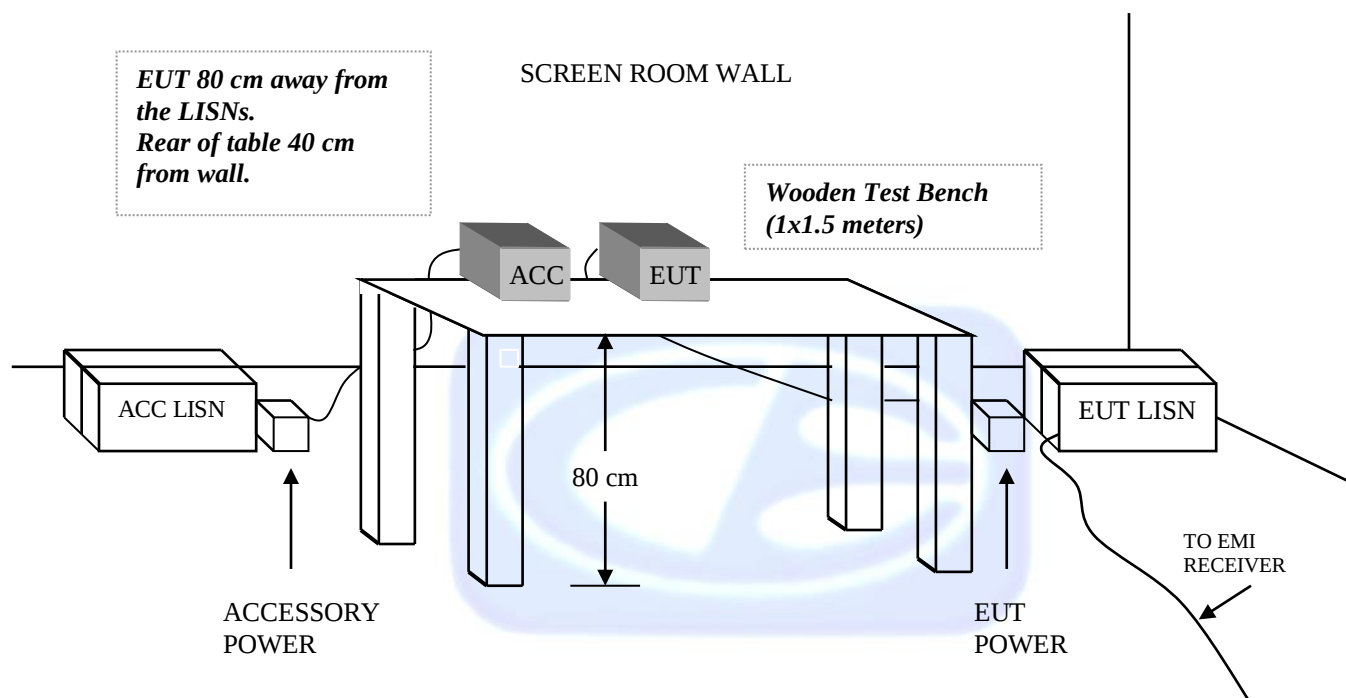
There are no additional models covered under this report.



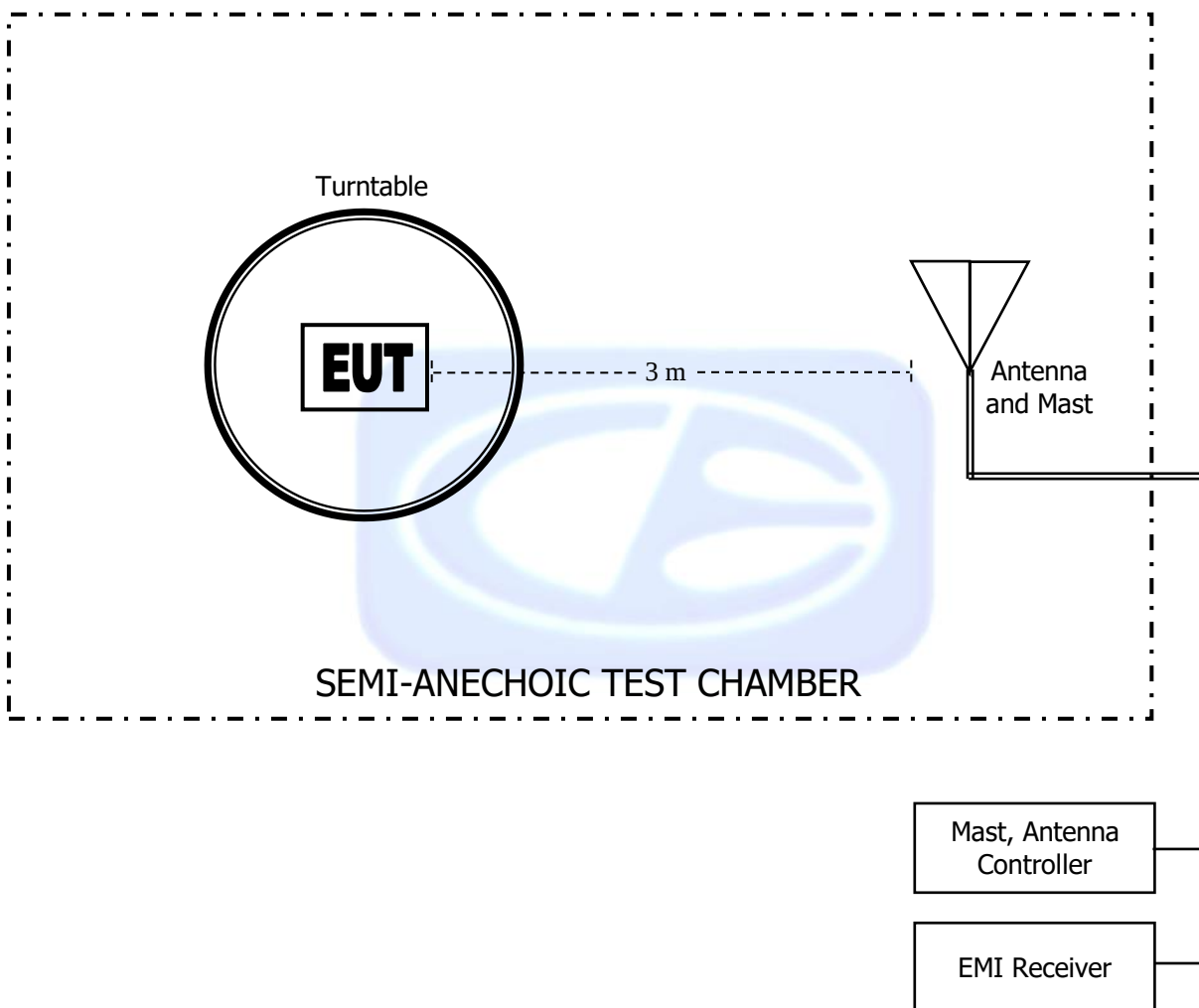
APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP



***FIGURE 1: LAYOUT OF THE SEMI -ANECHOIC
TEST CHAMBER***



COM-POWER AL-130R**LOOP ANTENNA****S/N: 121090****CALIBRATION DATE: FEBRUARY 5, 2019**

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.01	15.6	-35.9
0.02	14.8	-36.7
0.03	15.6	-35.9
0.04	15.1	-36.4
0.05	14.4	-37.0
0.06	14.6	-36.9
0.07	14.4	-37.1
0.08	14.3	-37.1
0.09	14.5	-36.9
0.10	14.1	-37.3
0.20	14.1	-37.3
0.30	14.0	-37.4
0.40	14.0	-37.4
0.50	14.2	-37.2
0.60	14.2	-37.2
0.70	14.2	-37.2
0.80	14.2	-37.3
0.90	14.3	-37.2
1.00	14.5	-37.0
2.00	14.5	-36.9
3.00	14.5	-36.9
4.00	14.7	-36.8
5.00	14.6	-36.9
6.00	14.6	-36.9
7.00	14.6	-36.9
8.00	14.6	-36.9
9.00	14.6	-36.9
10.00	14.8	-36.6
11.00	14.9	-36.6
12.00	14.8	-36.6
13.00	14.8	-36.7
14.00	14.6	-36.8
15.00	14.5	-36.9
16.00	14.5	-37.0
17.00	14.6	-36.9
18.00	14.7	-36.7
19.00	14.8	-36.6
20.00	14.9	-36.6
21.00	14.6	-36.8
22.00	14.2	-37.2
23.00	13.7	-37.7
24.00	13.3	-38.2
25.00	13.0	-38.5
26.00	12.9	-38.6
27.00	13.0	-38.5
28.00	13.1	-38.4
29.00	13.1	-38.4
30.00	12.9	-38.5

COM-POWER AC-220**COMBILOG ANTENNA****S/N: 61060****CALIBRATION DATE: JULY 27, 2017**

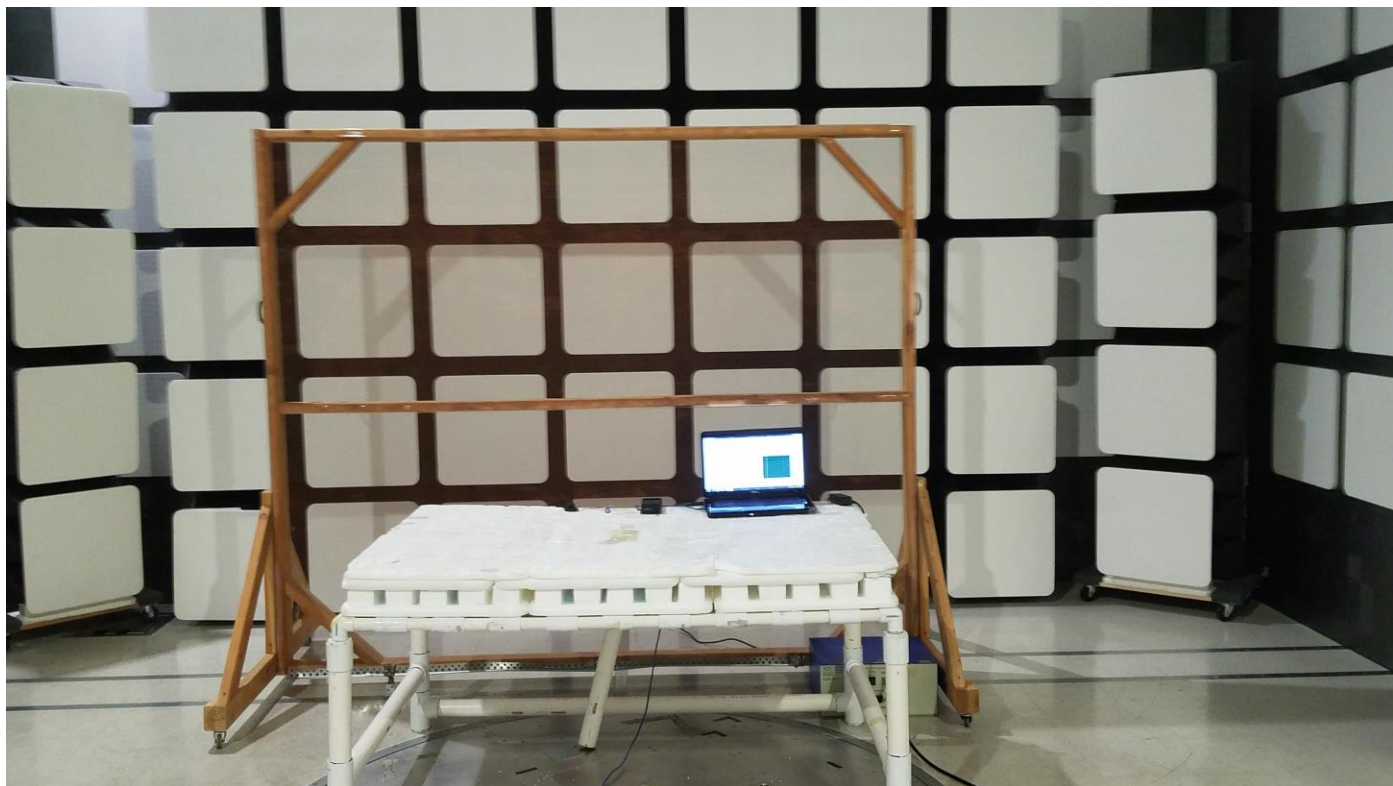
FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	23.80	200	14.10
35	24.00	250	15.30
40	24.70	300	17.70
45	22.90	350	17.70
50	22.10	400	19.00
60	17.60	450	21.30
70	12.70	500	21.00
80	11.20	550	22.30
90	13.10	600	23.40
100	14.40	650	22.90
120	15.30	700	24.60
125	15.00	750	24.50
140	12.80	800	25.40
150	16.50	850	26.40
160	12.90	900	27.20
175	14.30	950	27.80
180	14.50	1000	26.80

COM POWER AH-118**HORN ANTENNA****S/N: 071175****CALIBRATION DATE: FEBRUARY 22, 2018**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.71	10.0	40.08
1.5	25.46	10.5	40.75
2.0	29.26	11.0	41.78
2.5	27.95	11.5	41.02
3.0	29.03	12.0	40.32
3.5	29.70	12.5	40.96
4.0	30.71	13.0	40.29
4.5	31.62	13.5	39.48
5.0	33.23	14.0	39.89
5.5	35.07	14.5	42.75
6.0	34.43	15.0	40.98
6.5	34.98	15.5	38.54
7.0	36.75	16.0	39.40
7.5	37.10	16.5	39.40
8.0	37.66	17.0	41.74
8.5	39.29	17.5	42.58
9.0	37.75	18.0	44.68
9.5	38.23		

