FCC PART 15 SUBPART C SECTION 15.247
&
RSS 247
TEST REPORT

for

MODULAR TRANSMITTER

Model: ATWILC3000-MR110CA

Prepared for

MICROCHIP TECHNOLOGY
2355 WEST CHANDLER BLVD
CHANDLER, AZ 95224-6199

Prepared by:_____

MATT HARRISON

Approved by:_____

JOEY MADLANGBAYAN

COMPATIBLE ELECTRONICS INC.
20621 PASCAL WAY
LAKE FOREST, CALIFORNIA 92630
(949) 587-0400

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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 in any form unless done so in full with the written permission of Compatible Electronics.

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:	Modular Transmitter Model: ATWILC3000-MR110CA S/N: None
Product Description:	The EUT is a Bluetooth and Wifi Wireless Shielded Module with a chip antenna.
Modifications:	The EUT was not modified in order to comply with specifications.
Manufacturer:	Microchip Technology 2355 West Chandler Blvd Chandler, AZ 95224-6199
Test Dates:	September 17th – 23rd, 2015 & September 2, 2016

Test Specifications Covered by Accreditation:

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EMI requirements
CFR Title 47, Part 15 Subpart C Sections 15.205, 15.207, 15.209, & 15.247.
RSS 247 & RSS GEN

Test Procedure: ANSI C63.4 & C63.10, DA 00-705.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz	Complies with the limits of CFR Title 47 Part 15 Subpart C Section 15.207, and RSS GEN
2	Radiated RF Emissions & Harmonics, 9 kHz – 25,000 MHz	Complies with the limits of CFR Title 47 Part 15 Subpart C Sections 15.205, 15.209, and RSS GEN
3	20dB Bandwidth	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
4	Maximum Peak Conducted Output Power	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
5	Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth)	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
6	Emissions in the Restricted Bands	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
7	Average Time of Occupancy	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
8	Channel Separation	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
9	Hopping Channels	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Modular Transmitter Model: ATWILC3000-MR110CA. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4 & C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT (equipment under test) hereafter, are within the specification limits defined by the Code of Federal Regulations Title 47, Part 15 Subpart C sections 15.207, 15.205, 15.209, 15.247, RSS GEN, and RSS 247 as a FHSS device.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The tests described herein were performed at the test facility of Compatible Electronics, 20621 Pascal Way Lake Forest, California 92630.

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

Microchip Technology

Sanjay Malani

Compatible Electronics Inc.

Torey Oliver	Test Engineer
Matt Harrison	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on September 17, 2015.

2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics as of the date of this test report.

2.6 Abbreviations and Acronyms

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

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
PCB	Printed Circuit Board
TX	Transmit
RX	Receive

3. APPLICABLE DOCUMENS

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

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4 2014	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
RSS 247	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
RSS GEN	General Requirements for Compliance of Radio Apparatus
ANSI C63.10: 2013	American National Standard for Testing Unlicensed Wireless Devices
DA-00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

4. DESCRIPTION OF TEST CONFIGURATION

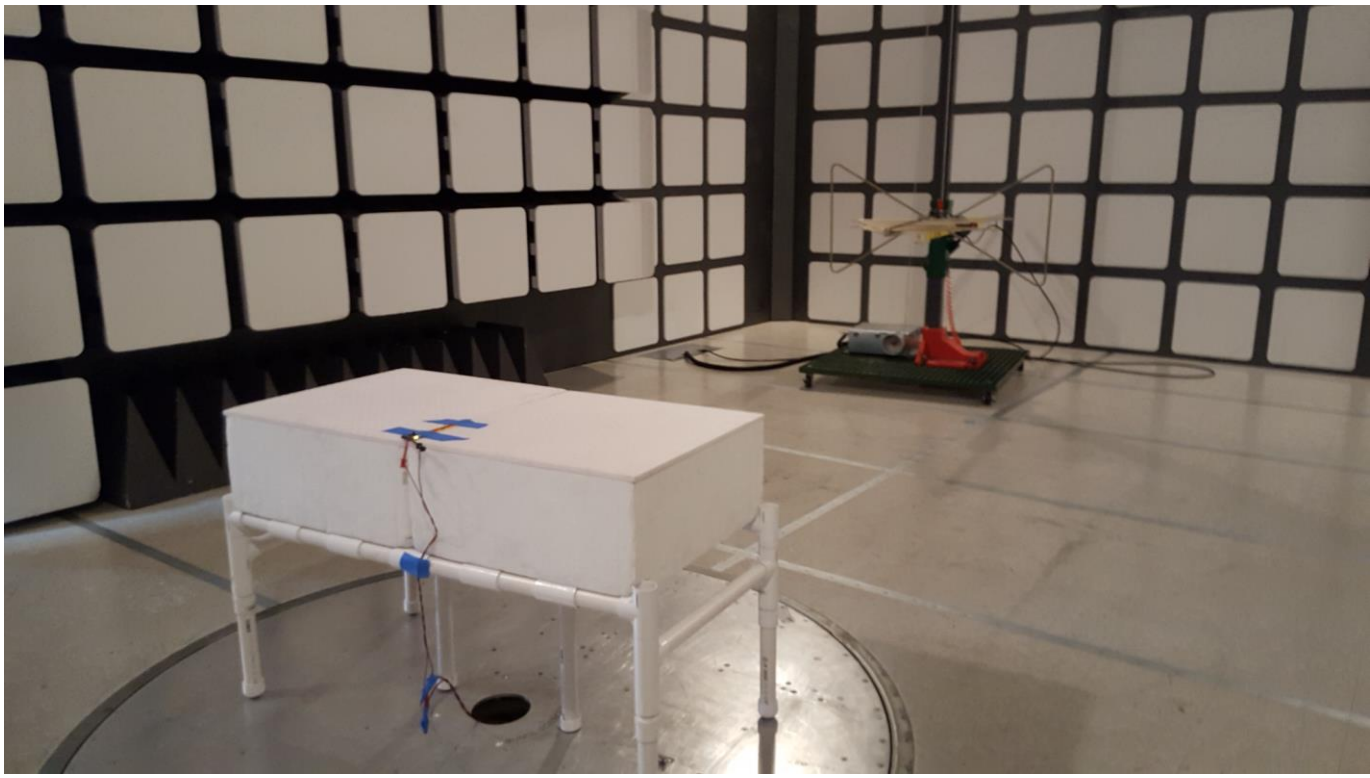
4.1 Description of Test Configuration

The Modular Transmitter Model: ATWILC3000-MR110CA (EUT) was setup in a tabletop configuration. The EUT was powered by a DC Supply (for Conducted Emissions the EUT was connected to a USB Power Adapter). The EUT was continuously transmitting a data stream during transmit tests and continuously receiving during receiver tests. The EUT was checked in all axes and the X-Axis was found to be the worst case. All modulation modes were checked and the worst case data is provided.

The voltage was varied ± 15% and the transmitting signal amplitude and frequency did not vary.

It was determined that the emissions were at their highest level when the EUT was transmitting in the configuration described above for Radiated Emissions. The final radiated data was taken in the above configuration. Please see Appendix E for the test data.

4.1.1 Photograph Test Configuration (Showing X-Axis Orientation)



4.1.2 Cable Construction and Termination

Cable 1-2

These are 2 meter, un-shielded, round cables that connect the EUT to the DC Power Supply. The cables were hardwired into the EUT and have banana connectors at the DC Supply end. The cables were not bundled.

Cable 3

This is a 10 centimeter, un-shielded, round cables that connect the EUT to the EUT Control Board. The cable is hardwired into both ends of the cable. The cable was not bundled.

Cable 4

This is a 1 meter, foil shielded, USB cable that connect the EUT to the USB Power Adapter. The cable is hardwired into both ends of the cable. The cable was not bundled. The shield of the cable was terminated at the connectors.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANU-FACTURER	MODEL	SERIAL NUMBER
1	MODULAR TRANSMITTER(EUT)	MICROCHIP TECHNOLOGY	ATWILC3000-MR110CA	N/A
2	DC SUPPLY	MPJA	0-30V / 0-5A	017687
3	EUT CONTROL BOARD	MICROCHIP TECHNOLOGY	NONE	NONE
4	USB POWER ADAPTER (CONDUCTED EMISSIONS)	BELKIN	F8J052	NONE

5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Computer	Compatible Electronics	NONE	NONE	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100219	9/3/2015	9/3/2016
EMI Receiver	Rohde & Schwarz	ESIB40	100219	9/22/2016	9/22/2017
Antenna, Loop	Com Power	AL-130	121049	12/06/2013	12/06/2016
Antenna, CombiLog	Com Power	AC-220	25857	5/21/2014	5/21/2016
Antenna, Horn 1-18GHz	Com Power	AH-118	071250	7/1/2014	7/1/2016
Antenna, Horn 1-18GHz	Com Power	AH-118	071250	5/18/2016	5/18/2017
Antenna, Horn 18-26 GHz	Com Power	AH-826	081033	NCR	NCR
Pre-Amp, 1-18GHz	Com Power	PAM-118A	551034	2/6/2015	2/6/2016
Pre-Amp, 18-40GHz	Com Power	PA-840	181289	6/16/2014	6/16/2016
LISN	Com Power	LI-215	191937	4/16/2015	4/16/2016
RF Peak Power Meter/Analyzer	Boonton	4500A	1282	12/2/2014	12/2/2015
Peak Power Sensor	Boonton	57318	3723	12/2/2014	12/2/2015
High Pass Filter	AMTI Microwave Circuits	H3G020G4	481230	6/4/2015	6/4/2016
Mast, Antenna Positioner	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Antenna Mast	Sunol Science Corporation	TWR 95-4	020808-3	N/A	N/A
Turntable	Sunol Science Corporation	FM 2001	N/A	N/A	N/A
Mast and Turntable Controller	Sunol Science Corporation	SC104V	020808-1	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and the figures in Appendix D of this report for test location.

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 by 0.8 meter high non-conductive table, which was placed on the ground plane.

For testing above 1 GHz the EUT was mounted 1.5 meter above the ground plane.

The EUT was not grounded.

While directly connecting to the EUT the test equipment matched the nominal impedance of the EUT.

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. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

For Bluetooth there are a total of 79 channels. The low channel is at 2402.0 MHz and the high channel is at 2480.0 MHz. There is approximately 1 MHz separation between channels and the EUT uses the following modulations: 1M: GFSK; 2M EDR: pi/4-DQPSK; & 3M EDR; 8DPSK. Below are the channels and power settings:

Bluetooth Settings

Channels	Frequency		Gain Settings	
0-78 ==	2402-2480 MHz	DG= -7	PPA 6	PA 12

7.2 Antenna

The antenna is made up of a Chip Antenna located on the PCB that has a max gain of 0.5 dBi.

8. TEST PROCEDURES

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

8.1 RF Emissions

8.1.1 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. 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 received its power through the LISN, which was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI. 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 computer software. The final qualification data is located in Appendix E.

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart C section 15.207 & RSS GEN.

8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The R&S receiver was used as a measuring meter. The receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the receiver records the highest measured reading over all the sweeps. Amplifiers were used to increase the sensitivity of the instrument. There was external preamps used for frequencies above 1 GHz.

For spurious emissions the quasi-peak detector was used for frequencies below 1GHz and the average detector was used for frequencies above 1 GHz.

For the radiated Harmonic emissions and Band Edges a linear average detector was used.

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

FREQUENCY RANGE (MHz)	TRANSDUCER	EFFECTIVE MEASUREMENT BANDWIDTH
.009 to .150	Active Loop Antenna	200 Hz
.150 to 30	Active Loop Antenna	9 kHz
30 to 1000	Combilog Antenna	100 kHz (120 kHz for QP)
1000 to 25000	Horn Antenna	1 MHz

The TDK FAC-3 shielded test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI, EN 50147-2, and CISPR 22. 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 in both vertical and horizontal polarizations (for E field radiated field strength).

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart C sections 15.205, 15.209, 15.247, and RSS GEN.

8.1.3 20dB Bandwidth

The 20dB Bandwidth was measured directly connected to the EMI Receiver using a RBW equal to 1% of the 20dB Bandwidth and a VBW of 3* the RBW. A peak detector and a max hold trace were used with auto sweep time. The trace was allowed to fully maximize. We measured the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.4 Maximum Peak Conducted Output Power

The maximum peak conducted output power was measured using a Peak Power Meter. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.5 Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth)

The Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth) measurements were performed using a direct connection from the primary antenna port to the EMI Receiver input. The results account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument was spanned at least 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency was split into smaller spans, as long as the entire spectrum is covered. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.6 Emissions in the Restricted Bands (Radiated)

The Emissions in the Restricted Bands measurement was performed using the EMI Receiver at a 3-meter test distance to obtain the final test data. A linear average was applied. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15 Subpart C, Section 15.205 and RSS GEN.

8.1.7 Emissions Radiated Outside of the Fundamental Frequency Band

The Band Edge measurement was performed using the EMI Receiver at a 3-meter test distance to obtain the final test data. The low and high channels were tuned to during the low and high band edge tests. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.8 Average Time of Occupancy

The average time of occupancy was measured using a near field probe connected to the EMI Receiver using a RBW of 1MHz VBW of 3* the RBW. A peak detector and a max hold trace were used with a sweep time long enough to capture the entire dwell time per hopping channel. The trace was allowed to fully maximize. We measured the maximum width of the emission pulse per channel and measured how many times that channel was occupied. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.9 Carrier Frequency Separation

The carrier frequency separation was measured using a near field probe connected to the EMI Receiver using a RBW equal to 1% of the span and a VBW of 3* the RBW. A peak detector and a max hold trace were used with auto sweep time. The trace was allowed to fully maximize. We measured the delta between two adjacent channels. The final qualification data sheets are located in Appendix E.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

8.1.10 Hopping Channels

The EUT was set into a hopping mode for all channels. The receiver was set to span for the entire frequency band of the EUT. A peak detector and a max hold trace were used with auto sweep time. The trace was allowed to fully maximize. A plot is shown in Appendix E along with the test data.