COM-POWER PAM-118A**PREAMPLIFIER****S/N: 551024****CALIBRATION DATE: MAY 10, 2018**

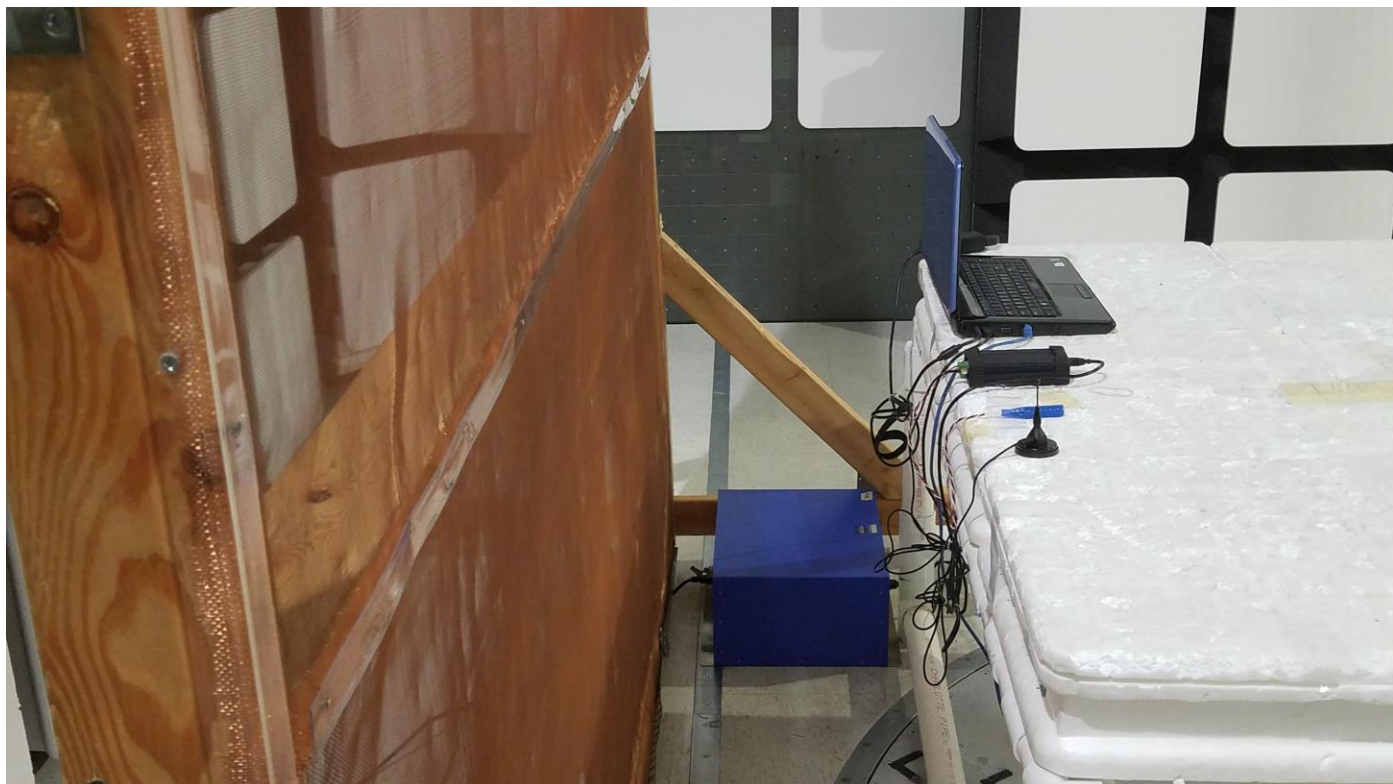
FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	40.99	6.0	39.01
1.1	39.77	6.5	39.00
1.2	39.02	7.0	39.69
1.3	39.44	7.5	38.96
1.4	39.64	8.0	38.57
1.5	40.23	8.5	39.17
1.6	40.17	9.0	38.82
1.7	40.23	9.5	39.30
1.8	39.48	10.0	38.90
1.9	39.85	11.0	38.86
2.0	39.99	12.0	39.87
2.5	40.38	13.0	39.55
3.0	40.64	14.0	38.92
3.5	40.68	15.0	39.33
4.0	40.87	16.0	39.60
4.5	40.04	17.0	40.28
5.0	39.54	18.0	39.58
5.5	39.58		



FRONT VIEW

**BINSFELD ENGINEERING INC.
TT20K SYSTEM RECEIVER
MODEL: RX20K
FCC SUBPART B AND C – CONDUCTED EMISSIONS**

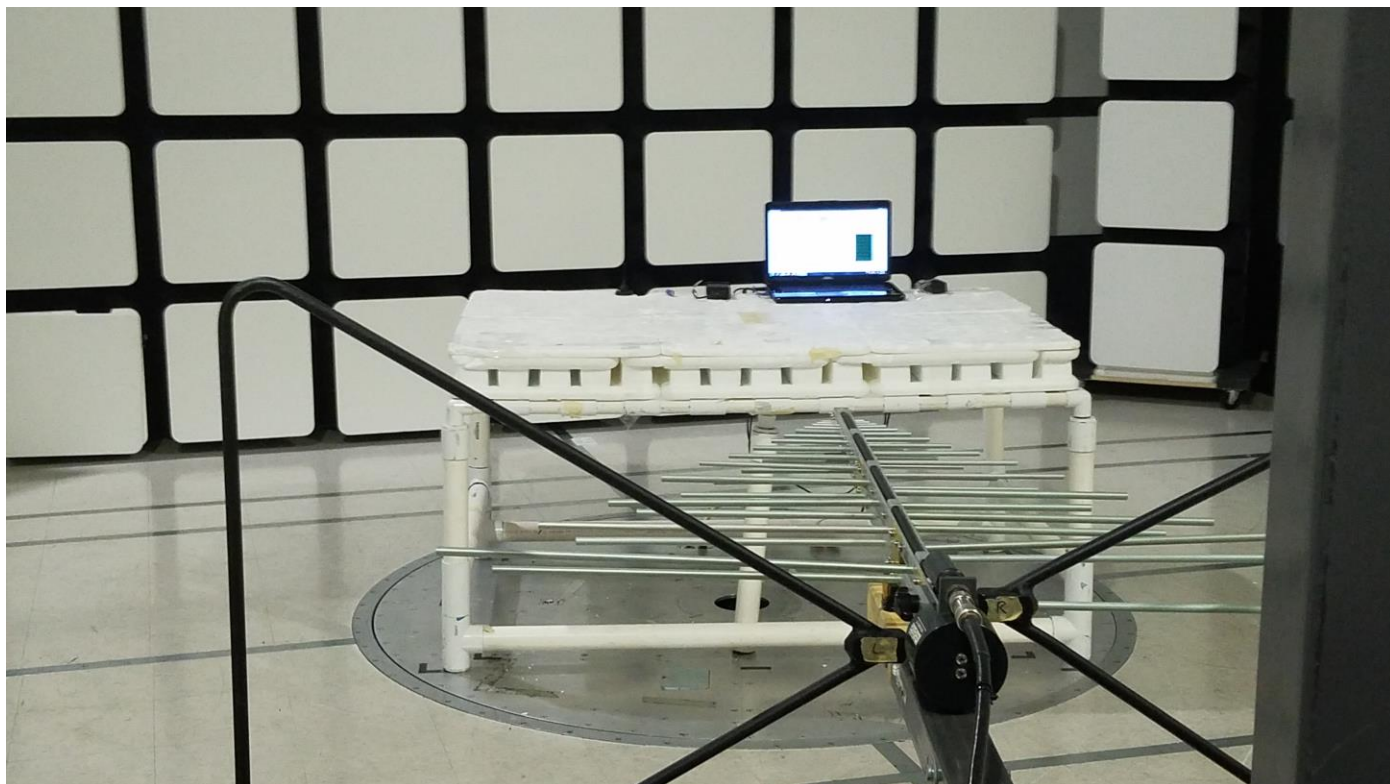
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

BINSFELD ENGINEERING INC.
TT20K SYSTEM RECEIVER
MODEL: RX20K
FCC SUBPART B AND C – CONDUCTED EMISSIONS

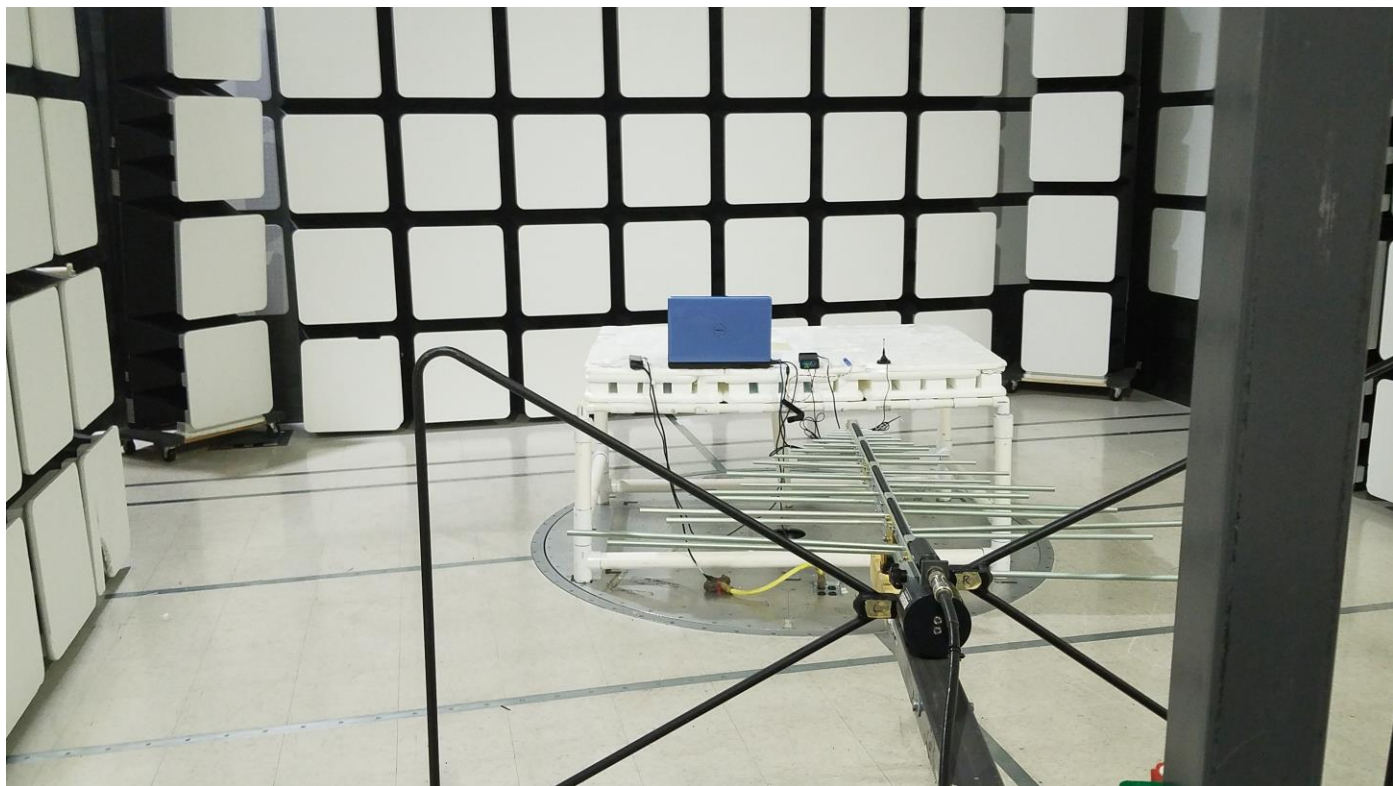
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



FRONT VIEW

BINSFELD ENGINEERING INC.
TT20K SYSTEM RECEIVER
MODEL: RX20K
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

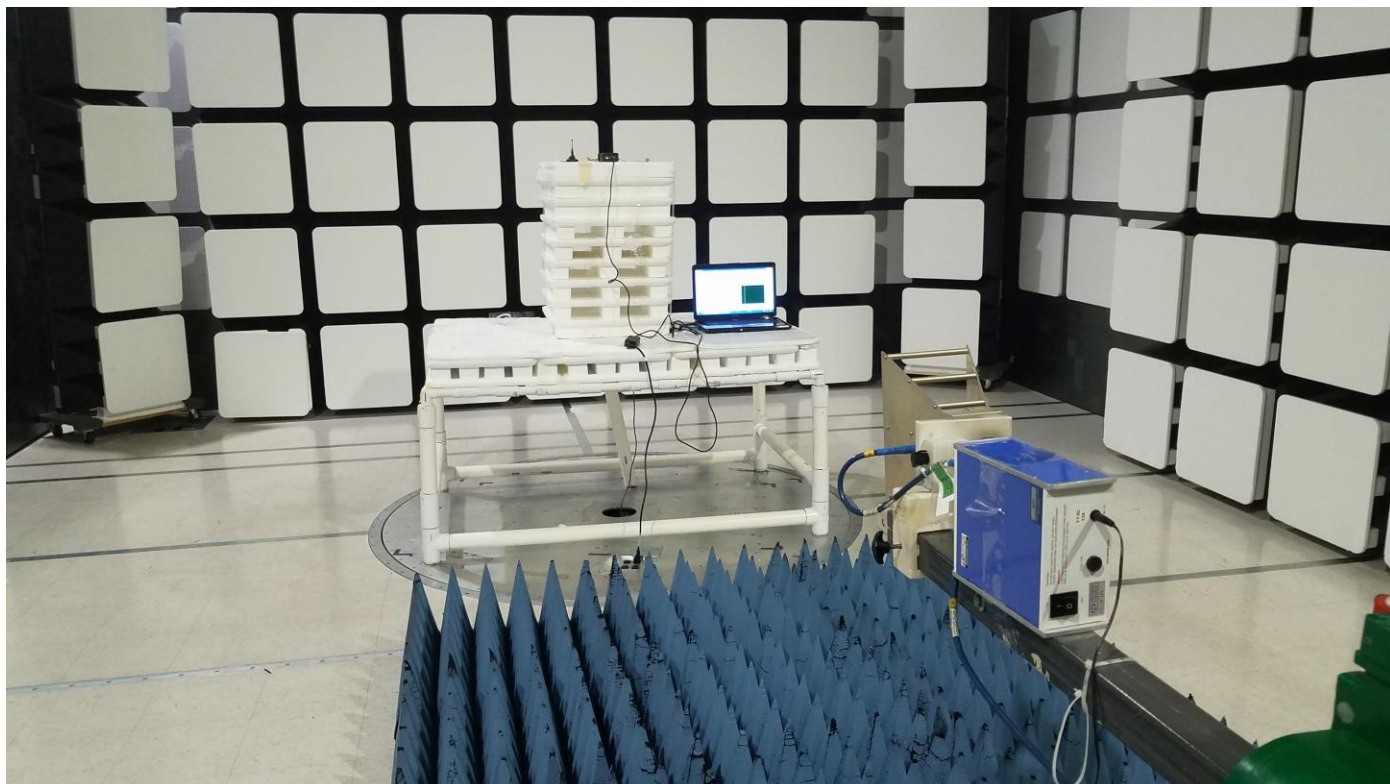
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

**BINSFELD ENGINEERING INC.
TT20K SYSTEM RECEIVER
MODEL: RX20K
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz**

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



FRONT VIEW

BINSFELD ENGINEERING INC.
TT20K SYSTEM RECEIVER
MODEL: RX20K
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

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



REAR VIEW

BINSFELD ENGINEERING INC.
TT20K SYSTEM RECEIVER
MODEL: RX20K
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

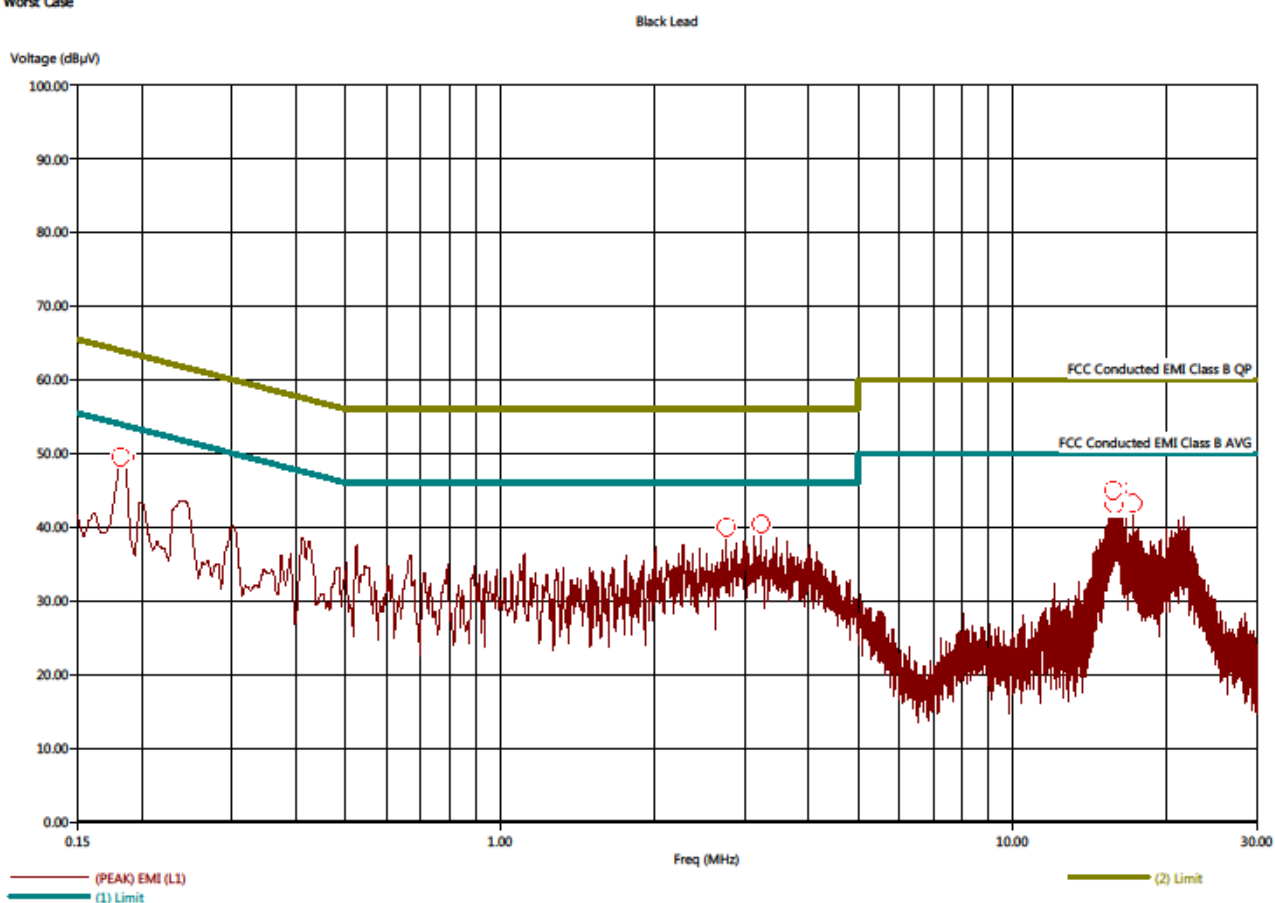
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

APPENDIX E

DATA SHEETS

Title: FCC Class B - Black Lead
File: 5 - Pre-Scan - Black Lead - Tx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously transmitting at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
M/N: RX20K
S/N: N/A
Worst Case

4/11/2019 4:24:25 PM
Sequence: Preliminary Scan





FCC Part 15 Subpart B and FCC Section 15.249 Test Report
 TT20K System Receiver
 Model: RX20K

Title: FCC Class B - Black Lead
 File: 5 - Final Scan - Black Lead - Tx Mode - FCC Class B.set
 Operator: Kyle Fujimoto
 EUT Type: TT20K System Receiver
 EUT Condition: The EUT is continuously transmitting at the high channel - X-Axis
 Comments: Company: Binsfeld Engineering, Inc.
 Model: RQ20K
 S/N: N/A

4/11/2019 4:27:52 PM
 Sequence: Final Measurements

Black Lead									
Freq (MHz)	(PEAK) EMI (dBμV)	(AVG) EMI (dBμV)	(PEAK) Marqin (dB)	(AVG) Marqin (AVG) (dB)	(AVG) Limit (dBμV)	Cable (dB)	Transducer (dB)	Filter (dB)	
0.182	51.86	42.79	-2.25	-11.32	54.11	0.00	0.35	9.80	
0.186	51.82	43.02	-2.22	-11.02	54.05	0.00	0.34	9.80	
2.766	38.27	28.36	-7.73	-17.64	46.00	0.04	0.05	9.80	
3.234	38.89	28.88	-7.11	-17.12	46.00	0.05	0.05	9.80	
15.738	44.76	32.67	-5.24	-17.33	50.00	0.17	0.02	9.72	
15.810	43.89	32.04	-6.11	-17.96	50.00	0.17	0.02	9.72	
15.926	44.39	32.05	-5.61	-17.95	50.00	0.17	0.02	9.72	
16.086	44.46	32.32	-5.54	-17.68	50.00	0.17	0.02	9.72	
17.170	41.07	29.59	-8.93	-20.41	50.00	0.18	0.01	9.75	

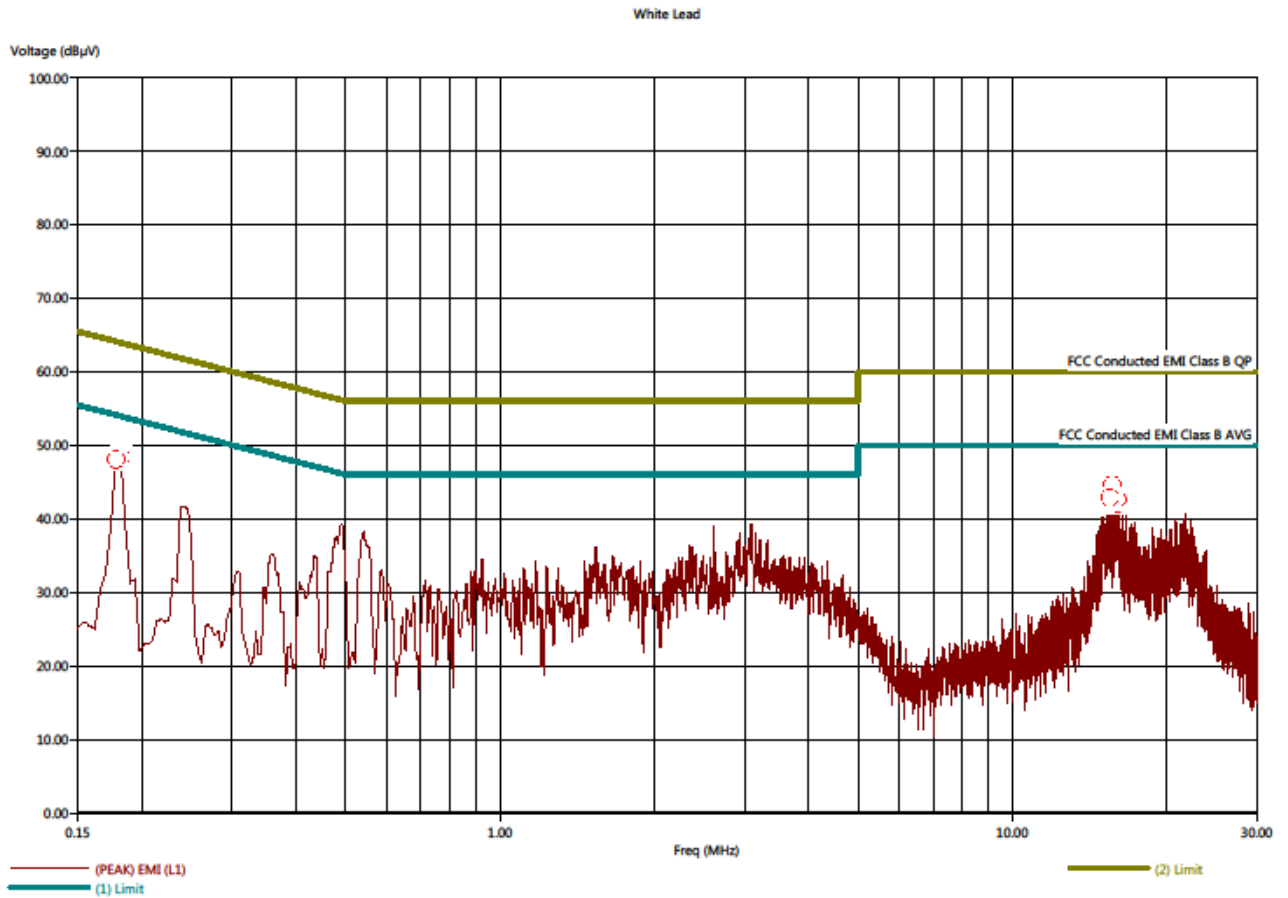
Brea Division
 114 Olinda Drive
 Brea, CA 92823
 (714) 579-0500

Newbury Park Division
 1050 Lawrence Drive
 Newbury Park, CA 91320
 (805) 480-4044

Lake Forest Division
 20621 Pascal Way
 Lake Forest, CA 92630
 (949) 587-0400

Title: FCC Class B - White Lead
File: 6 - Pre-Scan - White Lead - Tx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously transmitting at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
M/N: RX20K
S/N: N/A
Worst Case