Test Results:

The EUT complies with Part 15, Subpart C, Section 15.247 and RSS 247.

9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from throughout all tests.

10. CONCLUSIONS

The Modular Transmitter Model: ATWILC3000-MR110CA meets all of the relevant specification requirements defined in the Code of Federal Regulations Title 47, Part 15 Subpart C sections 15.205, 15.207, 15.209, 15.247, RSS GEN & RSS 247.

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP TESTING
NVLAP LAB CODE 200527-0

ilac-MRA

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."

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

There were no modifications made during testing.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	Modular Transmitter Model: ATWILC3000-MR110CA S/N: None

No additional models were tested.

APPENDIX D

DIAGRAMS, FACTORS, CHARTS, AND PHOTOS

FIGURE 1: PLOT MAP AND LAYOUT OF TEST SITE BELOW 1GHZ

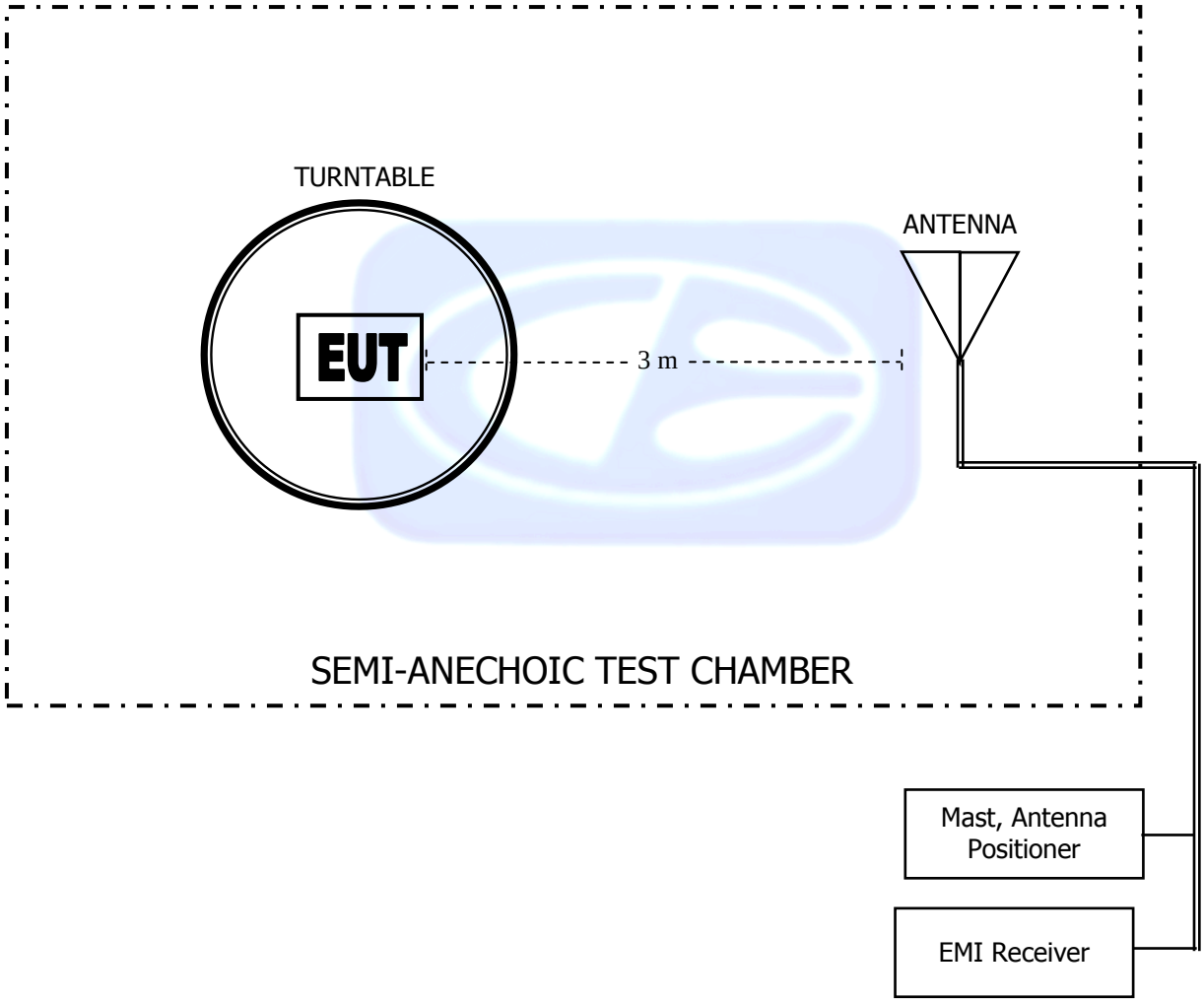


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ

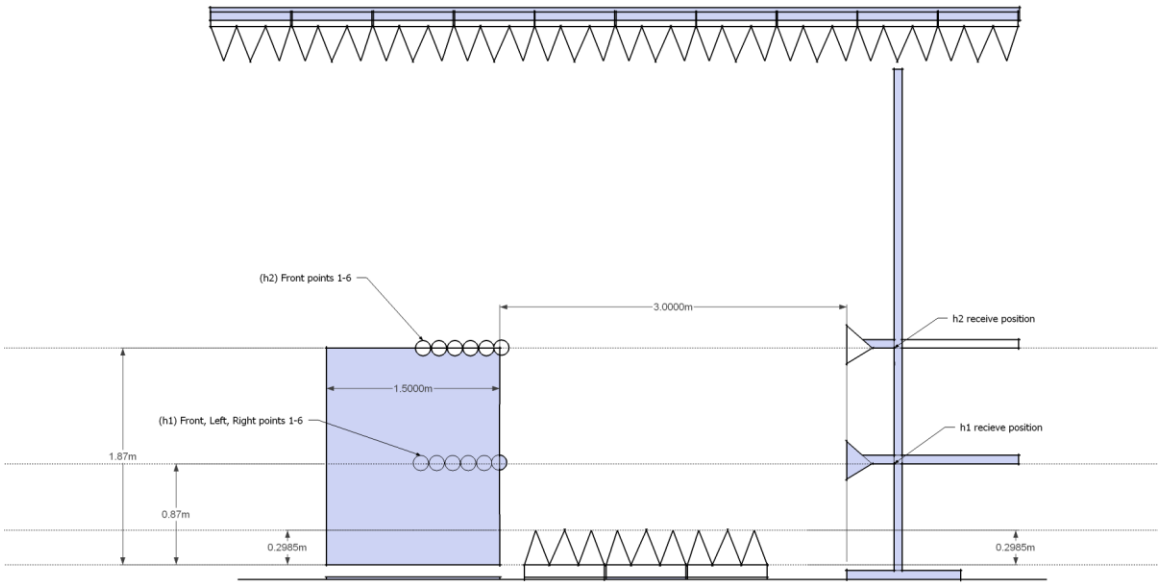
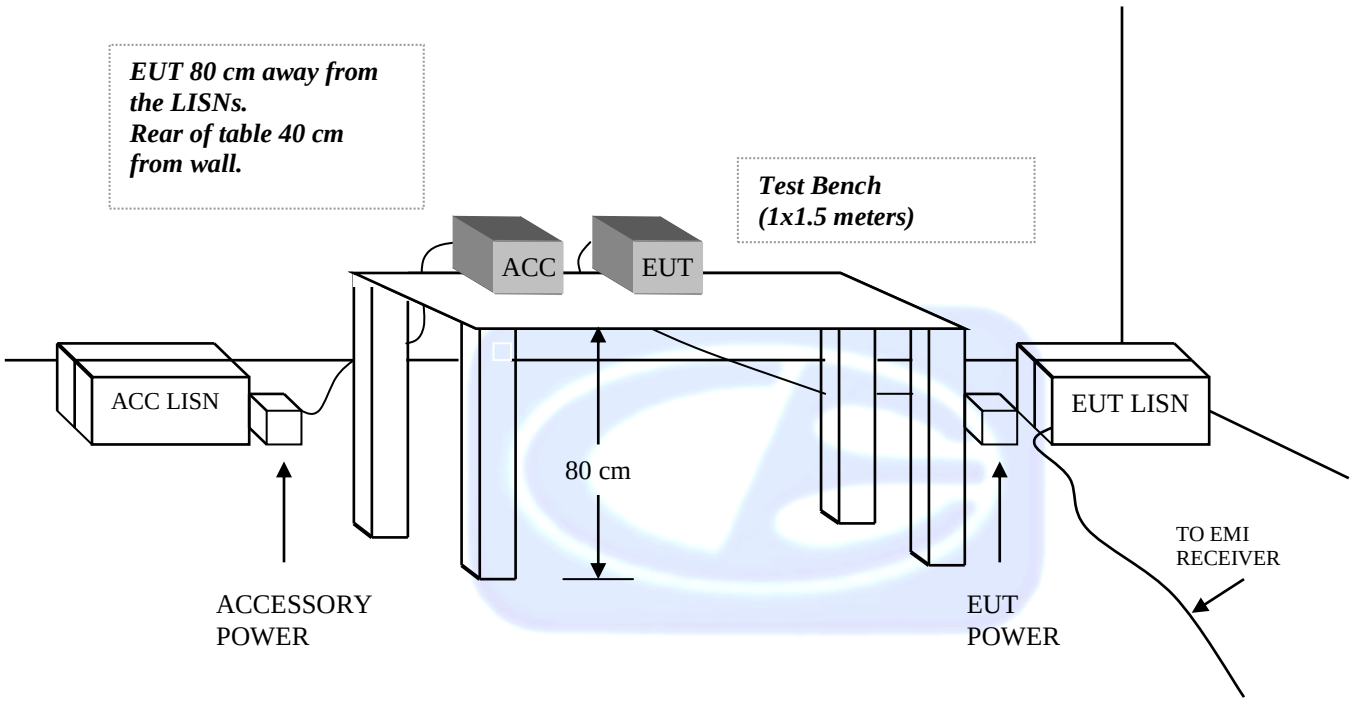


FIGURE 3: CONDUCTED EMISSIONS TEST SETUP



COM-POWER AL-130

LOOP ANTENNA

S/N: 121049

CALIBRATION DUE: DECEMBER 6, 2016

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)	FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-34.64	16.86	**0.8**	-36.32	15.18
0.01	-34.78	16.72	**0.9**	-36.22	15.28
0.02	-35.91	15.59	**1.0**	-36.22	15.28
0.03	-35.48	16.02	**2.0**	-35.91	15.59
0.04	-35.82	15.68	**3.0**	-35.91	15.59
0.05	-36.49	15.01	**4.0**	-36.01	15.49
0.06	-36.30	15.20	**5.0**	-35.80	15.70
0.07	-36.43	15.07	**6.0**	-36.00	15.50
0.08	-36.30	15.20	**7.0**	-35.90	15.60
0.09	-36.39	15.11	**8.0**	-35.70	15.80
0.1	-36.41	15.09	**9.0**	-35.70	15.80
0.2	-36.61	14.89	**10.0**	-35.60	15.90
0.3	-36.63	14.87	**15.0**	-36.52	14.98
0.4	-36.52	14.99	**20.0**	-35.75	15.75
0.5	-36.63	14.87	**25.0**	-37.78	13.72
0.6	-36.62	14.88	**30.0**	-38.62	12.88
0.7	-36.53	14.97			

COM-POWER AC-220

LAB R - COMBILOG ANTENNA

S/N: 25857

CALIBRATION DUE: MAY 21, 2016

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.5	**160**	13.3
35	22.5	**180**	15.0
40	23.0	**200**	14.6
45	21.5	**250**	16.5
50	21.3	**300**	18.1
60	18.2	**400**	19.4
70	13.2	**500**	21.4
80	11.6	**600**	21.6
90	11.9	**700**	23.7
100	12.6	**800**	26.0
120	15.1	**900**	26.6
140	13.6	**1000**	28.5

COM-POWER AH-118

HORN ANTENNA

S/N: 071250

CALIBRATION DUE: JULY 1, 2016

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	30.1	**9500**	44.2
1500	29.2	**10000**	43.4
2000	31.6	**10500**	44.6
2500	35.5	**11000**	45.1
3000	33.7	**11500**	45.7
3500	36.0	**12000**	46.2
4000	35.4	**12500**	45.4
4500	35.5	**13000**	44.8
5000	40.1	**13500**	46.7
5500	37.8	**14000**	47.8
6000	39.0	**14500**	46.4
6500	39.9	**15000**	47.2
7000	40.4	**15500**	45.5
7500	44.4	**16000**	45.0
8000	44.1	**16500**	44.5
8500	43.1	**17000**	47.0
9000	43.0	**17500**	47.8
		18000	44.2

COM-POWER PAM-118A

1-18GHz - PREAMPLIFIER

S/N: 551034

CALIBRATION DUE: FEBRUARY 6, 2016

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
500	36.77	**5500**	39.82
1000	38.63	**6000**	38.74
1100	38.72	**6500**	39.60
1200	38.97	**7000**	35.52
1300	38.59	**7500**	36.61
1400	39.18	**8000**	36.92
1500	38.71	**8500**	37.13
1600	39.28	**9000**	36.50
1700	39.25	**9500**	38.92
1800	39.06	**10000**	38.74
1900	40.34	**11000**	35.23
2000	40.07	**12000**	35.64
2500	39.69	**13000**	36.73
3000	40.94	**14000**	36.48
3500	40.41	**15000**	37.57
4000	40.44	**16000**	38.10
4500	41.20	**17000**	37.34
5000	39.35	**18000**	36.80

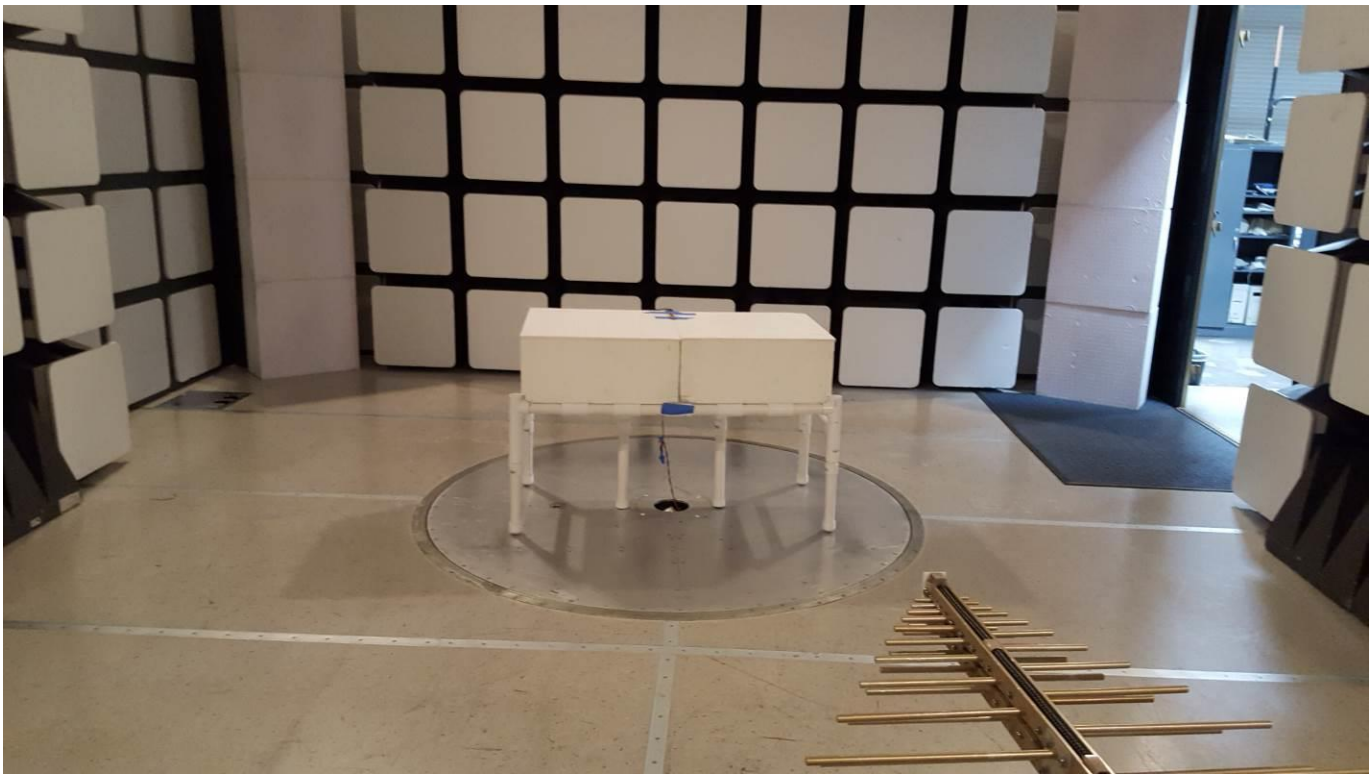
COM-POWER PA-840

18-40 GHz PREAMPLIFIER

S/N: 181289

CALIBRATION DUE: JUNE 16, 2016

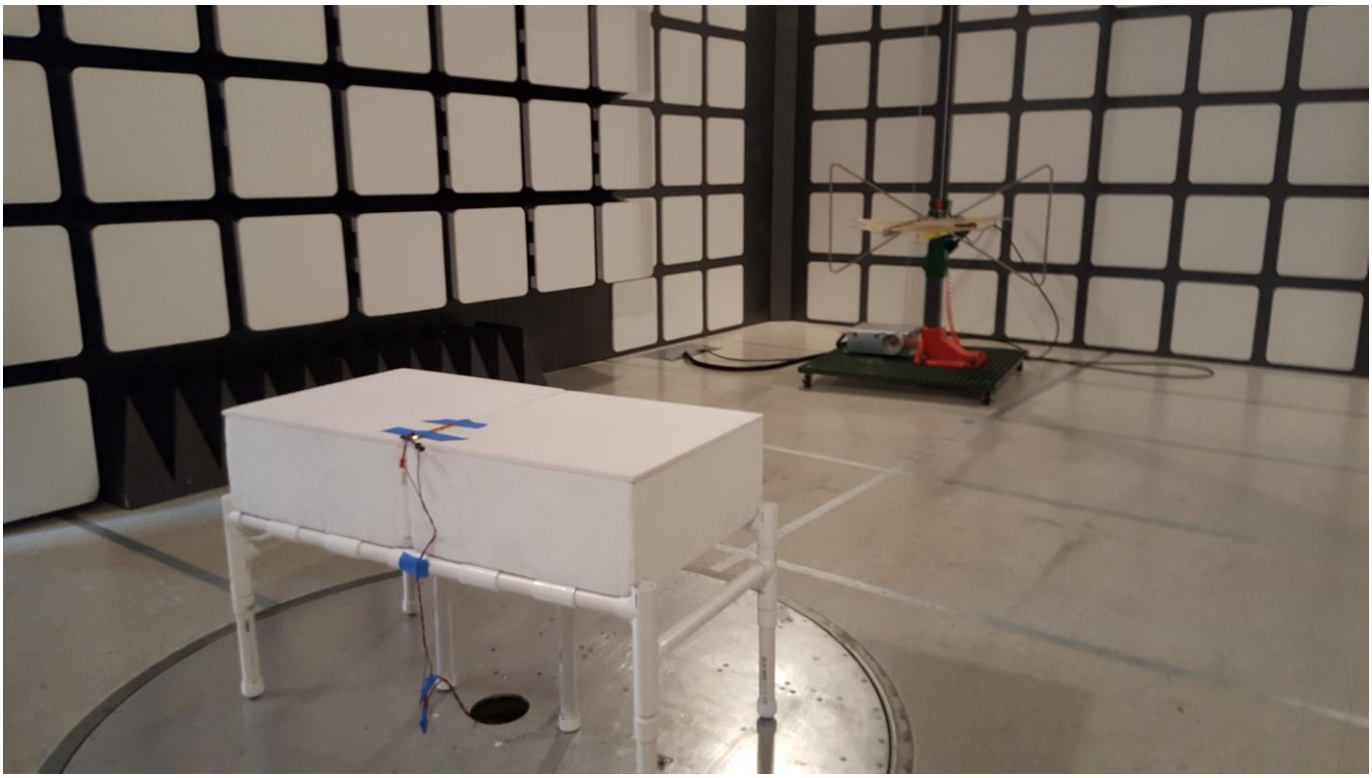
FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
18000	29.4	**31500**	28.2
19000	28.8	**32000**	28.6
20000	30.5	**32500**	28.8
21000	31.4	**33000**	28.2
22000	31.2	**33500**	27.7
23000	30.1	**34000**	27.2
24000	30.3	**34500**	28.2
25000	29.8	**35000**	27.3
26000	30.5	**35500**	27.2
26500	30.7	**36000**	27.2
27000	30.8	**36500**	27.5
27500	30.2	**37000**	27.0
28000	30.1	**37500**	26.7
28500	30.2	**38000**	26.2
29000	30.1	**38500**	26.5
29500	29.8	**39000**	26.3
30000	29.2	**39500**	26.9
30500	28.4	**40000**	27.6
31000	29.8		



FRONT VIEW

MICROCHIP TECHNOLOGY
MODULAR TRANSMITTER
Model: ATWILC3000-MR110CA
FCC SUBPART C - RADIATED EMISSIONS < 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

MICROCHIP TECHNOLOGY
MODULAR TRANSMITTER
Model: ATWILC3000-MR110CA
FCC SUBPART C - RADIATED EMISSIONS < 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

MICROCHIP TECHNOLOGY
MODULAR TRANSMITTER
Model: ATWILC3000-MR110CA
FCC SUBPART C - RADIATED EMISSIONS > 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

MICROCHIP TECHNOLOGY
MODULAR TRANSMITTER
Model: ATWILC3000-MR110CA
FCC SUBPART C - RADIATED EMISSIONS > 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

MICROCHIP TECHNOLOGY
MODULAR TRANSMITTER
Model: ATWILC3000-MR110CA
FCC SUBPART C - CONDUCTED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

MICROCHIP TECHNOLOGY
MODULAR TRANSMITTER
Model: ATWILC3000-MR110CA
FCC SUBPART C - CONDUCTED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

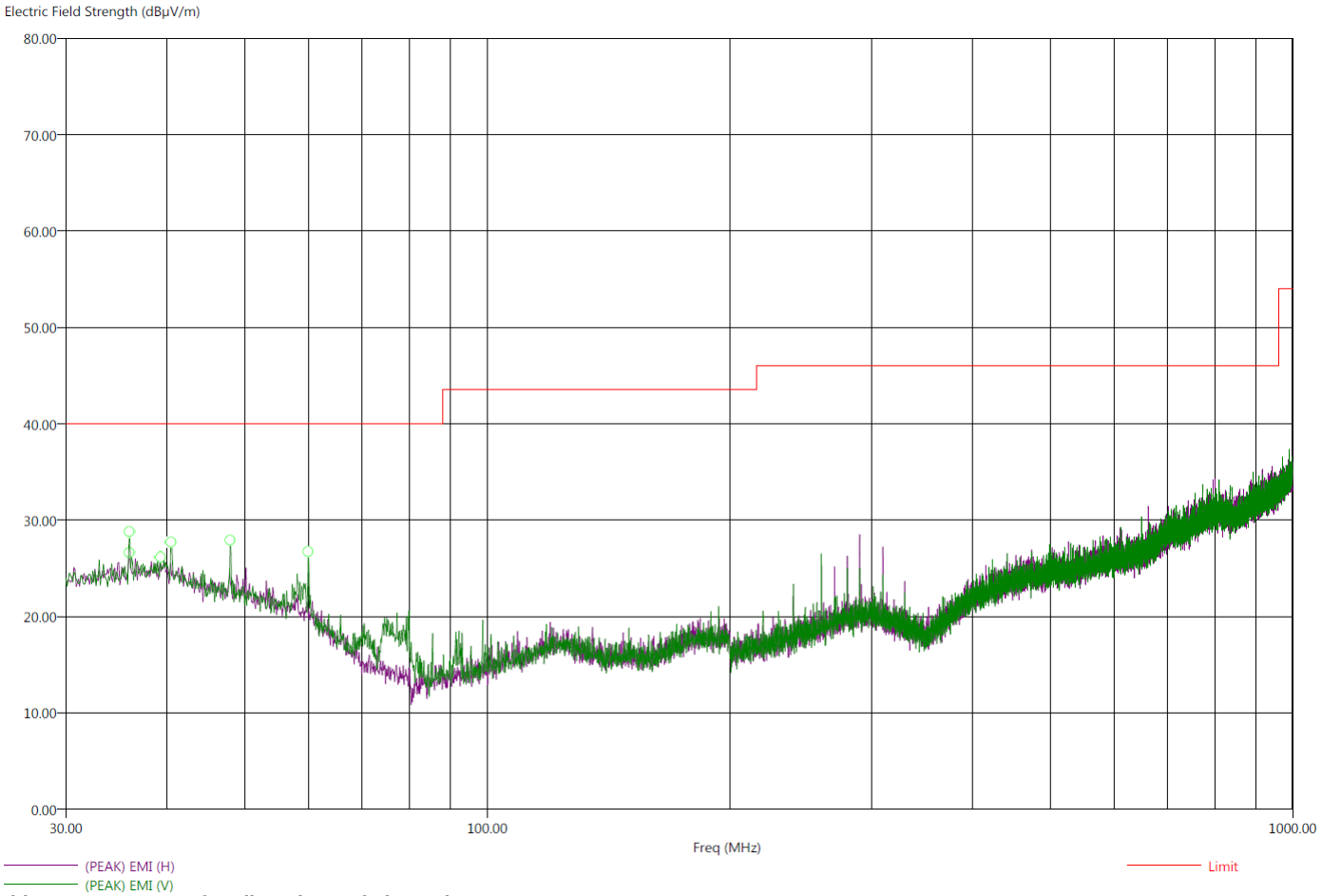
APPENDIX E

RADIATED EMISSIONS DATA SHEETS

Title: FCC 15.209
File: Radiated Pre-Scan 30-1000Mhz.set
Operator: Matt Harrison
EUT Type: ATWILC3000-MR110CA.
EUT Condition: Transmitting
Comments: Temp: 73f
Hum: 43%
3.3VDC

9/18/2015 2:08:54 PM
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (Lab R)



This was worst case for all modes and channels
There were no radiated emissions besides harmonics found between 9kHz-30 MHz or 1GHz-25GHz.