4/11/2019 4:51:19 PM
Sequence: Preliminary Scan





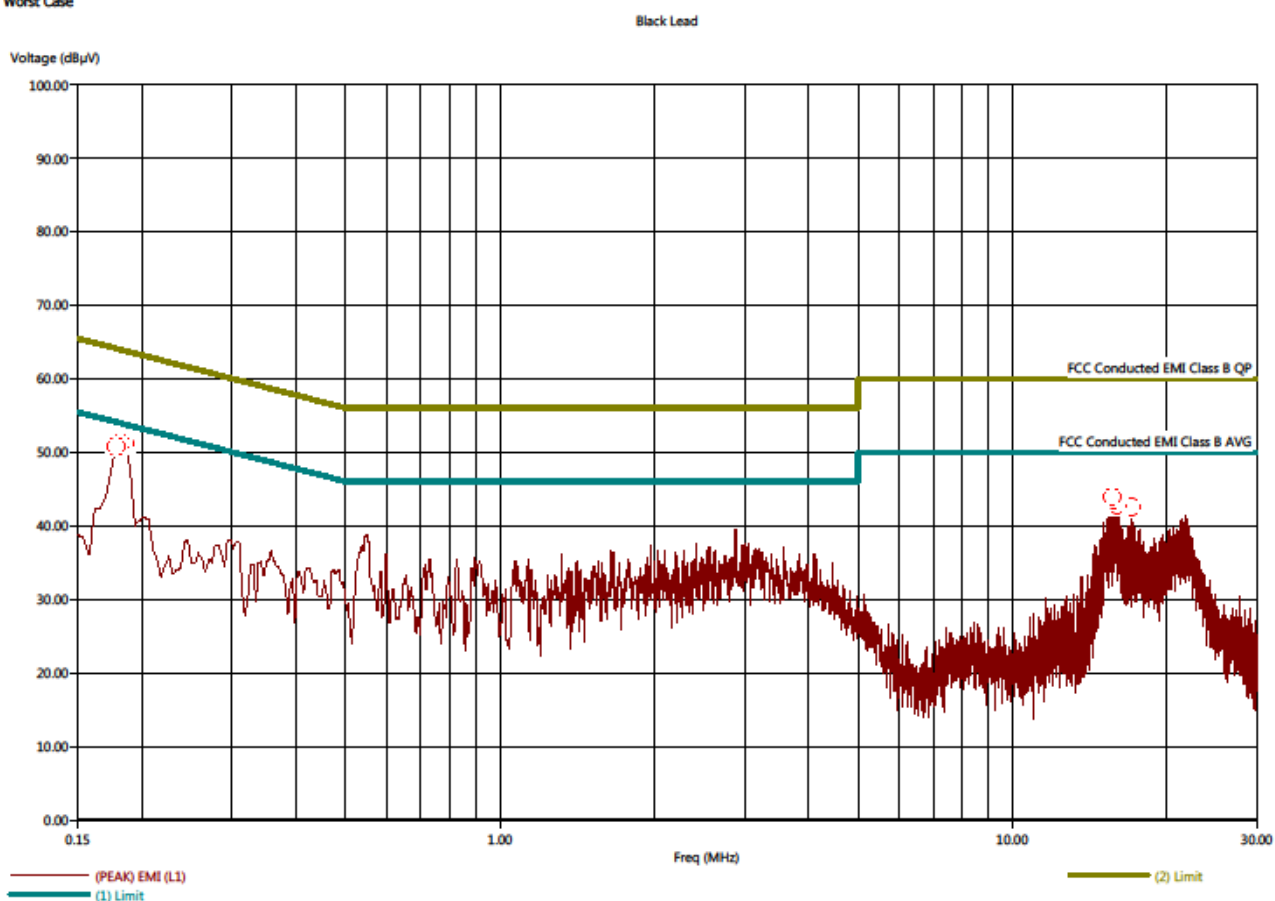
Title: FCC Class B - White Lead
File: 6 - Final Scan - White Lead - Tx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously transmitting at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
Model: RX20K
S/N: N/A

4/11/2019 5:00:08 PM
Sequence: Final Measurements

White Lead									
Freq (MHz)	(PEAK) EMI (dBμV)	(AVG) EMI (dBμV)	(PEAK) Marqin (dB)	(AVG) Marqin (AVG) (dB)	(AVG) Limit (dBμV)	Cable (dB)	Transducer (dB)	Filter (dB)	
0.178	52.91	42.30	-1.23	-11.84	54.14	0.00	0.32		9.80
0.182	52.79	41.79	-1.39	-12.39	54.18	0.00	0.33		9.80
15.486	43.41	31.76	-6.59	-18.24	50.00	0.16	0.07		9.71
15.654	45.30	32.09	-4.70	-17.91	50.00	0.16	0.07		9.71
16.006	45.46	31.74	-4.54	-18.26	50.00	0.17	0.07		9.72
16.058	44.42	31.60	-5.58	-18.40	50.00	0.17	0.07		9.72

Title: FCC Class B - Black Lead
File: 7 - Pre-Scan - Black Lead - Rx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously receiving at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
M/N: RX20K
S/N: N/A
Worst Case

4/11/2019 4:30:20 PM
Sequence: Preliminary Scan



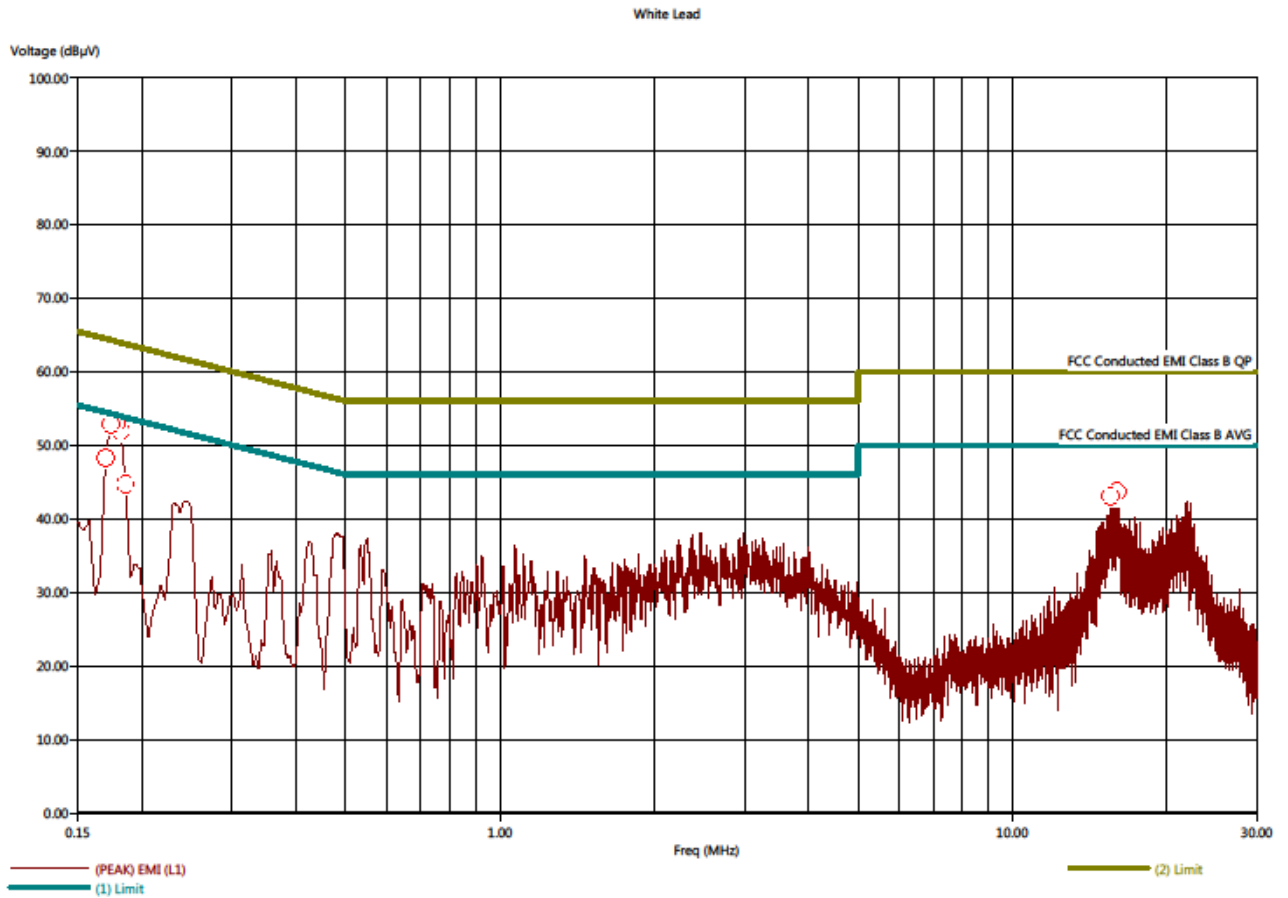
Title: FCC Class B - Black Lead
File: 7 - Final Scan - Black Lead - Rx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously receiving at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
Model: RQ20K
S/N: N/A

4/11/2019 4:43:03 PM
Sequence: Final Measurements

Black Lead									
Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)	
0.178	52.02	43.00	-2.08	-11.10	54.09	0.00	0.35		9.80
0.182	51.63	43.04	-2.33	-10.92	53.96	0.00	0.34		9.80
0.186	51.05	39.48	-2.71	-14.28	53.76	0.00	0.33		9.80
15.666	44.06	30.95	-5.94	-19.05	50.00	0.16	0.02		9.72
15.742	44.52	31.12	-5.48	-18.88	50.00	0.17	0.02		9.72
15.930	43.80	30.60	-6.20	-19.40	50.00	0.17	0.02		9.72
16.006	43.64	30.84	-6.36	-19.16	50.00	0.17	0.02		9.72
17.114	41.27	27.39	-8.73	-22.61	50.00	0.18	0.01		9.75

Title: FCC Class B - White Lead
File: 8 - Pre-Scan - White Lead - Rx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously receiving at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
M/N: RX20K
S/N: N/A
Worst Case

4/11/2019 4:47:03 PM
Sequence: Preliminary Scan



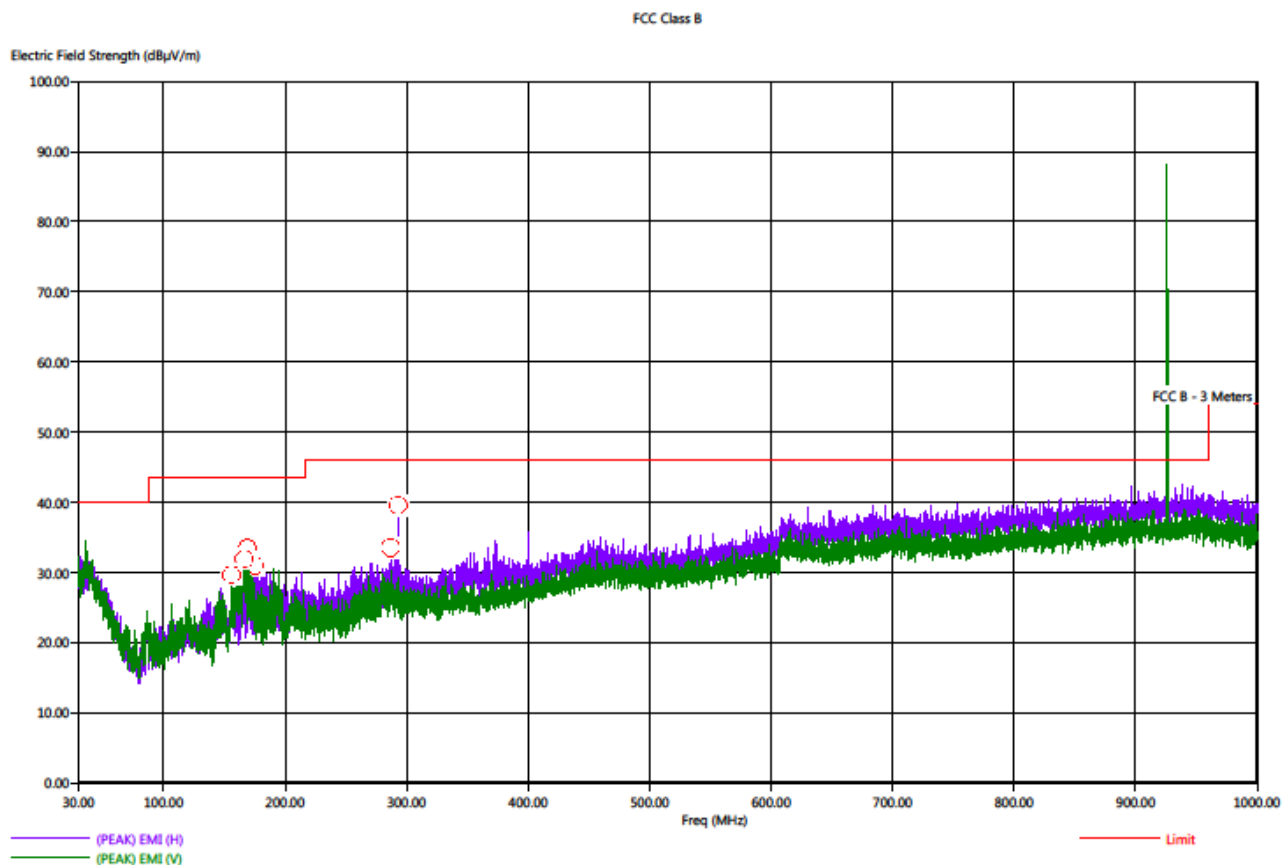
Title: FCC Class B - White Lead
File: 8 - Final Scan - White Lead - Rx Mode - FCC Class B.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously receiving at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
Model: RX20K
S/N: N/A

4/11/2019 4:49:13 PM
Sequence: Final Measurements

White Lead									
Freq (MHz)	(PEAK) EMI (dBμV)	(AVG) EMI (dBμV)	(PEAK) Marqin (dB)	(AVG) Marqin (dB)	(AVG) Limit (dBμV)	Cable (dB)	Transducer (dB)	Filter (dB)	
0.170	52.14	42.65	-1.86	-11.35	53.99	0.00	0.32		9.80
0.174	52.85	42.61	-1.19	-11.43	54.04	0.00	0.32		9.80
0.178	52.02	42.75	-2.01	-11.28	54.02	0.00	0.32		9.80
0.182	52.00	42.70	-2.00	-11.30	54.00	0.00	0.32		9.80
0.186	52.15	42.52	-1.81	-11.44	53.96	0.00	0.31		9.80
15.534	45.16	31.64	-4.84	-18.36	50.00	0.16	0.07		9.71
16.006	44.43	32.34	-5.57	-17.66	50.00	0.17	0.07		9.72

Title: Radiated Emissions - FCC Class B
File: 3 - Aqilent - Tx Mode - Pre-Scan - X-Axis - 04-10-2019.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously transmitting at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, inc.
M/N: RX20K
S/N: N/A
X-Axis Worst Case
Note: The Frequency at the 925.85 MHz is from the Transmitter and is subject to the limits of FCC 15.249 instead.