Title: FCC 15.209
File: Radiated Final 30-1000Mhz.set
Operator: Matt Harrison
EUT Type: ATWILC3000-MR110CA.
EUT Condition: Transmitting
Comments: Temp: 73f
Hum: 43%
3.3VDC

9/18/2015 2:30:34 PM
Sequence: Final Measurements

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq (MHz)	(QP) Margin (dB)	(QP) EMI (dBµV/m)	(PEAK) EMI (dBµV/m)	Limit (dBµV/m)	Pol	Ttbl Agl (deg)	Twr Ht (cm)	Transducer (dB)	Cable (dB)
36.00	-15.16	24.84	28.95	40.00	H	2.75	367.98	22.60	1.08
36.00	-13.78	26.22	29.76	40.00	V	98.00	206.13	22.61	1.08
39.30	-19.30	20.70	26.01	40.00	H	85.50	123.32	22.93	1.26
40.50	-19.32	20.68	26.20	40.00	V	46.50	236.10	22.86	1.24
48.00	-11.96	28.04	30.98	40.00	V	360.00	116.46	21.38	0.32
60.00	-21.98	18.02	22.83	40.00	V	31.50	279.38	18.18	1.00

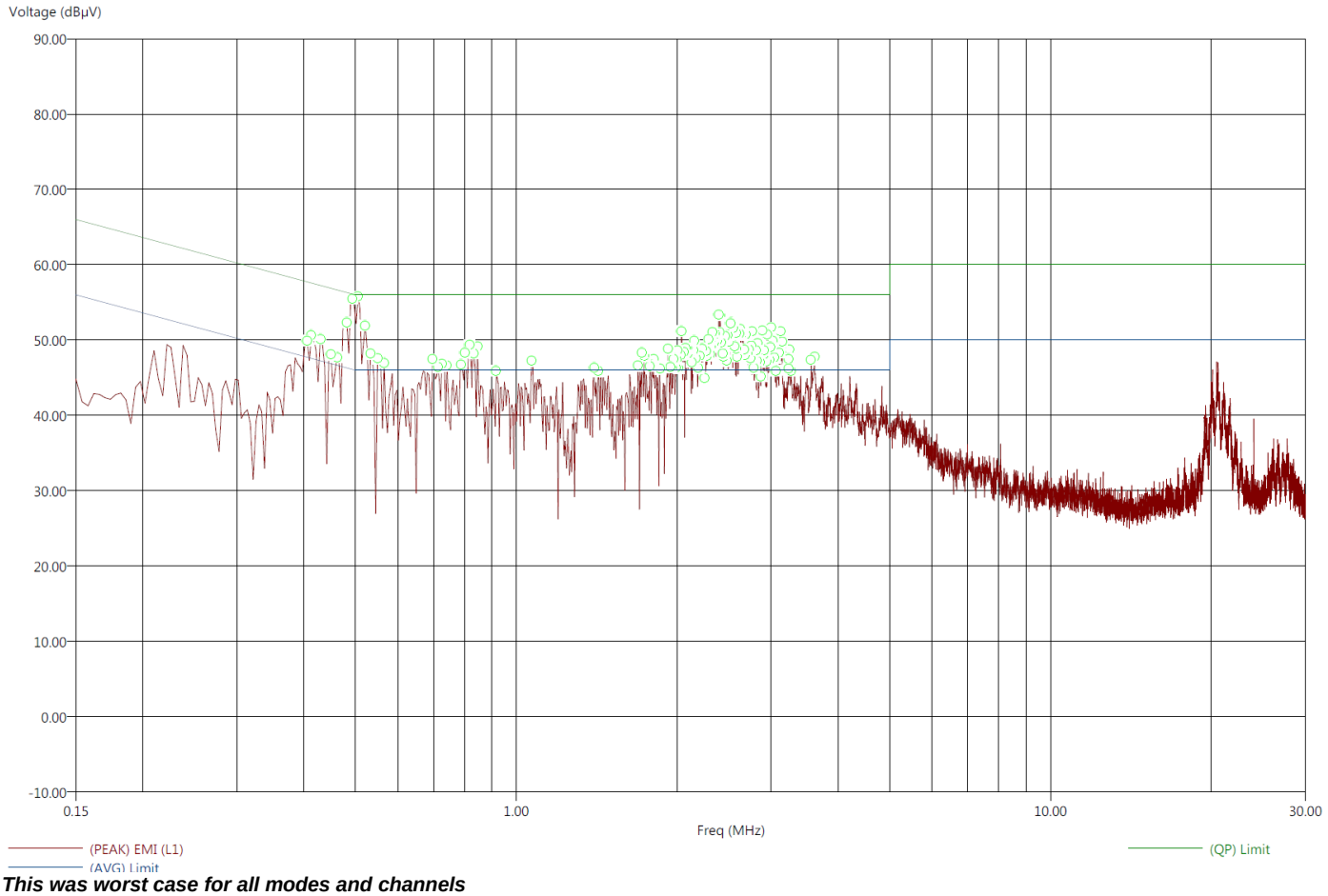
This was worst case for all modes and channels
There were no radiated emissions besides harmonics found between 9kHz-30 MHz or 1GHz-25GHz.

APPENDIX E

CONDUCTED EMISSIONS DATA SHEETS

Title: FCC 15.207 9/21/2015 9:26:40 AM
File: Conducted Pre-Line.set Sequence: Preliminary Scan
Operator: Torey Oliver
EUT Type: Wireless Module, ATWILC3000-MR110CA.
EUT Condition: Transmitting
Comments: Connected to Control Board Powered By USB Adapter.
Temp: 74f
Hum: 48%
USB Adapter: 120V 60Hz

Compatible Electronics, Inc. FAC-3 (LAB R)



This was worst case for all modes and channels

Title: FCC 15.207 9/21/2015 9:41:12 AM
File: Conducted Final-Line.set Sequence: Final Measurements
Operator: Torey Oliver
EUT Type: Wireless Module, ATWILC3000-MR110CA.
EUT Condition: Transmitting
Comments: Connected to Control Board Powered By USB Adapter.
Temp: 74f
Hum: 48%
USB Adapter: 120V 60Hz

Compatible Electronics, Inc. FAC-3 (LAB R)

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
0.41	-8.69	-9.51	39.04	48.22	51.80	47.73	57.73	0.04	0.07
0.41	-8.41	-9.15	39.16	48.42	51.67	47.57	57.57	0.04	0.06
0.43	-9.11	-9.61	38.14	47.64	50.82	47.25	57.25	0.04	0.05
0.45	-11.65	-11.59	35.22	45.28	49.89	46.88	56.88	0.04	0.03
0.46	-10.12	-10.61	36.54	46.04	50.63	46.66	56.66	0.04	0.03
0.48	-3.95	-4.61	42.36	51.69	54.92	46.30	56.30	0.03	0.01
0.49	-2.08	-2.43	44.02	53.67	56.57	46.10	56.10	0.02	0.00
0.51	-2.14	-1.83	43.86	54.17	57.50	46.00	56.00	0.02	0.00
0.52	-7.57	-7.61	38.43	48.39	51.91	46.00	56.00	0.02	0.00
0.53	-8.41	-9.36	37.59	46.64	50.06	46.00	56.00	0.02	0.00
0.55	-10.24	-10.68	35.76	45.32	48.69	46.00	56.00	0.02	0.00
0.57	-14.52	-14.28	31.48	41.72	46.34	46.00	56.00	0.03	0.00
0.70	-10.47	-10.98	35.53	45.02	47.76	46.00	56.00	0.04	0.00
0.71	-10.71	-11.43	35.29	44.57	47.61	46.00	56.00	0.04	0.00
0.73	-11.31	-11.81	34.69	44.19	47.06	46.00	56.00	0.04	0.00
0.74	-12.02	-11.78	33.98	44.22	47.62	46.00	56.00	0.04	0.00
0.79	-10.52	-11.48	35.48	44.52	47.16	46.00	56.00	0.04	0.00
0.80	-9.07	-9.39	36.93	46.61	49.68	46.00	56.00	0.04	0.00
0.82	-8.43	-9.05	37.57	46.95	49.59	46.00	56.00	0.04	0.00
0.83	-9.40	-9.46	36.60	46.54	49.39	46.00	56.00	0.04	0.00
0.85	-10.74	-10.79	35.26	45.21	48.07	46.00	56.00	0.04	0.00
0.92	-13.23	-14.00	32.77	42.00	45.14	46.00	56.00	0.03	0.00
1.07	-11.97	-11.71	34.03	44.29	47.89	46.00	56.00	0.03	0.03

This was worst case for all modes and channels

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
1.40	-13.35	-13.39	32.65	42.61	46.51	46.00	56.00	0.04	0.15
1.43	-14.25	-14.39	31.75	41.61	45.24	46.00	56.00	0.04	0.15
1.69	-14.02	-14.25	31.98	41.75	45.81	46.00	56.00	0.05	0.23
1.72	-11.48	-12.03	34.52	43.97	47.80	46.00	56.00	0.05	0.24
1.74	-12.10	-12.25	33.90	43.75	47.37	46.00	56.00	0.05	0.24
1.78	-14.06	-14.42	31.94	41.58	47.49	46.00	56.00	0.05	0.25
1.79	-13.79	-14.11	32.21	41.89	46.92	46.00	56.00	0.05	0.25
1.81	-14.29	-14.30	31.71	41.70	46.61	46.00	56.00	0.05	0.26
1.86	-16.64	-16.13	29.36	39.87	44.53	46.00	56.00	0.05	0.27
1.93	-15.32	-14.57	30.68	41.43	48.58	46.00	56.00	0.05	0.28
1.94	-14.23	-13.93	31.77	42.07	47.74	46.00	56.00	0.05	0.29
1.96	-12.74	-12.10	33.26	43.90	49.00	46.00	56.00	0.05	0.29
1.97	-11.87	-11.88	34.13	44.12	48.08	46.00	56.00	0.05	0.29
1.99	-9.95	-9.91	36.05	46.09	50.51	46.00	56.00	0.05	0.30
2.00	-7.87	-7.92	38.13	48.08	51.79	46.00	56.00	0.05	0.30
2.01	-11.16	-11.15	34.84	44.85	50.02	46.00	56.00	0.05	0.30
2.01	-10.85	-11.58	35.15	44.42	50.31	46.00	56.00	0.05	0.30
2.03	-11.43	-11.35	34.57	44.65	49.04	46.00	56.00	0.05	0.30
2.04	-11.32	-10.02	34.68	45.98	51.15	46.00	56.00	0.05	0.30
2.06	-12.02	-12.26	33.98	43.74	48.97	46.00	56.00	0.05	0.30
2.07	-10.84	-10.35	35.16	45.65	48.78	46.00	56.00	0.05	0.30
2.09	-9.93	-9.74	36.07	46.26	50.98	46.00	56.00	0.05	0.30

This was worst case for all modes and channels

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
2.09	-9.73	-9.97	36.27	46.03	51.99	46.00	56.00	0.05	0.29
2.11	-10.00	-9.87	36.00	46.13	50.28	46.00	56.00	0.05	0.29
2.11	-8.78	-8.50	37.22	47.50	52.28	46.00	56.00	0.05	0.29
2.12	-11.58	-11.39	34.42	44.61	49.77	46.00	56.00	0.05	0.29
2.13	-13.20	-12.77	32.80	43.23	48.75	46.00	56.00	0.05	0.29
2.15	-14.37	-14.22	31.63	41.78	47.68	46.00	56.00	0.05	0.29
2.15	-13.84	-13.18	32.16	42.82	48.87	46.00	56.00	0.05	0.29
2.17	-13.35	-13.47	32.65	42.53	48.71	46.00	56.00	0.05	0.29
2.19	-14.33	-13.69	31.67	42.31	48.03	46.00	56.00	0.05	0.29
2.21	-13.76	-13.40	32.24	42.60	46.92	46.00	56.00	0.05	0.29
2.23	-12.37	-12.17	33.63	43.83	49.64	46.00	56.00	0.05	0.29
2.25	-13.49	-12.95	32.51	43.05	48.22	46.00	56.00	0.05	0.29
2.27	-12.62	-11.98	33.38	44.02	50.52	46.00	56.00	0.05	0.29
2.28	-12.04	-11.40	33.96	44.60	49.73	46.00	56.00	0.05	0.29
2.29	-10.86	-10.79	35.14	45.21	49.32	46.00	56.00	0.05	0.29
2.31	-11.14	-10.65	34.86	45.35	50.05	46.00	56.00	0.05	0.28
2.31	-11.12	-10.91	34.88	45.09	51.33	46.00	56.00	0.05	0.28
2.32	-10.93	-10.71	35.07	45.29	49.85	46.00	56.00	0.05	0.28
2.33	-10.84	-10.70	35.16	45.30	50.78	46.00	56.00	0.05	0.28
2.34	-9.65	-9.97	36.35	46.03	51.23	46.00	56.00	0.05	0.28
2.35	-7.85	-7.24	38.15	48.76	53.38	46.00	56.00	0.05	0.28
2.36	-8.88	-8.86	37.12	47.14	52.45	46.00	56.00	0.05	0.28
2.37	-9.24	-9.36	36.76	46.64	50.79	46.00	56.00	0.05	0.28
2.38	-9.54	-9.39	36.46	46.61	52.15	46.00	56.00	0.05	0.28
2.39	-9.94	-9.55	36.06	46.45	50.99	46.00	56.00	0.05	0.28
2.40	-7.49	-7.61	38.51	48.39	52.69	46.00	56.00	0.05	0.28
2.41	-9.35	-9.12	36.65	46.88	54.49	46.00	56.00	0.05	0.28
2.42	-10.47	-10.31	35.53	45.69	52.76	46.00	56.00	0.05	0.28
2.43	-10.56	-10.64	35.44	45.36	50.57	46.00	56.00	0.05	0.28
2.44	-11.17	-11.07	34.83	44.93	50.65	46.00	56.00	0.05	0.28
2.45	-11.09	-10.89	34.91	45.11	50.56	46.00	56.00	0.05	0.28
2.46	-5.28	-6.08	40.72	49.92	53.83	46.00	56.00	0.04	0.28
2.48	-11.03	-10.59	34.97	45.41	50.77	46.00	56.00	0.04	0.28
2.49	-10.81	-10.58	35.19	45.42	50.34	46.00	56.00	0.04	0.28

This was worst case for all modes and channels

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
2.50	-12.29	-12.06	33.71	43.94	50.13	46.00	56.00	0.04	0.28
2.52	-10.89	-10.70	35.11	45.30	52.45	46.00	56.00	0.04	0.27
2.53	-8.99	-11.69	37.01	44.31	52.89	46.00	56.00	0.04	0.27
2.55	-13.27	-11.79	32.73	44.21	49.48	46.00	56.00	0.04	0.27
2.56	-13.27	-12.33	32.73	43.67	49.24	46.00	56.00	0.04	0.27
2.58	-8.05	-7.77	37.95	48.23	52.47	46.00	56.00	0.04	0.27
2.59	-7.82	-8.07	38.18	47.93	52.57	46.00	56.00	0.04	0.27
2.59	-11.30	-11.11	34.70	44.89	50.96	46.00	56.00	0.04	0.27
2.61	-11.99	-11.38	34.01	44.62	49.68	46.00	56.00	0.04	0.27
2.63	-11.63	-11.08	34.37	44.92	50.40	46.00	56.00	0.04	0.27
2.64	-9.28	-10.21	36.72	45.79	51.80	46.00	56.00	0.04	0.27
2.65	-11.47	-10.36	34.53	45.64	51.03	46.00	56.00	0.04	0.27
2.66	-11.90	-11.10	34.10	44.90	50.06	46.00	56.00	0.04	0.27
2.67	-11.76	-11.44	34.24	44.56	50.00	46.00	56.00	0.04	0.27
2.69	-11.26	-11.20	34.74	44.80	49.49	46.00	56.00	0.04	0.27
2.69	-11.02	-10.75	34.98	45.25	49.97	46.00	56.00	0.04	0.27
2.71	-10.87	-11.16	35.13	44.84	49.82	46.00	56.00	0.04	0.27
2.73	-11.43	-11.67	34.57	44.33	49.99	46.00	56.00	0.04	0.27
2.74	-11.75	-11.46	34.25	44.54	49.19	46.00	56.00	0.04	0.27
2.75	-11.83	-11.78	34.17	44.22	49.45	46.00	56.00	0.04	0.27
2.77	-11.19	-12.10	34.81	43.90	49.49	46.00	56.00	0.04	0.26
2.79	-14.51	-14.32	31.49	41.68	47.88	46.00	56.00	0.04	0.26
2.81	-14.74	-14.98	31.26	41.02	46.66	46.00	56.00	0.04	0.26
2.83	-15.00	-14.76	31.00	41.24	48.40	46.00	56.00	0.04	0.26

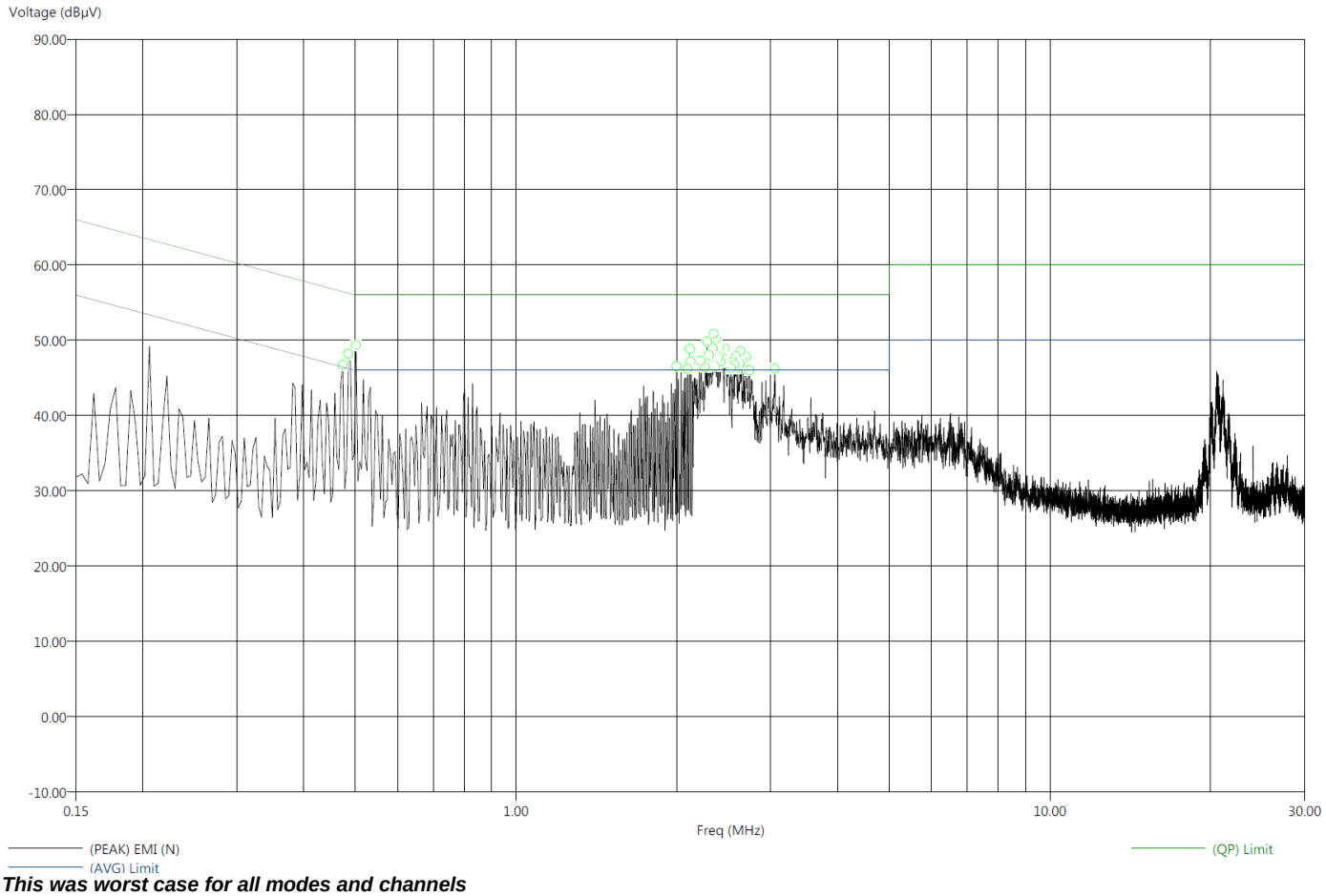
This was worst case for all modes and channels

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
2.83	-15.58	-15.50	30.42	40.50	46.47	46.00	56.00	0.04	0.26
2.86	-15.95	-15.06	30.05	40.94	46.50	46.00	56.00	0.04	0.26
2.87	-13.99	-14.09	32.01	41.91	48.02	46.00	56.00	0.04	0.26
2.89	-15.50	-14.06	30.50	41.94	48.33	46.00	56.00	0.04	0.26
2.91	-15.04	-13.33	30.96	42.67	47.95	46.00	56.00	0.04	0.26
2.91	-15.52	-14.25	30.48	41.75	47.12	46.00	56.00	0.04	0.26
2.94	-11.73	-11.65	34.27	44.35	50.65	46.00	56.00	0.04	0.26
2.95	-13.55	-13.13	32.45	42.87	47.86	46.00	56.00	0.04	0.26
2.98	-12.75	-12.46	33.25	43.54	49.72	46.00	56.00	0.04	0.26
2.99	-10.05	-11.48	35.95	44.52	51.87	46.00	56.00	0.04	0.26
3.00	-11.40	-10.05	34.60	45.95	51.23	46.00	56.00	0.04	0.26
3.01	-11.81	-10.25	34.19	45.75	52.91	46.00	56.00	0.04	0.26
3.03	-12.47	-12.29	33.53	43.71	49.87	46.00	56.00	0.04	0.25
3.05	-9.22	-8.54	36.78	47.46	51.82	46.00	56.00	0.04	0.25
3.06	-11.58	-11.41	34.42	44.59	50.65	46.00	56.00	0.04	0.25
3.08	-13.00	-13.75	33.00	42.25	47.76	46.00	56.00	0.04	0.25
3.11	-14.22	-13.36	31.78	42.64	49.96	46.00	56.00	0.04	0.25
3.13	-14.12	-11.35	31.88	44.65	50.36	46.00	56.00	0.04	0.25
3.15	-15.39	-14.52	30.61	41.48	48.44	46.00	56.00	0.04	0.25
3.23	-16.46	-15.85	29.54	40.15	45.76	46.00	56.00	0.04	0.25
3.24	-15.60	-14.11	30.40	41.89	47.85	46.00	56.00	0.04	0.25
3.25	-14.69	-13.19	31.31	42.81	48.40	46.00	56.00	0.04	0.25
3.27	-15.10	-13.81	30.90	42.19	47.87	46.00	56.00	0.04	0.25
3.57	-9.87	-10.07	36.13	45.93	49.33	46.00	56.00	0.03	0.24
3.62	-15.44	-14.74	30.56	41.26	47.11	46.00	56.00	0.03	0.24

This was worst case for all modes and channels

Title: FCC 15.207 9/21/2015 11:15:45 AM
File: Conducted Pre-Neutral.set Sequence: Preliminary Scan
Operator: Torey Oliver
EUT Type: Wireless Module, ATWILC3000-MR110CA.
EUT Condition: Transmitting
Comments: Connected to Control Board Powered By USB Adapter.
Temp: 74f
Hum: 48%
USB Adapter: 120V 60Hz

Compatible Electronics, Inc. FAC-3 (LAB R)



This was worst case for all modes and channels

Title: FCC 15.207 9/21/2015 11:34:25 AM
File: Conducted Final-Neutral.set Sequence: Final Measurements
Operator: Torey Oliver
EUT Type: Wireless Module, ATWILC3000-MR110CA.
EUT Condition: Transmitting
Comments: Connected to Control Board Powered By USB Adapter.
Temp: 74f
Hum: 48%
USB Adapter: 120V 60Hz

Compatible Electronics, Inc. FAC-3 (LAB R)

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
0.49	-17.35	-11.35	28.89	44.89	49.55	46.24	56.24	0.03	0.01
0.50	-14.67	-9.21	31.33	46.79	51.53	46.00	56.00	0.03	0.00
2.03	-23.31	-15.02	22.69	40.98	47.86	46.00	56.00	0.03	0.30
2.10	-22.05	-13.44	23.95	42.56	48.11	46.00	56.00	0.03	0.29
2.11	-20.86	-12.03	25.14	43.97	49.52	46.00	56.00	0.03	0.29
2.13	-21.90	-13.37	24.10	42.63	50.38	46.00	56.00	0.03	0.29
2.16	-23.38	-14.60	22.62	41.40	48.21	46.00	56.00	0.03	0.29
2.20	-23.65	-15.47	22.35	40.53	47.18	46.00	56.00	0.03	0.29
2.22	-24.18	-15.51	21.82	40.49	47.42	46.00	56.00	0.03	0.29
2.26	-24.73	-16.81	21.27	39.19	45.70	46.00	56.00	0.03	0.29
2.29	-23.36	-14.86	22.64	41.14	48.04	46.00	56.00	0.03	0.29
2.31	-22.63	-14.13	23.37	41.87	48.10	46.00	56.00	0.03	0.28
2.32	-22.81	-14.07	23.19	41.93	49.12	46.00	56.00	0.03	0.28
2.33	-22.36	-13.91	23.64	42.09	48.67	46.00	56.00	0.03	0.28
2.34	-20.95	-12.58	25.05	43.42	50.19	46.00	56.00	0.03	0.28
2.35	-20.68	-11.70	25.32	44.30	50.36	46.00	56.00	0.03	0.28
2.36	-21.59	-12.95	24.41	43.05	50.06	46.00	56.00	0.03	0.28
2.37	-21.74	-13.25	24.26	42.75	49.30	46.00	56.00	0.03	0.28
2.37	-21.05	-12.82	24.95	43.18	49.31	46.00	56.00	0.03	0.28
2.38	-21.32	-12.47	24.68	43.53	50.77	46.00	56.00	0.03	0.28
2.40	-20.57	-12.18	25.43	43.82	49.02	46.00	56.00	0.03	0.28
2.41	-20.56	-12.30	25.44	43.70	52.05	46.00	56.00	0.03	0.28
2.42	-20.77	-12.37	25.23	43.63	49.53	46.00	56.00	0.03	0.28