4/10/2019 3:37:02 PM
Sequence: Preliminary Scan



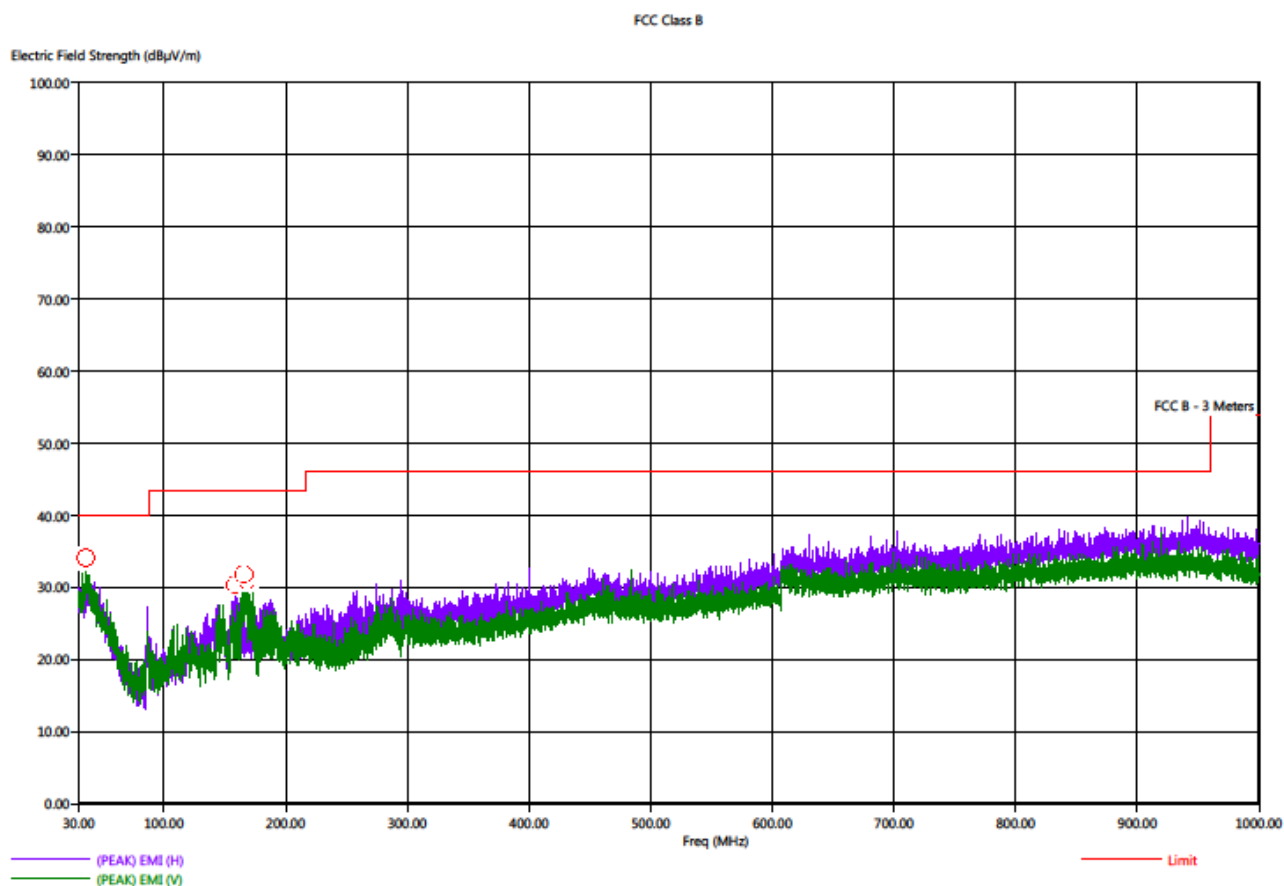
Title: Radiated Emissions - FCC Class B
File: 4 - Agilent - Tx Mode - Final Scan - X-Axis - 04-10-2019.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously transmitting at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, Inc.
M/N: RX20K
S/N: N/A
X-Axis Worst Case

4/10/2019 4:06:55 PM
Sequence: Final Measurements

FCC Class B										
Freq (MHz)	Pol	(PEAK) EMI (dBμV/m)	(QP) EMI (dBμV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBμV/m)	Transducer (dB)	Cable (dB)	Ttl Aql (deg)	Twr Ht (cm)
155.90	V	32.07	26.71	-11.43	-16.79	43.50	14.35	1.30	48.50	112.16
166.30	V	33.52	28.40	-9.98	-15.10	43.50	13.51	1.30	359.75	127.32
168.70	V	35.94	31.79	-7.56	-11.71	43.50	13.73	1.30	4.75	127.26
175.10	H	35.94	30.91	-7.56	-12.59	43.50	14.31	1.30	346.50	127.32
286.70	H	38.02	29.82	-7.98	-16.18	46.00	17.11	1.70	24.50	111.20
292.80	H	39.01	27.27	-6.99	-18.73	46.00	17.39	1.70	359.25	111.44

Title: Radiated Emissions - FCC Class B
File: 1 - Aqilent - Rx Mode - Pre-Scan - X-Axis - 04-10-2019.set
Operator: Kyle Fujimoto
EUT Type: TT20K System Receiver
EUT Condition: The EUT is continuously receiving at the high channel - X-Axis
Comments: Company: Binsfeld Engineering, inc.
M/N: RX20K
S/N: N/A
X-Axis Worst Case

4/10/2019 2:37:05 PM
Sequence: Preliminary Scan



No emissions found above 1 GHz

Title: Radiated Emissions - FCC Class B
 File: 2 - Agilent - Rx Mode - Final Scan - X-Axis - 04-10-2019.set
 Operator: Kyle Fujimoto
 EUT Type: TT20K System Receiver
 EUT Condition: The EUT is continuously receiving at the high channel - X-Axis
 Comments: Company: Binsfeld Engineering, Inc.
 M/N: RX20K
 S/N: N/A
 X-Axis Worst Case

4/10/2019 3:04:21 PM
 Sequence: Final Measurements

FCC Class B										
Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Aql (dca)	Twr Ht (cm)
35.80	V	37.24	32.47	-2.76	-7.53	40.00	24.12	0.86	275.25	127.26
36.20	V	36.71	31.66	-3.29	-8.34	40.00	24.18	0.87	250.75	159.08
158.50	H	28.08	23.62	-15.42	-19.88	43.50	13.43	1.30	333.00	111.44
165.50	V	33.96	28.99	-9.54	-14.51	43.50	13.44	1.30	19.00	127.32
167.60	V	34.87	29.51	-8.63	-13.99	43.50	13.60	1.30	58.25	127.26
168.20	V	36.30	32.75	-7.20	-10.75	43.50	13.67	1.30	52.25	111.20

1

No emissions found above 1 GHz

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel

X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	93.40	V	93.97	-0.57	Peak	30.25	100.19	
903.37	93.31	V	93.97	-0.66	QP	30.25	100.19	
1806.74	34.79	V	73.97	-39.18	Peak	139.25	175.38	
1806.74	22.93	V	53.97	-31.04	Avg	139.25	175.38	
2710.11	40.60	V	73.97	-33.37	Peak	284.75	111.44	
2710.11	34.55	V	53.97	-19.42	Avg	284.75	111.44	
3613.48	49.08	V	73.97	-24.89	Peak	184.75	191.20	
3613.48	42.94	V	53.97	-11.03	Avg	184.75	191.20	
4516.85	49.58	V	73.97	-24.39	Peak	194.75	142.73	
4516.85	47.08	V	53.97	-6.89	Avg	194.75	142.73	
5420.22	47.12	V	73.97	-26.85	Peak	218.50	126.97	
5420.22	41.72	V	53.97	-12.25	Avg	218.50	126.97	
6323.59	45.77	V	73.97	-28.20	Peak	161.00	127.14	
6323.59	38.52	V	53.97	-15.45	Avg	161.00	127.14	
7226.96	54.68	V	73.97	-19.29	Peak	212.00	143.26	
7226.96	52.12	V	53.97	-1.85	Avg	212.00	143.26	
8130.33	49.01	V	73.97	-24.96	Peak	218.75	127.14	
8130.33	42.59	V	53.97	-11.38	Avg	218.75	127.14	
9033.70	49.12	V	73.97	-24.85	Peak	157.00	127.26	
9033.70	41.62	V	53.97	-12.35	Avg	157.00	127.26	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel

X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	83.17	H	93.97	-10.80	Peak	9.20	100.95	
903.37	83.00	H	93.97	-10.97	QP	9.50	100.95	
1806.74	34.34	H	73.97	-39.63	Peak	146.00	143.14	
1806.74	22.82	H	53.97	-31.15	Avg	146.00	143.14	
2710.11	36.88	H	73.97	-37.09	Peak	51.75	175.56	
2710.11	25.47	H	53.97	-28.50	Avg	51.75	175.56	
3613.48	48.02	H	73.97	-25.95	Peak	73.00	143.14	
3613.48	45.33	H	53.97	-8.64	Avg	73.00	143.14	
4516.85	44.60	H	73.97	-29.37	Peak	314.25	111.32	
4516.85	39.11	H	53.97	-14.86	Avg	314.25	111.32	
5420.22	43.97	H	73.97	-30.00	Peak	201.00	159.14	
5420.22	36.77	H	53.97	-17.20	Avg	201.00	159.14	
6323.59	46.83	H	73.97	-27.14	Peak	142.00	175.74	
6323.59	39.93	H	53.97	-14.04	Avg	142.00	175.74	
7226.96	52.07	H	73.97	-21.90	Peak	194.50	127.26	
7226.96	47.45	H	53.97	-6.52	Avg	194.50	127.26	
8130.33	46.56	H	73.97	-27.41	Peak	132.50	249.99	
8130.33	38.05	H	53.97	-15.92	Avg	132.50	249.99	
9033.70	47.78	H	73.97	-26.19	Peak	187.00	127.26	
9033.70	37.58	H	53.97	-16.39	Avg	187.00	127.26	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel

Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	83.54	V	93.97	-10.43	Peak	25.50	100.02	
903.37	82.37	V	93.97	-11.61	QP	25.50	100.02	
1806.74	53.67	V	73.97	-20.30	Peak	201.00	127.14	
1806.74	43.08	V	53.97	-10.89	Avg	201.00	127.14	
2710.11	40.15	V	73.97	-33.82	Peak	172.25	239.02	
2710.11	32.96	V	53.97	-21.01	Avg	172.25	239.02	
3613.48	44.71	V	73.97	-29.26	Peak	74.75	191.86	
3613.48	40.21	V	53.97	-13.76	Avg	74.75	191.86	
4516.85	48.34	V	73.97	-25.63	Peak	51.50	127.20	
4516.85	45.35	V	53.97	-8.62	Avg	51.50	127.20	
5420.22	45.30	V	73.97	-28.67	Peak	354.50	159.14	
5420.22	38.73	V	53.97	-15.24	Avg	354.50	159.14	
6323.59	42.62	V	73.97	-31.35	Peak	195.00	191.08	
6323.59	32.16	V	53.97	-21.81	Avg	195.00	191.08	
7226.96	49.21	V	73.97	-24.76	Peak	0.00	159.20	
7226.96	43.10	V	53.97	-10.87	Avg	0.00	159.20	
8130.33	46.70	V	73.97	-27.27	Peak	217.25	175.20	
8130.33	38.63	V	53.97	-15.34	Avg	217.25	175.20	
9033.70	46.08	V	73.97	-27.89	Peak	14.00	190.97	
9033.70	35.44	V	53.97	-18.53	Avg	14.00	190.97	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel

Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	86.14	H	93.97	-7.83	Peak	133.25	100.25	
903.37	85.16	H	93.97	-8.81	QP	133.25	100.25	
1806.74	33.95	H	73.97	-40.02	Peak	99.25	239.08	
1806.74	22.78	H	53.97	-31.19	Avg	99.25	239.08	
2710.11	40.26	H	73.97	-33.71	Peak	210.00	129.47	
2710.11	33.94	H	53.97	-20.03	Avg	210.00	129.47	
3613.48	44.67	H	73.97	-29.30	Peak	139.50	127.14	
3613.48	39.77	H	53.97	-14.20	Avg	139.50	127.14	
4516.85	45.47	H	73.97	-28.50	Peak	83.25	249.99	
4516.85	40.93	H	53.97	-13.04	Avg	83.25	249.99	
5420.22	41.13	H	73.97	-32.84	Peak	157.75	126.31	
5420.22	30.17	H	53.97	-23.80	Avg	157.75	126.31	
6323.59	44.81	H	73.97	-29.16	Peak	133.25	110.67	
6323.59	36.39	H	53.97	-17.58	Avg	133.25	110.67	
7226.96	51.96	H	73.97	-22.01	Peak	167.50	175.02	
7226.96	47.58	H	53.97	-6.39	Avg	167.50	175.02	
8130.33	44.97	H	73.97	-29.00	Peak	255.00	143.20	
8130.33	34.18	H	53.97	-19.79	Avg	255.00	143.20	
9033.70	47.59	H	73.97	-26.38	Peak	142.25	145.25	
9033.70	38.02	H	53.97	-15.95	Avg	142.25	145.25	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel

Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	83.09	V	93.97	-10.88	Peak	320.00	100.25	
903.37	82.12	V	93.97	-11.85	QP	320.00	100.25	
1806.74	53.66	V	73.97	-20.31	Peak	237.75	174.91	
1806.74	42.81	V	53.97	-11.16	Avg	237.75	174.91	
2710.11	40.79	V	73.97	-33.18	Peak	266.00	111.38	
2710.11	34.83	V	53.97	-19.14	Avg	266.00	111.38	
3613.48	46.84	V	73.97	-27.13	Peak	23.75	127.14	
3613.48	43.60	V	53.97	-10.37	Avg	23.75	127.14	
4516.85	45.95	V	73.97	-28.02	Peak	286.00	175.20	
4516.85	41.51	V	53.97	-12.46	Avg	286.00	175.20	
5420.22	41.12	V	73.97	-32.85	Peak	214.00	127.08	
5420.22	30.33	V	53.97	-23.64	Avg	214.00	127.08	
6323.59	47.76	V	73.97	-26.21	Peak	173.00	127.14	
6323.59	42.16	V	53.97	-11.81	Avg	173.00	127.14	
7226.96	52.76	V	73.97	-21.21	Peak	162.50	111.32	
7226.96	48.76	V	53.97	-5.21	Avg	162.50	111.32	
8130.33	48.13	V	73.97	-25.84	Peak	304.75	143.32	
8130.33	41.21	V	53.97	-12.76	Avg	304.75	143.32	
9033.70	48.76	V	73.97	-25.21	Peak	295.25	158.97	
9033.70	41.24	V	53.97	-12.73	Avg	295.25	158.97	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel

Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
903.37	89.47	H	93.97	-4.50	Peak	60.50	126.85	
903.37	89.39	H	93.97	-4.58	QP	60.50	126.85	
1806.74	53.49	H	73.97	-20.48	Peak	231.75	127.08	
1806.74	42.82	H	53.97	-11.15	Avg	231.75	127.08	
2710.11	36.21	H	73.97	-37.76	Peak	49.00	223.02	
2710.11	25.41	H	53.97	-28.56	Avg	49.00	223.02	
3613.48	44.20	H	73.97	-29.77	Peak	304.75	127.26	
3613.48	38.74	H	53.97	-15.23	Avg	304.75	127.26	
4516.85	50.13	H	73.97	-23.84	Peak	169.25	127.08	
4516.85	47.81	H	53.97	-6.16	Avg	169.25	127.08	
5420.22	45.29	H	73.97	-28.68	Peak	328.00	110.55	
5420.22	38.47	H	53.97	-15.50	Avg	328.00	110.55	
6323.59	44.88	H	73.97	-29.09	Peak	47.75	249.95	
6323.59	36.20	H	53.97	-17.77	Avg	47.75	249.95	
7226.96	54.81	H	73.97	-19.16	Peak	204.50	111.44	
7226.96	52.25	H	53.97	-1.72	Avg	204.50	111.44	
8130.33	47.51	H	73.97	-26.46	Peak	190.00	143.38	
8130.33	39.57	H	53.97	-14.40	Avg	190.00	143.38	
9033.70	49.20	H	73.97	-24.77	Peak	134.25	191.68	
9033.70	40.98	H	53.97	-12.99	Avg	134.25	191.68	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Date:
 04/09/2019
 Lab: D
 Tested By: Kyle Fujimoto

**Mid Channel
 X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
913.78	93.35	V	93.97	-0.62	Peak	13.50	100.07	
913.78	93.11	V	93.97	-0.86	QP	13.50	100.07	
1827.56	53.80	V	73.97	-20.17	Peak	269.75	143.20	
1827.56	43.15	V	53.97	-10.82	Avg	269.75	143.20	
2741.34	41.89	V	73.97	-32.08	Peak	261.25	109.71	
2741.34	36.85	V	53.97	-17.12	Avg	261.25	109.71	
3655.12	47.39	V	73.97	-26.58	Peak	198.50	206.73	
3655.12	44.12	V	53.97	-9.85	Avg	198.50	206.73	
4568.90	46.58	V	73.97	-27.39	Peak	274.50	191.02	
4568.90	41.91	V	53.97	-12.06	Avg	274.50	191.02	
5482.68	41.54	V	73.97	-32.43	Peak	277.75	191.02	
5482.68	30.55	V	53.97	-23.42	Avg	277.75	191.02	
6396.46	46.46	V	73.97	-27.51	Peak	156.00	111.44	
6396.46	39.97	V	53.97	-14.00	Avg	156.00	111.44	
7310.24	54.44	V	73.97	-19.53	Peak	217.75	207.74	
7310.24	51.26	V	53.97	-2.71	Avg	217.75	207.74	
8224.02	47.94	V	73.97	-26.03	Peak	207.25	127.32	
8224.02	41.09	V	53.97	-12.88	Avg	207.25	127.32	
9137.80	48.41	V	73.97	-25.56	Peak	203.00	127.26	
9137.80	39.89	V	53.97	-14.08	Avg	203.00	127.26	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Date:
 04/09/2019
 Lab: D
 Tested By: Kyle Fujimoto

**Mid Channel
 X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
913.78	79.61	H	93.97	-14.36	Peak	159.50	100.31	
913.78	79.26	H	93.97	-14.71	QP	159.50	100.31	
1827.56	36.14	H	73.97	-37.83	Peak	28.75	175.14	
1827.56	25.75	H	53.97	-28.22	Avg	28.75	175.14	
2741.34	36.44	H	73.97	-37.53	Peak	320.50	249.99	
2741.34	25.64	H	53.97	-28.33	Avg	320.50	249.99	
3655.12	39.21	H	73.97	-34.76	Peak	50.75	143.38	
3655.12	28.05	H	53.97	-25.92	Avg	50.75	143.38	
4568.90	45.63	H	73.97	-28.34	Peak	349.50	127.26	
4568.90	41.90	H	53.97	-12.07	Avg	349.50	127.26	
5482.68	43.10	H	73.97	-30.87	Peak	295.25	175.26	
5482.68	33.96	H	53.97	-20.01	Avg	295.25	175.26	
6396.46	46.43	H	73.97	-27.54	Peak	272.00	111.38	
6396.46	38.84	H	53.97	-15.13	Avg	272.00	111.38	
7310.24	55.90	H	73.97	-18.07	Peak	274.75	111.38	
7310.24	52.98	H	53.97	-0.99	Avg	274.75	111.38	
8224.02	46.18	H	73.97	-27.79	Peak	235.50	175.08	
8224.02	36.05	H	53.97	-17.92	Avg	235.50	175.08	
9137.80	46.74	H	73.97	-27.23	Peak	19.00	159.14	
9137.80	36.45	H	53.97	-17.52	Avg	19.00	159.14	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Date:
 04/09/2019
 Lab: D
 Tested By: Kyle Fujimoto

**Mid Channel
 Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
913.78	84.01	V	93.97	-9.96	Peak	256.75	100.38	
913.78	82.59	V	93.97	-11.38	QP	256.75	100.38	
1827.56	53.76	V	73.97	-20.21	Peak	6.00	176.46	
1827.56	43.20	V	53.97	-10.77	Avg	6.00	176.46	
2741.34	36.55	V	73.97	-37.42	Peak	61.25	175.08	
2741.34	25.04	V	53.97	-28.93	Avg	61.25	175.08	
3655.12	47.07	V	73.97	-26.90	Peak	75.00	127.20	
3655.12	43.73	V	53.97	-10.24	Avg	75.00	127.20	
4568.90	48.46	V	73.97	-25.51	Peak	178.75	223.14	
4568.90	45.42	V	53.97	-8.55	Avg	178.75	223.14	
5482.68	42.51	V	73.97	-31.46	Peak	194.50	159.20	
5482.68	32.35	V	53.97	-21.62	Avg	194.50	159.20	
6396.46	46.46	V	73.97	-27.51	Peak	153.25	159.20	
6396.46	39.97	V	53.97	-14.00	Avg	153.25	159.20	
7310.24	55.83	V	73.97	-18.14	Peak	205.75	111.50	
7310.24	52.75	V	53.97	-1.22	Avg	205.75	111.50	
8224.02	46.00	V	73.97	-27.97	Peak	288.00	111.26	
8224.02	35.90	V	53.97	-18.07	Avg	288.00	111.26	
9137.80	46.66	V	73.97	-27.31	Peak	295.00	249.99	
9137.80	35.86	V	53.97	-18.11	Avg	295.00	249.99	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Date:
 04/09/2019
 Lab: D
 Tested By: Kyle Fujimoto

**Mid Channel
 Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
913.78	87.44	H	93.97	-6.53	Peak	116.75	100.25	
913.78	87.35	H	93.97	-6.62	QP	116.75	100.25	
1827.56	36.77	H	73.97	-37.20	Peak	187.50	158.79	
1827.56	25.51	H	53.97	-28.46	Avg	187.50	158.79	
2741.34	36.35	H	73.97	-37.62	Peak	216.50	111.44	
2741.34	25.93	H	53.97	-28.04	Avg	216.50	111.44	
3655.12	44.24	H	73.97	-29.73	Peak	46.50	112.58	
3655.12	38.38	H	53.97	-15.59	Avg	46.50	112.58	
4568.90	45.45	H	73.97	-28.52	Peak	168.00	222.67	
4568.90	40.77	H	53.97	-13.20	Avg	168.00	222.67	
5482.68	43.27	H	73.97	-30.70	Peak	304.25	111.14	
5482.68	32.21	H	53.97	-21.76	Avg	304.25	111.14	
6396.46	45.05	H	73.97	-28.92	Peak	183.00	111.38	
6396.46	36.71	H	53.97	-17.26	Avg	183.00	111.38	
7310.24	52.64	H	73.97	-21.33	Peak	266.50	111.32	
7310.24	48.07	H	53.97	-5.90	Avg	266.50	111.32	
8224.02	46.34	H	73.97	-27.63	Peak	233.00	175.32	
8224.02	36.60	H	53.97	-17.37	Avg	233.00	175.32	
9137.80	47.23	H	73.97	-26.74	Peak	143.75	159.20	
9137.80	36.23	H	53.97	-17.74	Avg	143.75	159.20	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Date:
 04/09/2019
 Lab: D
 Tested By: Kyle Fujimoto

**Mid Channel
 Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
913.78	84.12	V	93.97	-9.86	Peak	357.00	173.23	
913.78	82.73	V	93.97	-11.24	QP	357.00	173.23	
1827.56	54.04	V	73.97	-19.93	Peak	138.50	222.97	
1827.56	43.10	V	53.97	-10.87	Avg	138.50	222.97	
2741.34	41.90	V	73.97	-32.07	Peak	243.50	111.44	
2741.34	37.00	V	53.97	-16.97	Avg	243.50	111.44	
3655.12	39.09	V	73.97	-34.88	Peak	315.25	111.14	
3655.12	27.98	V	53.97	-25.99	Avg	315.25	111.14	
4568.90	48.95	V	73.97	-25.02	Peak	16.50	127.26	
4568.90	45.99	V	53.97	-7.98	Avg	16.50	127.26	
5482.68	41.57	V	73.97	-32.40	Peak	138.50	159.08	
5482.68	30.42	V	53.97	-23.55	Avg	138.50	159.08	
6396.46	47.39	V	73.97	-26.58	Peak	182.75	175.14	
6396.46	41.41	V	53.97	-12.56	Avg	182.75	175.14	
7310.24	54.79	V	73.97	-19.18	Peak	193.50	191.02	
7310.24	51.87	V	53.97	-2.10	Avg	193.50	191.02	
8224.02	45.23	V	73.97	-28.74	Peak	3.75	158.97	
8224.02	34.69	V	53.97	-19.28	Avg	3.75	158.97	
9137.80	46.81	V	73.97	-27.16	Peak	205.50	239.32	
9137.80	36.07	V	53.97	-17.90	Avg	205.50	239.32	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Date:
 04/09/2019
 Lab: D
 Tested By: Kyle Fujimoto

Mid Channel Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
913.78	86.32	H	93.97	-7.65	Peak	237.25	100.25	
913.78	86.02	H	93.97	-7.95	QP	237.25	100.25	
1827.56	36.23	H	73.97	-37.74	Peak	152.75	159.20	
1827.56	25.62	H	53.97	-28.35	Avg	152.75	159.20	
2741.34	36.43	H	73.97	-37.54	Peak	305.25	224.82	
2741.34	25.74	H	53.97	-28.23	Avg	305.25	224.82	
3655.12	48.61	H	73.97	-25.36	Peak	297.50	127.26	
3655.12	45.78	H	53.97	-8.19	Avg	297.50	127.26	
4568.90	50.20	H	73.97	-23.77	Peak	269.25	127.32	
4568.90	47.81	H	53.97	-6.16	Avg	269.25	127.32	
5482.68	42.85	H	73.97	-31.12	Peak	90.00	127.26	
5482.68	34.05	H	53.97	-19.92	Avg	90.00	127.26	
6396.46	46.79	H	73.97	-27.18	Peak	114.50	143.20	
6396.46	40.63	H	53.97	-13.34	Avg	114.50	143.20	
7310.24	54.90	H	73.97	-19.07	Peak	274.75	127.20	
7310.24	51.98	H	53.97	-1.99	Avg	274.75	127.20	
8224.02	44.64	H	73.97	-29.33	Peak	180.25	143.26	
8224.02	33.93	H	53.97	-20.04	Avg	180.25	143.26	
9137.80	47.14	H	73.97	-26.83	Peak	13.25	222.73	
9137.80	36.59	H	53.97	-17.38	Avg	13.25	222.73	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/09/2019 and 04/12/2019
 Lab: D
 Tested By: Kyle Fujimoto