This was worst case for all modes and channels

Freq (MHz)	(AVG) Margin AVL (dB)	(QP) Margin QPL (dB)	(AVG) EMI (dBµV)	(QP) EMI (dBµV)	(PEAK) EMI (dBµV)	(AVG) Limit (dBµV)	(QP) Limit (dBµV)	Transducer (dB)	Cable (dB)
2.43	-20.85	-12.43	25.15	43.57	49.84	46.00	56.00	0.03	0.28
2.45	-21.25	-13.00	24.75	43.00	50.05	46.00	56.00	0.03	0.28
2.45	-21.24	-12.98	24.76	43.02	50.07	46.00	56.00	0.04	0.28
2.46	-17.18	-8.68	28.82	47.32	52.77	46.00	56.00	0.04	0.28
2.47	-18.23	-9.90	27.77	46.10	51.97	46.00	56.00	0.04	0.28
2.49	-21.64	-13.14	24.36	42.86	48.49	46.00	56.00	0.04	0.28
2.50	-21.64	-13.12	24.36	42.88	49.66	46.00	56.00	0.04	0.28
2.51	-21.99	-13.79	24.01	42.21	48.71	46.00	56.00	0.04	0.28
2.53	-22.69	-15.06	23.31	40.94	49.14	46.00	56.00	0.04	0.27
2.53	-23.20	-15.72	22.80	40.28	47.51	46.00	56.00	0.04	0.27
2.57	-22.36	-14.72	23.64	41.28	47.34	46.00	56.00	0.04	0.27
2.58	-18.95	-10.99	27.05	45.01	51.03	46.00	56.00	0.04	0.27
2.59	-21.25	-13.83	24.75	42.17	48.15	46.00	56.00	0.04	0.27
2.70	-19.34	-11.90	26.66	44.10	49.42	46.00	56.00	0.04	0.27
2.75	-22.31	-16.65	23.69	39.35	46.27	46.00	56.00	0.04	0.27
3.06	-19.45	-14.23	26.55	41.77	47.80	46.00	56.00	0.04	0.25

This was worst case for all modes and channels

20DB BANDWIDTH

DATA SHEETS

20dB BANDWIDTH

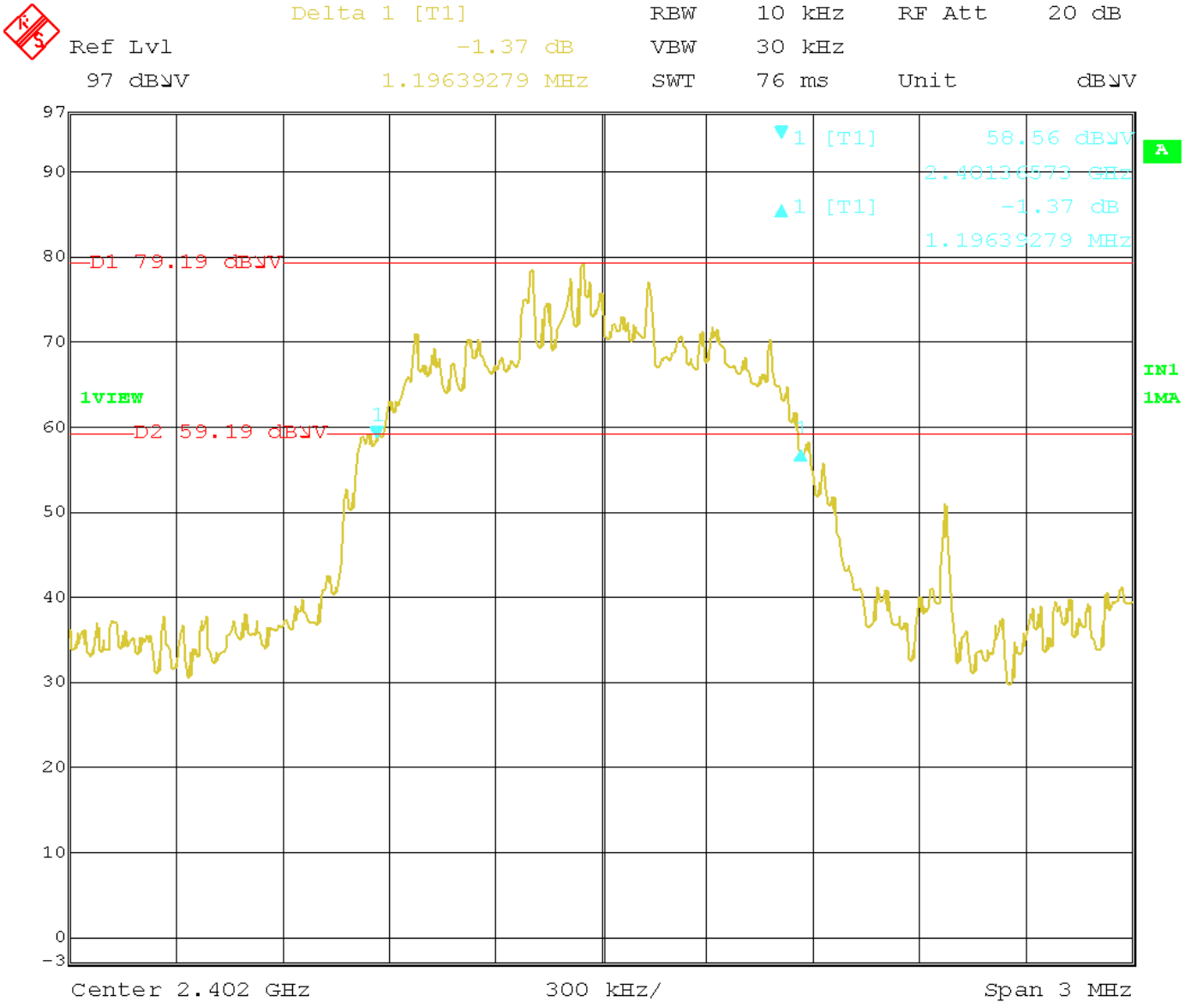
FCC 15.247

Company:	Microchip Technology	Date:	9/2/2016
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Matt H
Mode:	Bluetooth		

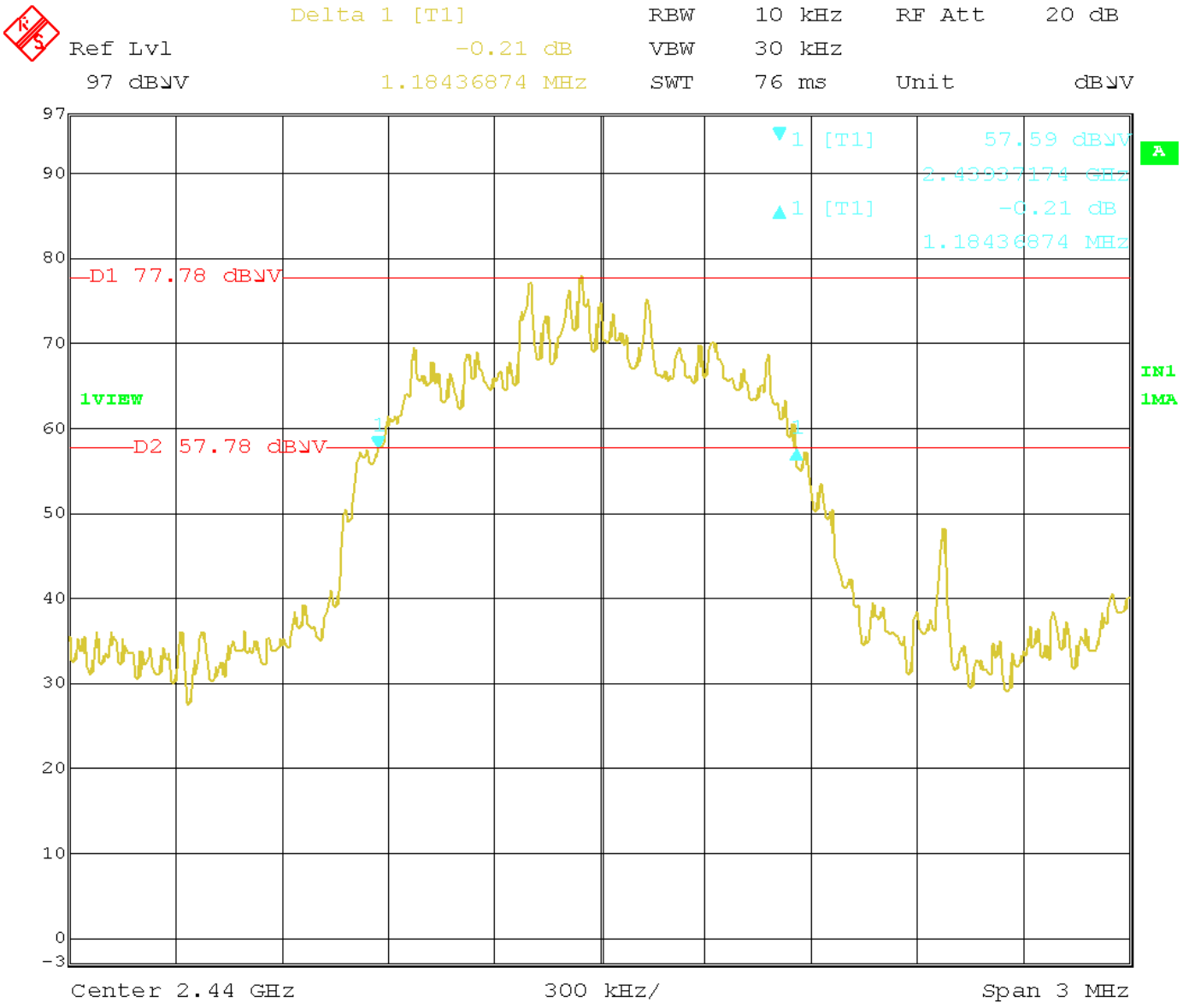
Compatible Electronics, Inc. FAC-3 (Lab R)

20dB Bandwidth

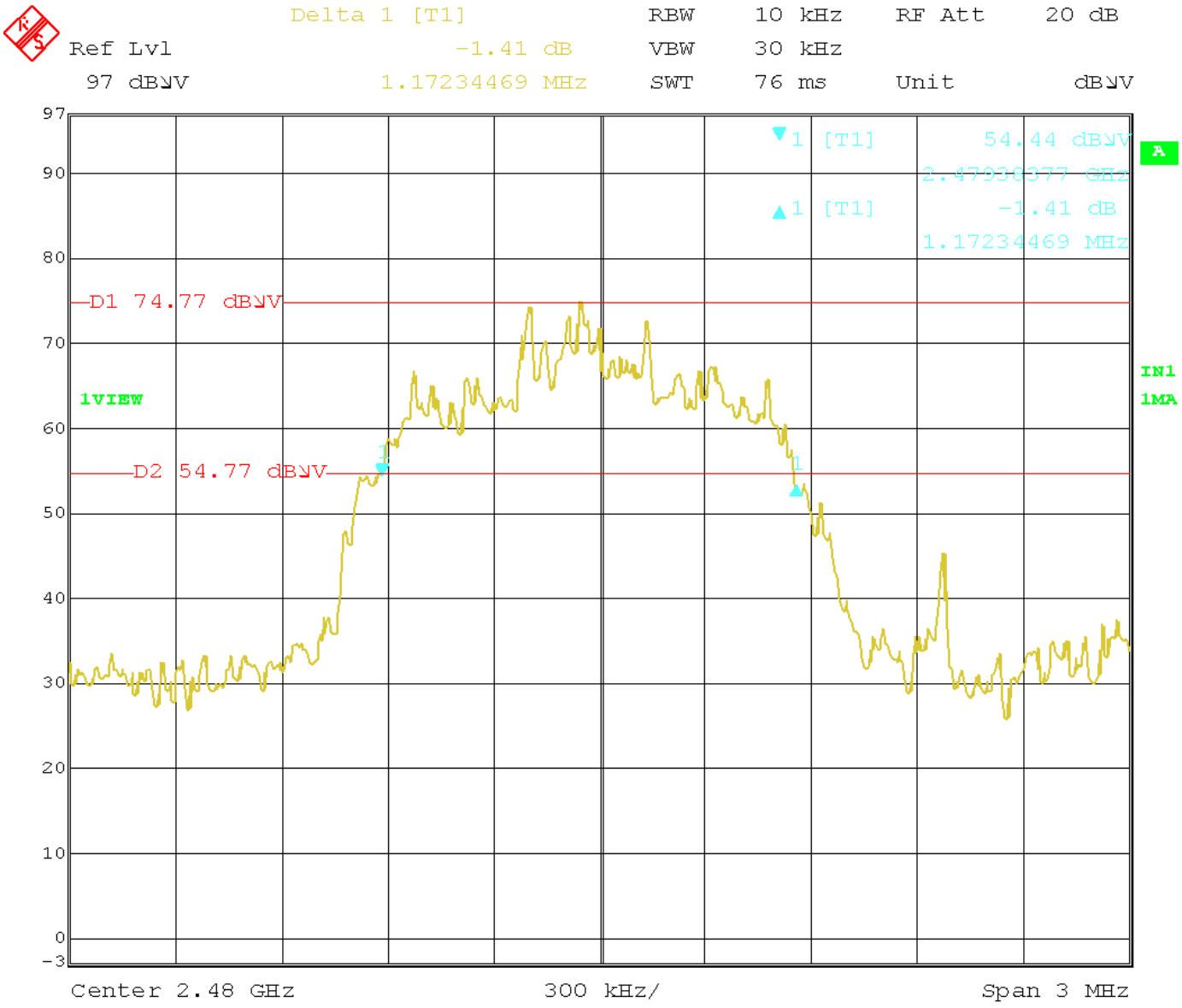
Freq. (MHz)	Measured BW (kHz)	Peak / QP / Avg	Comments
2402	1196.39	Peak	
2440	1184.36	Peak	
2480	1172.34	Peak	