**High Channel
X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
925.87	93.30	V	93.97	-0.67	Peak	9.25	100.53	
925.87	93.25	V	93.97	-0.72	QP	9.25	100.53	
1851.74	56.55	V	73.97	-17.42	Peak	281.50	197.50	
1851.74	44.75	V	53.97	-9.22	Avg	281.50	197.50	
2777.61	58.74	V	73.97	-15.23	Peak	212.50	238.91	
2777.61	49.10	V	53.97	-4.87	Avg	212.50	238.91	
3703.48	48.43	V	73.97	-25.54	Peak	316.50	143.20	
3703.48	45.13	V	53.97	-8.84	Avg	316.50	143.20	
4629.35	50.50	V	73.97	-23.47	Peak	193.50	143.26	
4629.35	48.47	V	53.97	-5.50	Avg	193.50	143.26	
5555.22	45.24	V	73.97	-28.73	Peak	164.25	143.26	
5555.22	38.38	V	53.97	-15.59	Avg	164.25	143.26	
6481.09	47.87	V	73.97	-26.10	Peak	246.50	111.38	
6481.09	42.10	V	53.97	-11.87	Avg	246.50	111.38	
7406.96	51.66	V	73.97	-22.31	Peak	177.00	127.20	
7406.96	46.95	V	53.97	-7.02	Avg	177.00	127.20	
8332.83	48.21	V	73.97	-25.76	Peak	159.50	111.44	
8332.83	41.02	V	53.97	-12.95	Avg	159.50	111.44	
9258.70	46.50	V	73.97	-27.47	Peak	203.25	127.26	
9258.70	36.28	V	53.97	-17.69	Avg	203.25	127.26	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/09/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

**High Channel
X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
925.87	79.39	H	93.97	-14.58	Peak	171.00	100.25	
925.87	78.65	H	93.97	-15.32	QP	171.00	100.25	
1851.74	56.67	H	73.97	-17.30	Peak	143.75	143.38	
1851.74	45.47	H	53.97	-8.50	Avg	143.75	143.38	
2777.61	36.71	H	73.97	-37.26	Peak	320.25	111.26	
2777.61	25.79	H	53.97	-28.18	Avg	320.25	111.26	
3703.48	46.40	H	73.97	-27.57	Peak	50.50	143.32	
3703.48	42.26	H	53.97	-11.71	Avg	50.50	143.32	
4629.35	45.25	H	73.97	-28.72	Peak	57.50	159.14	
4629.35	40.59	H	53.97	-13.38	Avg	57.50	159.14	
5555.22	44.61	H	73.97	-29.36	Peak	288.50	127.32	
5555.22	35.76	H	53.97	-18.21	Avg	288.50	127.32	
6481.09	47.80	H	73.97	-26.17	Peak	248.00	175.26	
6481.09	41.52	H	53.97	-12.45	Avg	248.00	175.26	
7406.96	50.81	H	73.97	-23.16	Peak	65.25	111.44	
7406.96	45.76	H	53.97	-8.21	Avg	65.25	111.44	
8332.83	45.28	H	73.97	-28.69	Peak	358.50	127.02	
8332.83	34.08	H	53.97	-19.89	Avg	358.50	127.02	
9258.70	47.17	H	73.97	-26.80	Peak	7.25	249.95	
9258.70	35.99	H	53.97	-17.98	Avg	7.25	249.95	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/09/2019 and 04/12/2019
 Lab: D
 Tested By: Kyle Fujimoto

**High Channel
Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
925.87	84.52	V	93.97	-9.45	Peak	180.00	110.25	
925.87	84.16	V	93.97	-9.81	QP	180.00	110.25	
1851.74	57.07	V	73.97	-16.90	Peak	48.00	144.16	
1851.74	44.74	V	53.97	-9.23	Avg	48.00	144.16	
2777.61	59.43	V	73.97	-14.54	Peak	193.50	109.95	
2777.61	52.05	V	53.97	-1.92	Avg	193.50	109.95	
3703.48	47.23	V	73.97	-26.74	Peak	181.50	144.04	
3703.48	43.90	V	53.97	-10.07	Avg	181.50	144.04	
4629.35	44.60	V	73.97	-29.37	Peak	186.25	159.20	
4629.35	38.34	V	53.97	-15.63	Avg	186.25	159.20	
5555.22	41.29	V	73.97	-32.68	Peak	296.75	143.08	
5555.22	30.45	V	53.97	-23.52	Avg	296.75	143.08	
6481.09	47.72	V	73.97	-26.25	Peak	188.25	111.44	
6481.09	41.86	V	53.97	-12.11	Avg	188.25	111.44	
7406.96	49.83	V	73.97	-24.14	Peak	52.00	143.20	
7406.96	44.17	V	53.97	-9.80	Avg	52.00	143.20	
8332.83	45.85	V	73.97	-28.12	Peak	51.25	223.08	
8332.83	35.56	V	53.97	-18.41	Avg	51.25	223.08	
9258.70	46.99	V	73.97	-26.98	Peak	255.00	239.06	
9258.70	35.88	V	53.97	-18.09	Avg	255.00	239.06	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/09/2019 and 04/12/2019
 Lab: D
 Tested By: Kyle Fujimoto

**High Channel
Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
925.87	87.99	H	93.97	-5.98	Peak	93.00	143.44	
925.87	87.92	H	93.97	-6.05	QP	93.00	143.44	
1851.74	56.08	H	73.97	-17.89	Peak	312.50	141.77	
1851.74	45.52	H	53.97	-8.45	Avg	312.50	141.77	
2777.61	57.14	H	73.97	-16.83	Peak	152.25	249.99	
2777.61	45.66	H	53.97	-8.31	Avg	152.25	249.99	
3703.48	43.69	H	73.97	-30.28	Peak	263.50	143.14	
3703.48	35.47	H	53.97	-18.50	Avg	263.50	143.14	
4629.35	43.41	H	73.97	-30.56	Peak	158.25	159.08	
4629.35	36.72	H	53.97	-17.25	Avg	158.25	159.08	
5555.22	43.09	H	73.97	-30.88	Peak	245.75	111.32	
5555.22	33.22	H	53.97	-20.75	Avg	245.75	111.32	
6481.09	42.90	H	73.97	-31.07	Peak	253.00	111.20	
6481.09	32.33	H	53.97	-21.64	Avg	253.00	111.20	
7406.96	50.32	H	73.97	-23.65	Peak	4.00	222.91	
7406.96	44.11	H	53.97	-9.86	Avg	4.00	222.91	
8332.83	44.67	H	73.97	-29.30	Peak	188.25	174.97	
8332.83	34.19	H	53.97	-19.78	Avg	188.25	174.97	
9258.70	47.08	H	73.97	-26.89	Peak	130.00	127.20	
9258.70	35.88	H	53.97	-18.09	Avg	130.00	127.20	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/09/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

High Channel

Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
925.87	84.26	V	93.97	-9.71	Peak	225.00	102.25	
925.87	84.03	V	93.97	-9.94	QP	225.00	102.25	
1851.74	57.09	V	73.97	-16.88	Peak	100.25	138.61	
1851.74	44.82	V	53.97	-9.15	Avg	100.25	138.61	
2777.61	60.16	V	73.97	-13.81	Peak	183.75	189.89	
2777.61	53.34	V	53.97	-0.63	Avg	183.75	189.89	
3703.48	46.73	V	73.97	-27.24	Peak	86.75	111.44	
3703.48	42.81	V	53.97	-11.16	Avg	86.75	111.44	
4629.35	42.34	V	73.97	-31.63	Peak	235.25	143.32	
4629.35	33.71	V	53.97	-20.26	Avg	235.25	143.32	
5555.22	41.54	V	73.97	-32.43	Peak	298.50	206.79	
5555.22	31.35	V	53.97	-22.62	Avg	298.50	206.79	
6481.09	47.68	V	73.97	-26.29	Peak	238.00	207.02	
6481.09	42.08	V	53.97	-11.89	Avg	238.00	207.02	
7406.96	51.65	V	73.97	-22.32	Peak	68.50	111.50	
7406.96	46.72	V	53.97	-7.25	Avg	68.50	111.50	
8332.83	46.20	V	73.97	-27.77	Peak	315.00	127.32	
8332.83	36.78	V	53.97	-17.19	Avg	315.00	127.32	
9258.70	46.91	V	73.97	-27.06	Peak	198.00	221.89	
9258.70	36.91	V	53.97	-17.06	Avg	198.00	221.89	

FCC 15.249

Binsfeld Engineering, Inc.
 TT20K System Receiver
 Model: RX20K

Dates: 04/09/2019 and 04/12/2019
 Lab: D
 Tested By: Kyle Fujimoto

**High Channel
Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
925.87	86.98	H	93.97	-6.99	Peak	345.00	103.21	
925.87	86.35	H	93.97	-7.62	QP	345.00	103.21	
1851.74	56.53	H	73.97	-17.44	Peak	277.00	174.97	
1851.74	45.70	H	53.97	-8.27	Avg	277.00	174.97	
2777.61	56.88	H	73.97	-17.09	Peak	31.50	159.14	
2777.61	46.21	H	53.97	-7.76	Avg	31.50	159.14	
3703.48	48.38	H	73.97	-25.59	Peak	281.25	111.08	
3703.48	45.34	H	53.97	-8.63	Avg	281.25	111.08	
4629.35	49.27	H	73.97	-24.70	Peak	292.25	111.20	
4629.35	46.87	H	53.97	-7.10	Avg	292.25	111.20	
5555.22	41.02	H	73.97	-32.95	Peak	65.75	111.20	
5555.22	30.56	H	53.97	-23.41	Avg	65.75	111.20	
6481.09	49.03	H	73.97	-24.94	Peak	138.00	111.38	
6481.09	44.25	H	53.97	-9.72	Avg	138.00	111.38	
7406.96	51.56	H	73.97	-22.41	Peak	215.25	222.85	
7406.96	46.74	H	53.97	-7.23	Avg	215.25	222.85	
8332.83	46.09	H	73.97	-27.88	Peak	100.25	175.14	
8332.83	34.16	H	53.97	-19.81	Avg	100.25	175.14	
9258.70	47.15	H	73.97	-26.82	Peak	149.00	190.85	
9258.70	35.99	H	53.97	-17.98	Avg	149.00	190.85	

FCC 15.249 and 15.209Binsfeld Engineering Inc.
TT20K System Receiver
Model: RX20K

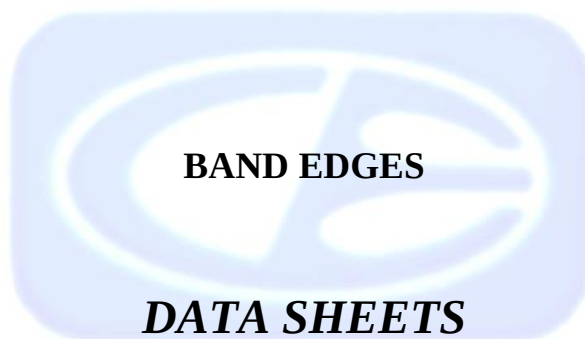
Dates: 4/8/2019 and 4/12/2019

Lab: D

Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx and Digital Portion - 9 kHz to 30 MHz**Non Harmonic Emissions from the Tx and Digital Portion - 1 GHz to 9.3 GHz**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit (dBuV/m)	Margin (dB)	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
								No Emissions Detected
								from 9 kHz to 30 MHz
								for the digital portion
								of the EUT
								No Emissions Detected
								from 9 kHz to 30 MHz
								for the Non-Harmonic Emissions
								of the Transmitter for the EUT
								No Emissions Detected
								from 1 GHz to 9.3 GHz
								for the digital portion
								of the EUT
								No Emissions Detected
								from 1 GHz to 9.3 GHz
								for the Non-Harmonic Emissions
								of the Transmitter for the EUT
								Investigated in the X-Axis,
								Y-Axis, and Z-Axis



FCC 15.249 and 15.209

Binsfeld Engineering, Inc.
TT20K System Receiver
Model: RX20K

Dates: 04/10/2019 and 04/12/2019

Lab: D

Tested By: Kyle Fujimoto

Low Channel Band Edges

[illegible]