Title: ATWILC3000
Comment A: BANDWIDTH 2MBPS



Title: ATWILC3000
Comment A: BANDWIDTH 2MBPS



Title: ATWILC3000
Comment A: BANDWIDTH 2MBPS

MAXIMUM PEAK CONDUCTED OUTPUT POWER

DATA SHEETS

MAXIMUM PEAK CONDUCTED OUTPUT POWER

FCC 15.247

Company:	Microchip Technology	Date:	9/23/2015
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Torey Oliver
Mode:	Bluetooth		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2402	10.72	30.00	-19.28	Peak	
2440	11.08	30.00	-18.92	Peak	
2480	11.15	30.00	-18.85	Peak	

EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS (IN 100KHZ BANDWIDTH) / CONDUCTED

DATA SHEETS

EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

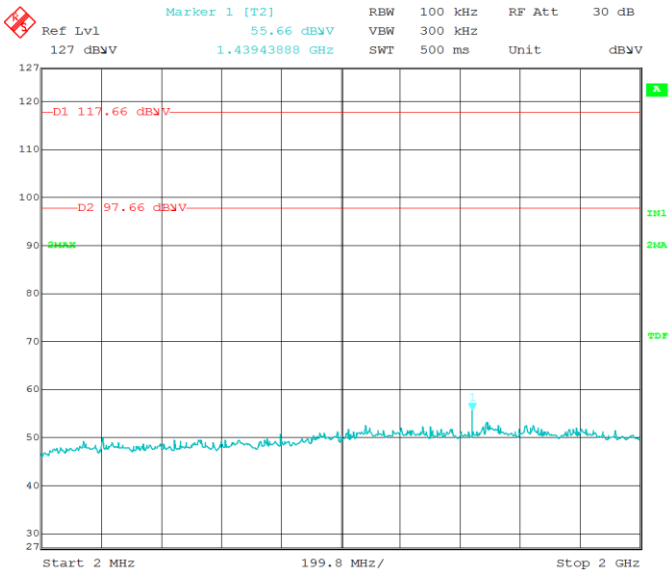
FCC 15.247

Company:	Microchip Technology	Date:	9/23/2015
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Torey Oliver
Mode:	BT		

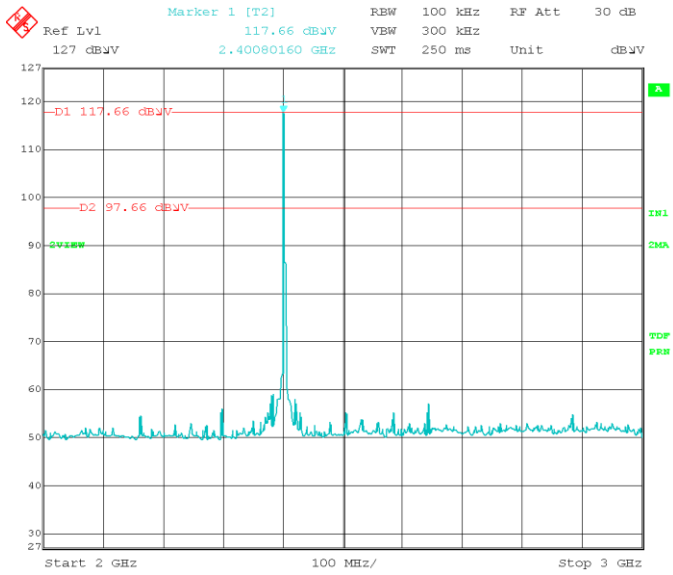
Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Peak / QP / Avg	Comments
7206	62.47	97.66	-35.19	Peak	Low Channel
14640	59.96	97.93	-37.97	Peak	Mid Channel
9920	63.73	98.01	-34.28	Peak	High Channel

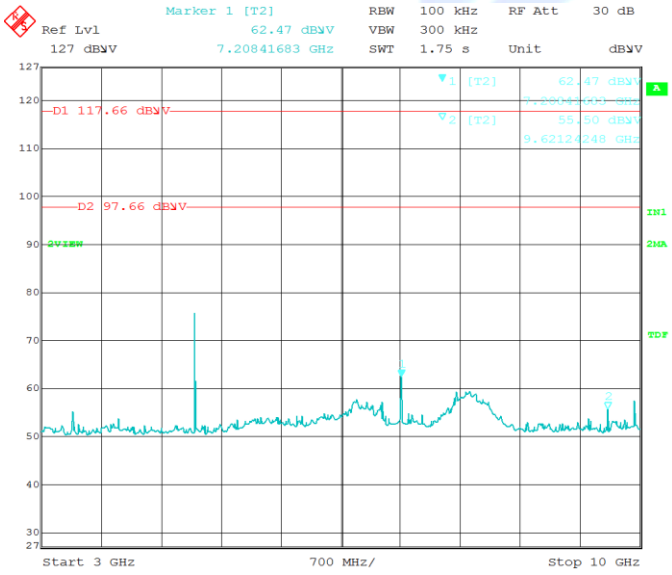
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS
LOW CHANNEL



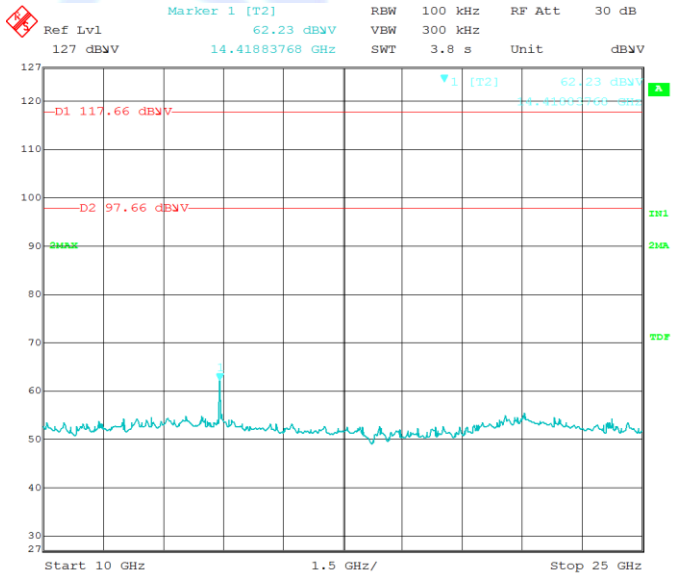
Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2402 MHz
Date: 23.SEP.2015 13:39:46



Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2402 MHz
Date: 23.SEP.2015 13:39:11

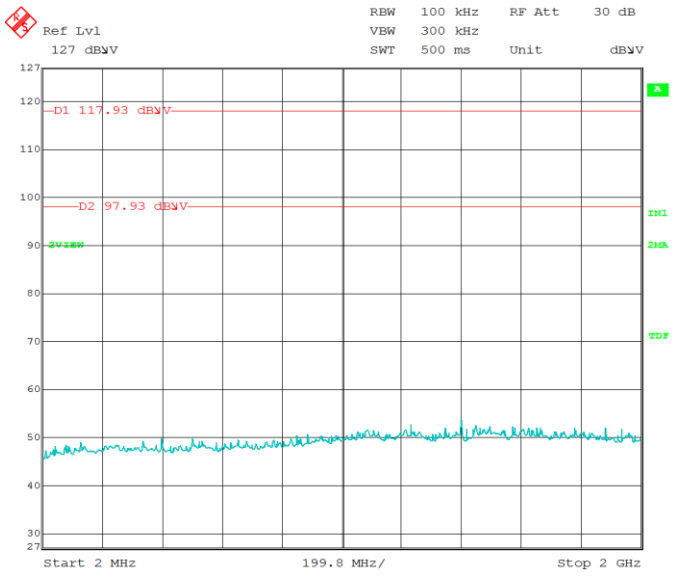


Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2402 MHz
Date: 23.SEP.2015 13:41:30

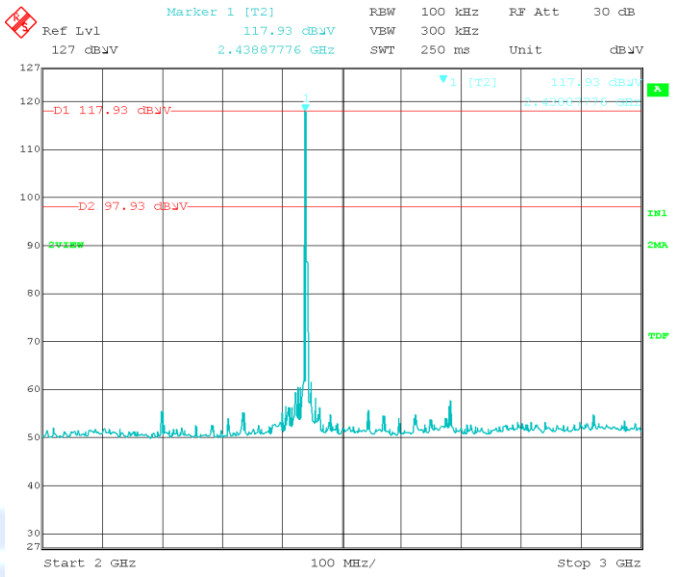


Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2402 MHz
Date: 23.SEP.2015 13:42:55

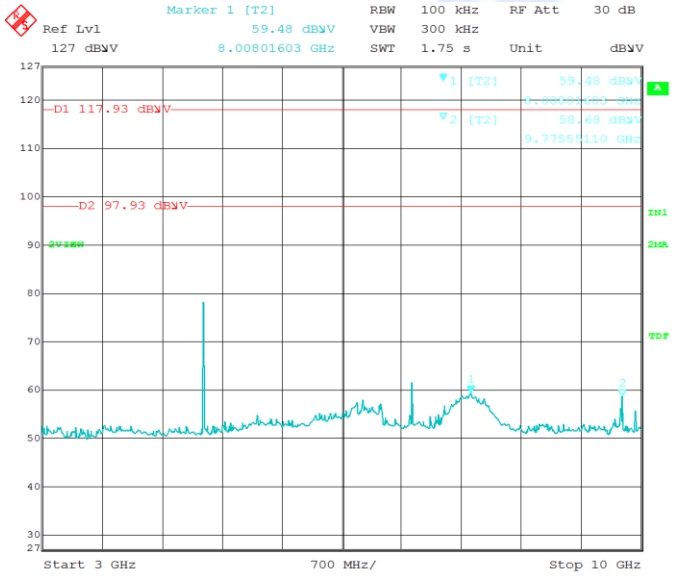
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS
MID CHANNEL



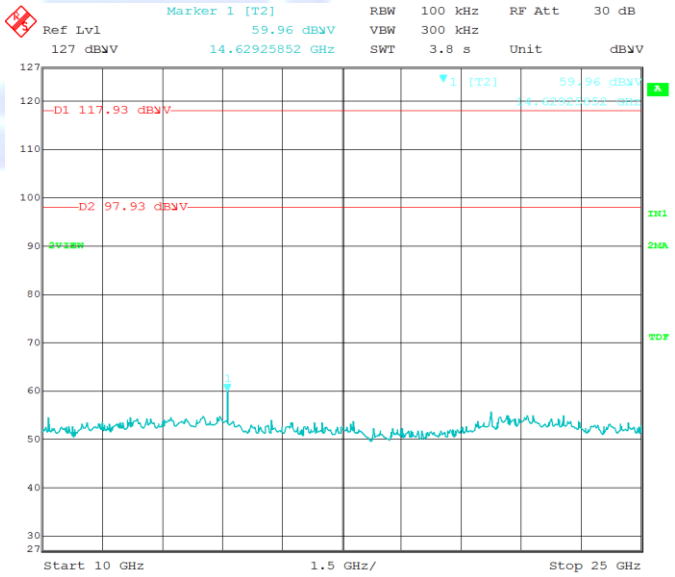
Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2440 MHz
Date: 23.SEP.2015 13:51:09



Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2440 MHz
Date: 23.SEP.2015 13:50:43

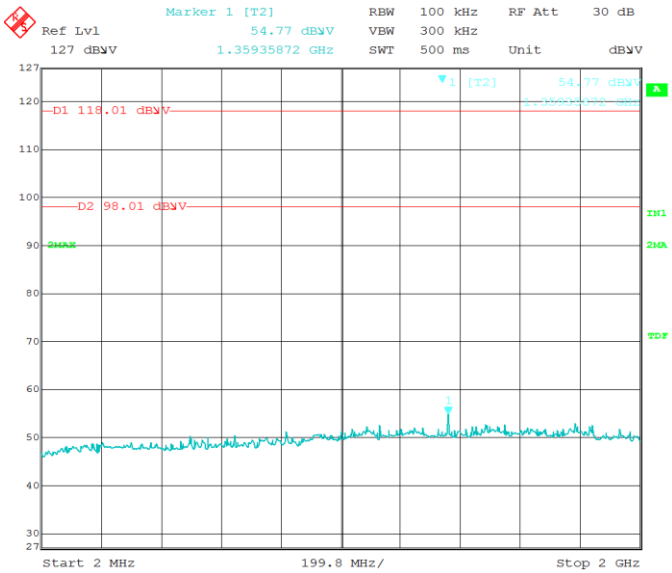


Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2440 MHz
Date: 23.SEP.2015 13:52:33

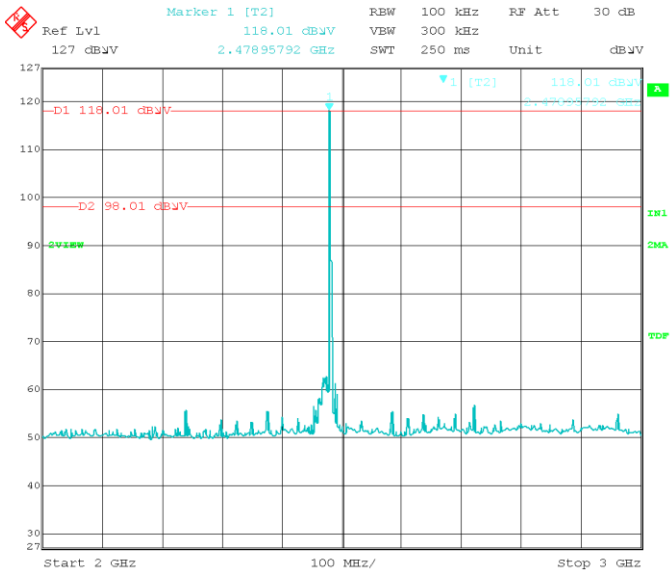


Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2440 MHz
Date: 23.SEP.2015 13:54:07