FCC 15.249 and 15.209

Binsfeld Engineering, Inc.
TT20K System Receiver
Model: RX20K

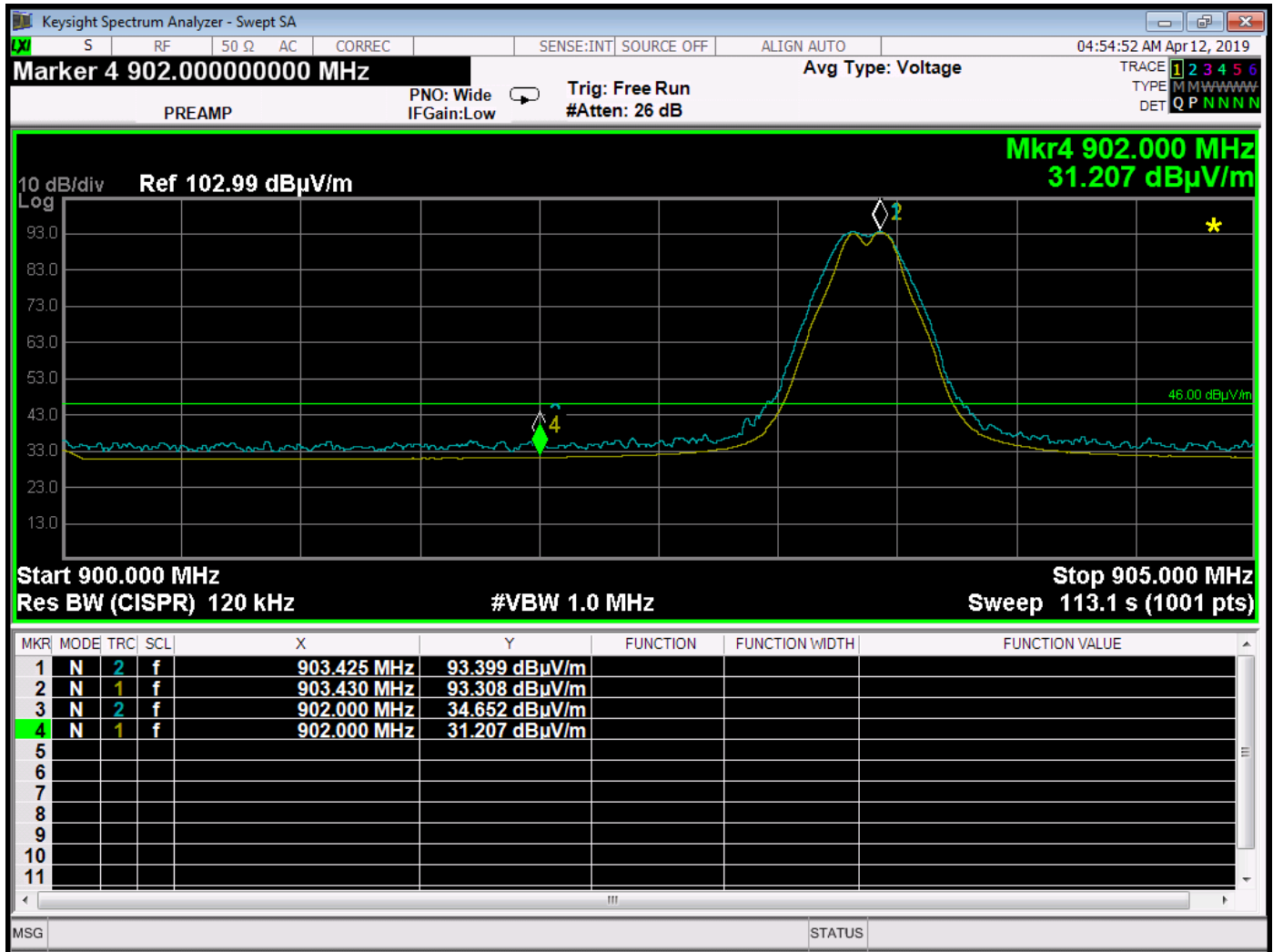
Date: 04/12/2019

Lab: D

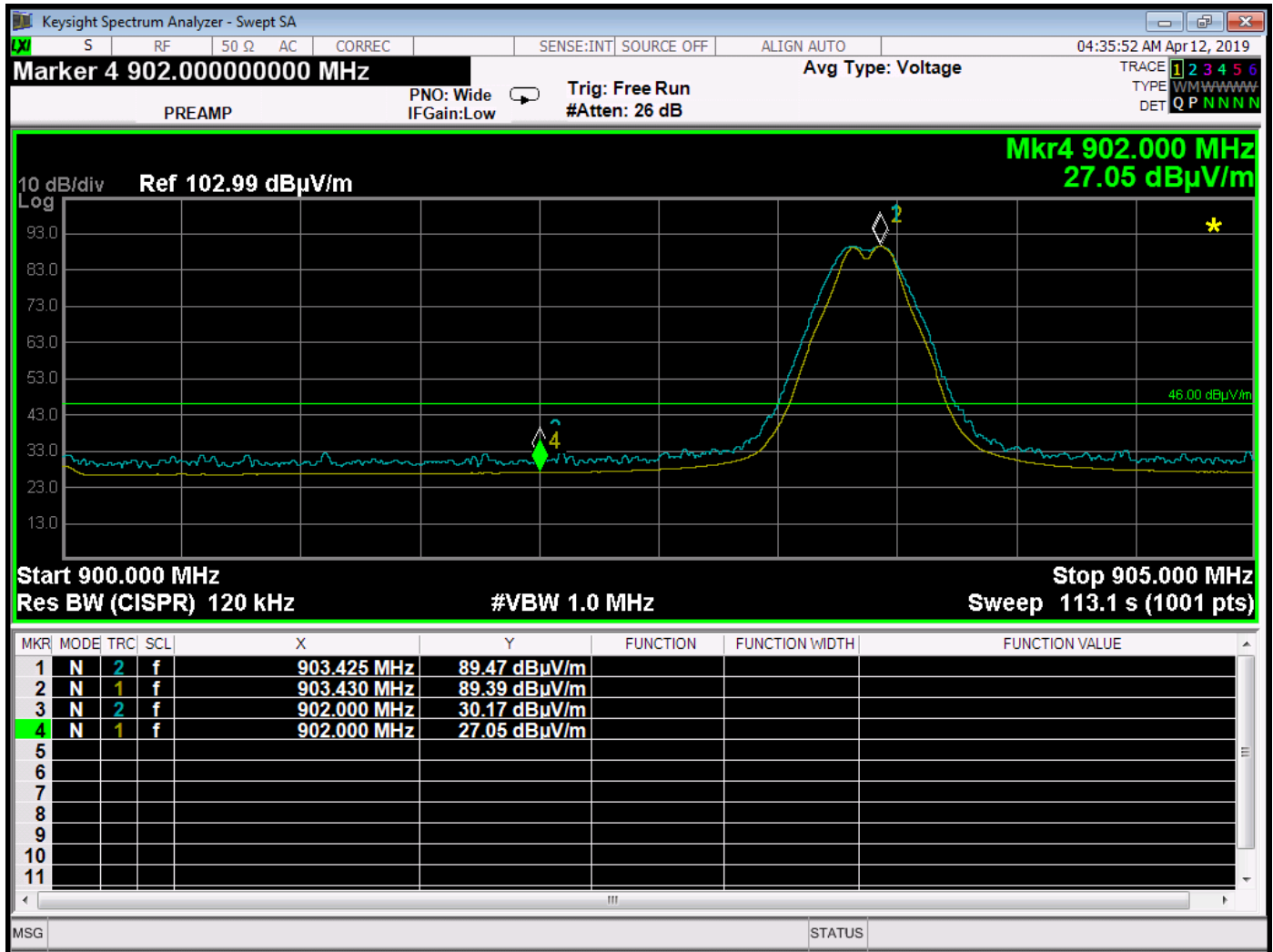
Tested By: Kyle Fujimoto

High Channel Band Edges

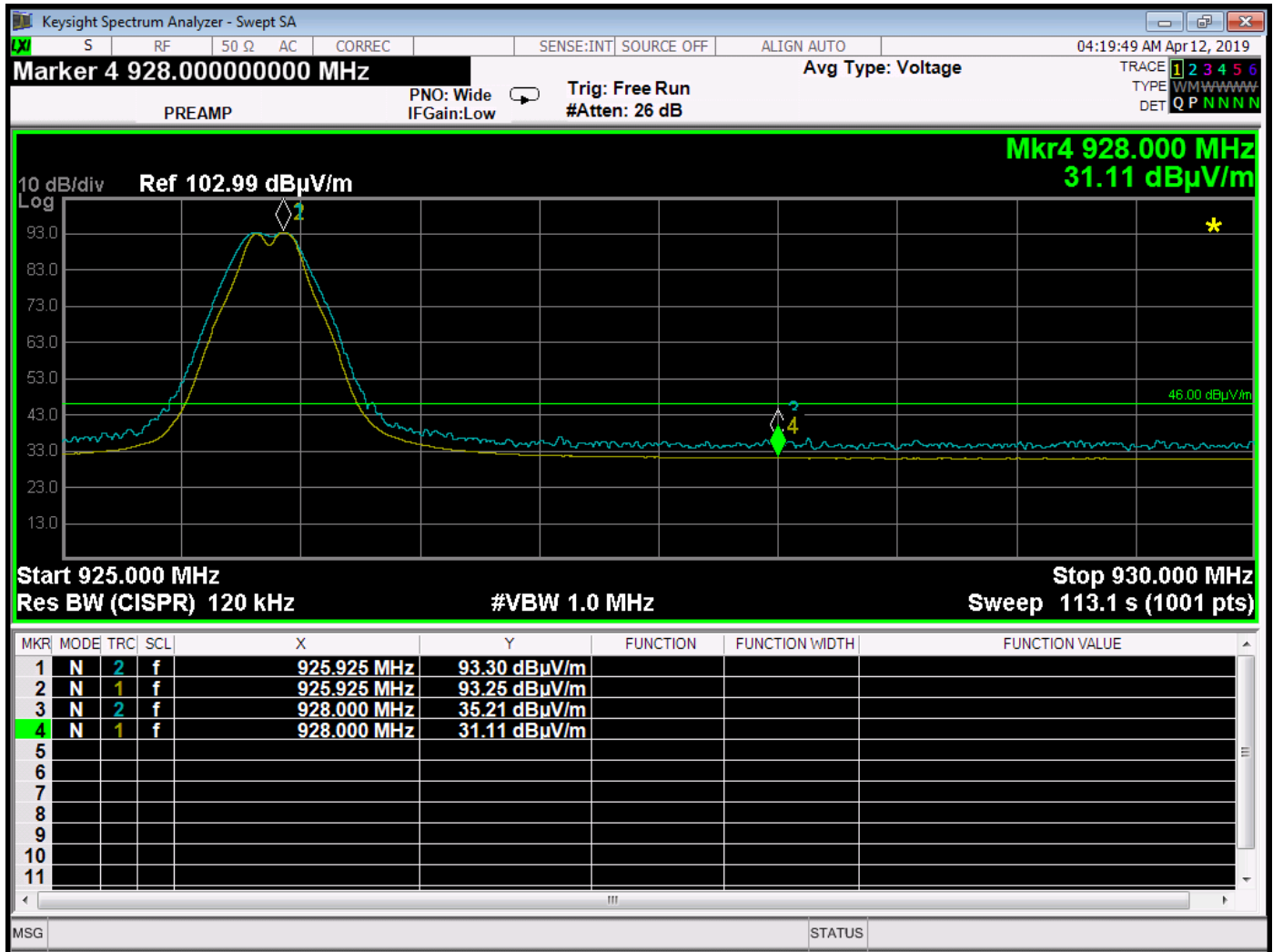
[illegible]



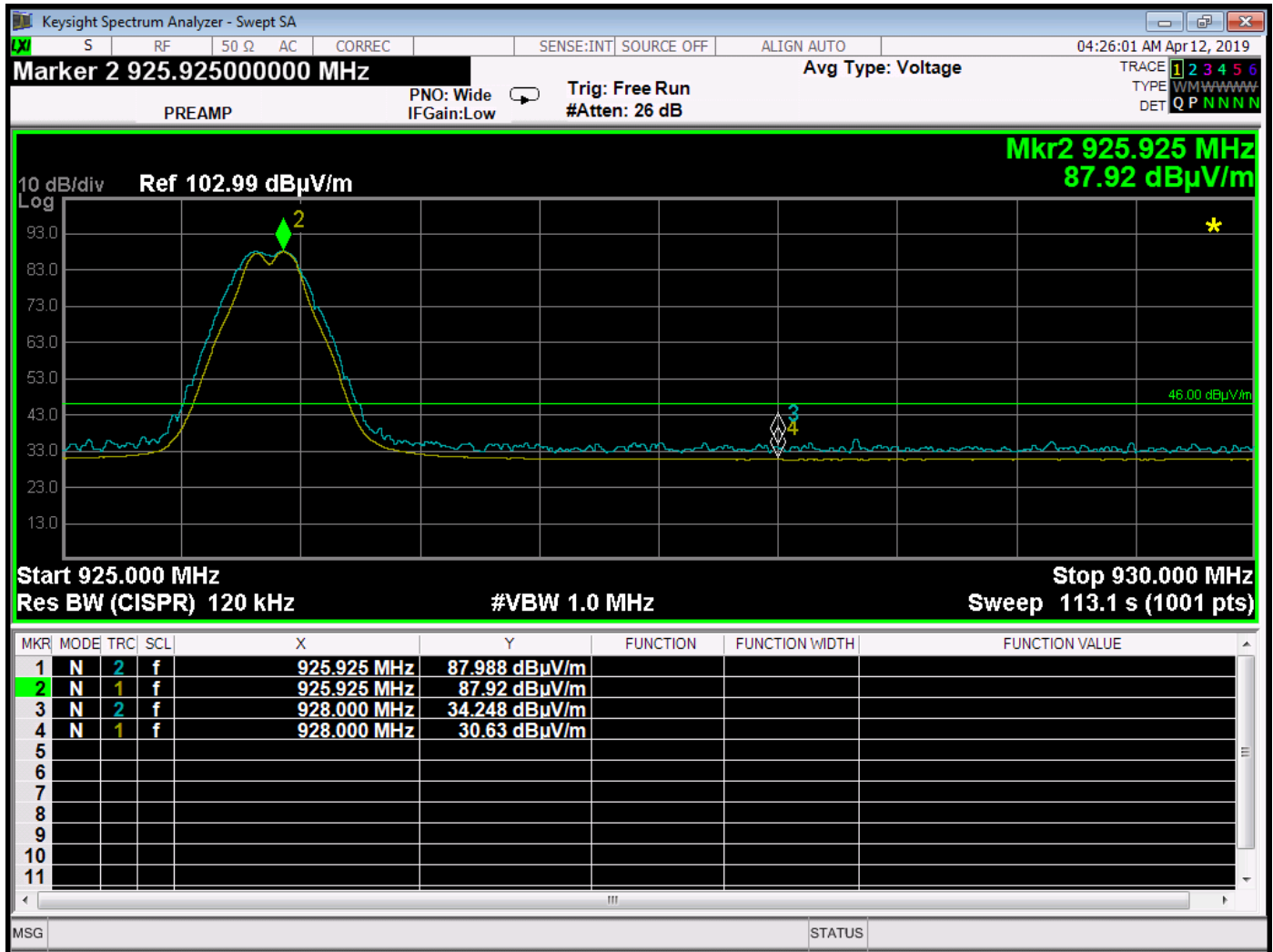
Low Band Edge – Vertical – X-Axis



Low Band Edge – Horizontal – Z-Axis



High Band Edge – Vertical – X-Axis



High Band Edge – Horizontal – Y-Axis