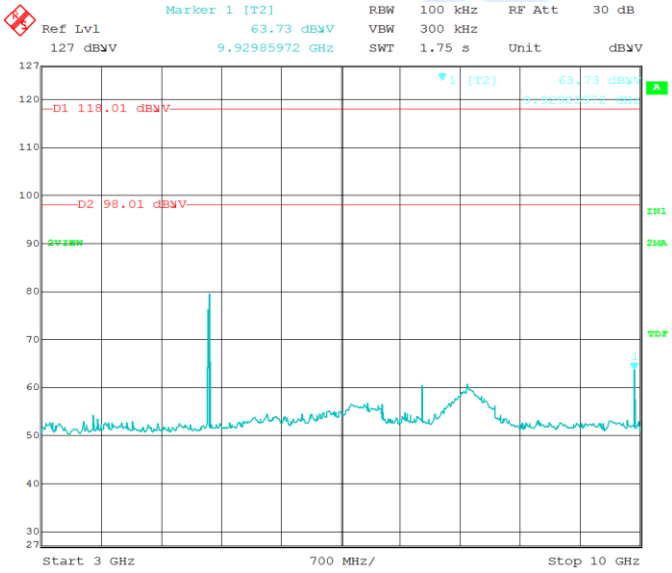
EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS
HIGH CHANNEL



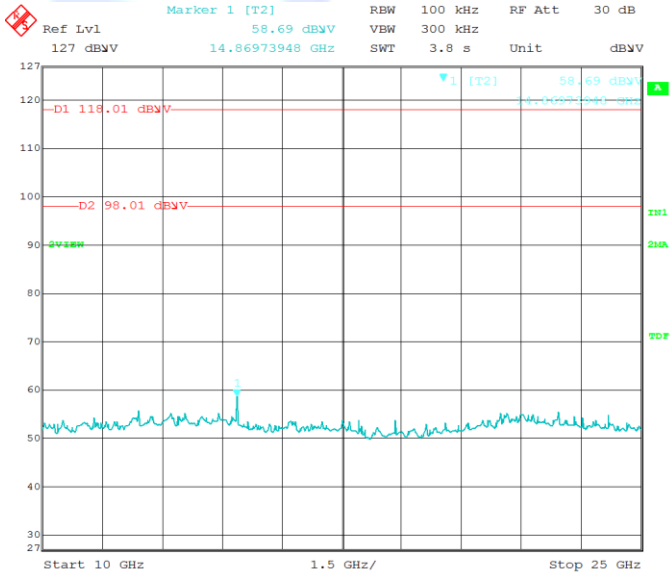
Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2480 MHz
Date: 23.SEP.2015 14:37:24



Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2480 MHz
Date: 23.SEP.2015 14:36:49



Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2480 MHz
Date: 23.SEP.2015 14:38:36



Title: ATWILC3000
Comment A: Conducted Spurious Bluetooth 2480 MHz
Date: 23.SEP.2015 14:40:16

EMISSIONS IN RESTRICTED FREQUENCY BANDS (RADIATED FIELD STRENGTH)

DATA SHEETS

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS
Low Channel, Horizontal & Vertical

FCC 15.247

Company:	Microchip Technology	Date:	9/23/2015
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Torey Oliver
Mode:	BT		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4804.00	46.13	H	73.98	-27.85	Peak	1.56	207	**In Restricted Band**
4804.00	33.76	H	53.98	-20.22	Avg	1.56	207	
12010.00	62.17	H	73.98	-11.81	Peak	1.55	28	**In Restricted Band**
12010.00	49.10	H	53.98	-4.88	Avg	1.55	28	
14412.00		H	73.98		Peak			**In Restricted Band**
14412.00		H	53.98		Avg			No emissions found
19216.00		H	73.98		Peak			**In Restricted Band**
19216.00		H	53.98		Avg			No Emissions Found
4804.00	46.49	V	73.98	-27.49	Peak	2.80	185	**In Restricted Band**
4804.00	33.70	V	53.98	-20.28	Avg	2.80	185	
12010.00	61.67	V	73.98	-12.31	Peak	2.13	143	**In Restricted Band**
12010.00	48.92	V	53.98	-5.06	Avg	2.13	143	
14412.00		V	73.98		Peak			**In Restricted Band**
14412.00		V	53.98		Avg			No emissions found
19216.00		V	73.98		Peak			**In Restricted Band**
19216.00		V	53.98		Avg			No Emissions Found

Test distance
3 meter

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS
Mid Channel, Horizontal & Vertical

FCC 15.247

Company:	Microchip Technology	Date:	9/23/2015
EUT:	Modular Transmitter	Lab:	R
		Test ENG:	Torey Oliver
Model:	ATWILC3000-MR110CA		
Mode:	BT		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4880.00	58.00	H	73.98	-15.98	Peak	1.68	288	**In Restricted Band**
4880.00	45.51	H	53.98	-8.47	Avg	1.68	288	
7320.00		H	73.98		Peak			**In Restricted Band**
7320.00		H	53.98		Avg			No Emissions Found
12200.00		H	73.98		Peak			**In Restricted Band**
12200.00		H	53.98		Avg			No Emissions Found
19520.00		H	73.98		Peak			**In Restricted Band**
19520.00		H	53.98		Avg			No Emissions Found
4880.00	57.16	V	73.98	-16.82	Peak	1.07	181	**In Restricted Band**
4880.00	44.32	V	53.98	-9.66	Avg	1.07	181	
7320.00		V	73.98		Peak			**In Restricted Band**
7320.00		V	53.98		Avg			No emission found
12200.00		V	73.98		Peak			**In Restricted Band**
12200.00		V	53.98		Avg			No emission found
19520.00		V	73.98		Peak			**In Restricted Band**
19520.00		V	53.98		Avg			No emission found

Test distance
3 meter

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS
High Channel, Horizontal & Vertical

FCC 15.247

Company:	Microchip Technology	Date:	9/23/2015
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Torey Oliver
Mode:	BT		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
4960.00	56.23	H	73.98	-17.75	Peak	1.22	257	**In Restricted Band**
4960.00	40.61	H	53.98	-13.37	Avg	1.22	257	
7440.00		H	73.98		Peak			**In Restricted Band**
7440.00		H	53.98		Avg			No emission found
12400.00		H	73.98		Peak			**In Restricted Band**
12400.00		H	53.98		Avg			No Emissions Found
19840.00		H	73.98		Peak			**In Restricted Band**
19840.00		H	53.98		Avg			No Emissions Found
22320.00		H	73.98		Peak			**In Restricted Band**
22320.00		H	53.98		Avg			No Emissions Found
4960.00	52.21	V	73.98	-21.77	Peak	1.14	37	**In Restricted Band**
4960.00	37.66	V	53.98	-16.32	Avg	1.14	37	
7440.00		V	73.98		Peak			**In Restricted Band**
7440.00		V	53.98		Avg			No emission found
12400.00		V	73.98		Peak			**In Restricted Band**
12400.00		V	53.98		Avg			No Emissions Found
19840.00		V	73.98		Peak			**In Restricted Band**
19840.00		V	53.98		Avg			No Emissions Found
22320.00		V	73.98		Peak			**In Restricted Band**
22320.00		V	53.98		Avg			No Emissions Found

Test distance
3 meter

EMISSIONS RADIATED OUTSIDE OF THE FUNDAMENTAL FREQUENCY BAND AT BAND EDGES

DATA SHEETS

BAND EDGES- VERTICAL

FCC 15.247

Company: Microchip Technology
EUT: Modular Transmitter
Model: ATWILC3000-MR110CA
Mode: BT

Date: 9/22/2015
Lab: R
Test ENG: Torey Oliver

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBµV/m)	Pol	Limit (dBµV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402.00	101.27	V	--	--	Peak	1.07	202	Fundamental of Low Channel
2400.00	75.40	V	81.27	-5.87	Delta	1.07	202	From Peak
2384.15	62.69	V	73.98	-11.29	Peak	1.07	202	**No** Marker Delta Method Used
2384.15	38.29	V	53.98	-15.69	Avg	1.07	202	
2480.00	103.35	V	--	--	Peak	1.09	194	Fundamental of High Channel
2483.70	63.66	V	73.98	-10.32	Peak	1.09	194	**No** Marker Delta Method Used
2483.70	41.12	V	53.98	-12.86	Avg	1.09	194	

Test distance
3 meter

BAND EDGES- HORIZONTAL

BT Mode

FCC 15.247

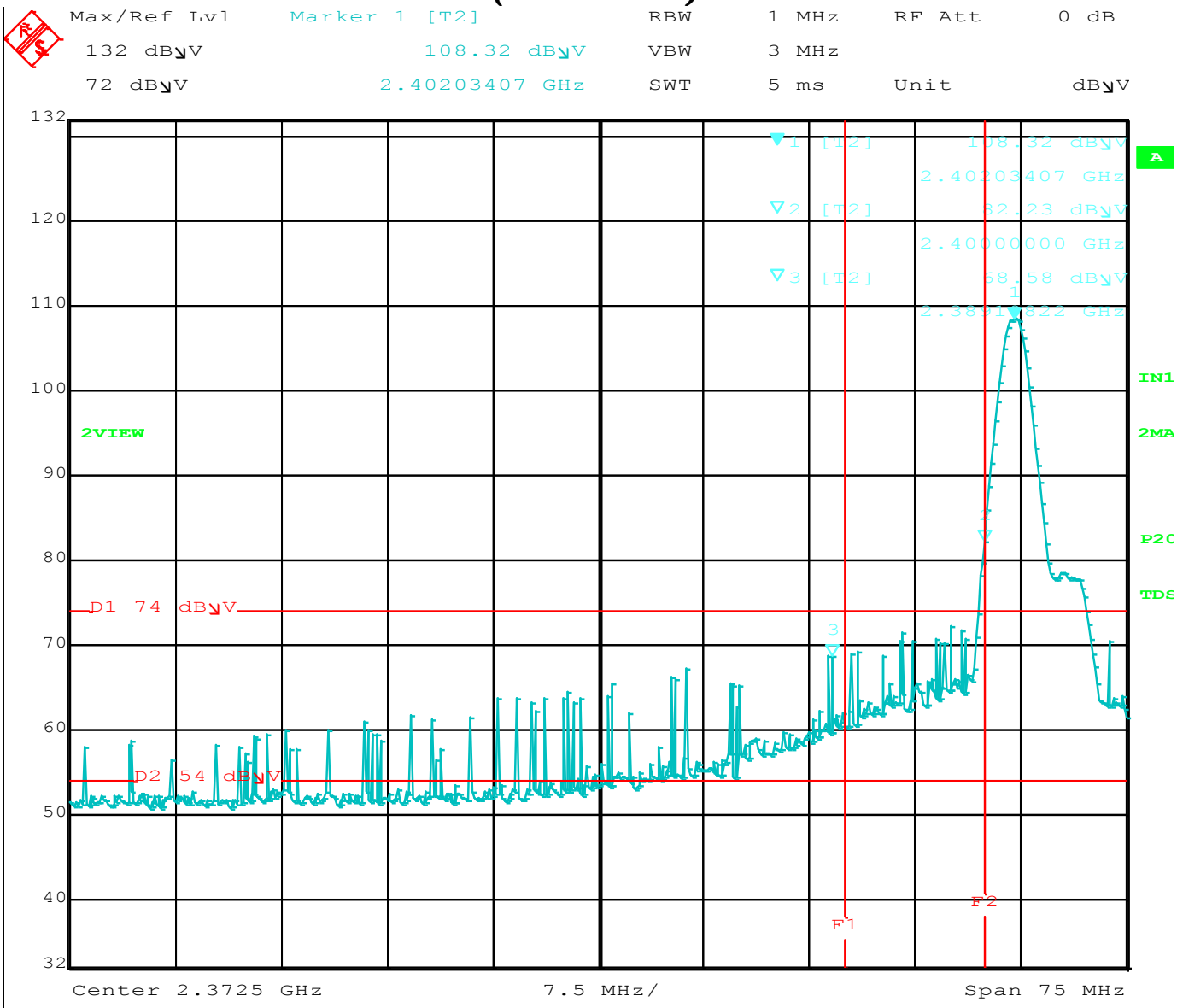
Company:	Microchip Technology	Date:	9/22/2015
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Torey Oliver
Mode:	BT		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBµV/m)	Pol	Limit (dBµV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402.00	108.32	H	--	--	Peak	1	210	Fundamental of Low Channel
2400.00	82.23	H	88.32	-6.09	Delta	1	210	
2389.11	68.58	H	73.98	-4.72	Peak	1	210	**No** Marker Delta Method Used
2389.11	38.59	H	53.98	-15.39	Avg	1	210	
2480.00	109.85	H	--	--	Peak	1.14	210	Fundamental of High Channel
2483.50	67.81	H	73.98	-6.17	Peak	1.14	210	**No** Marker Delta Method Used
2483.50	46.19	H	53.98	-7.79	Avg	1.14	210	

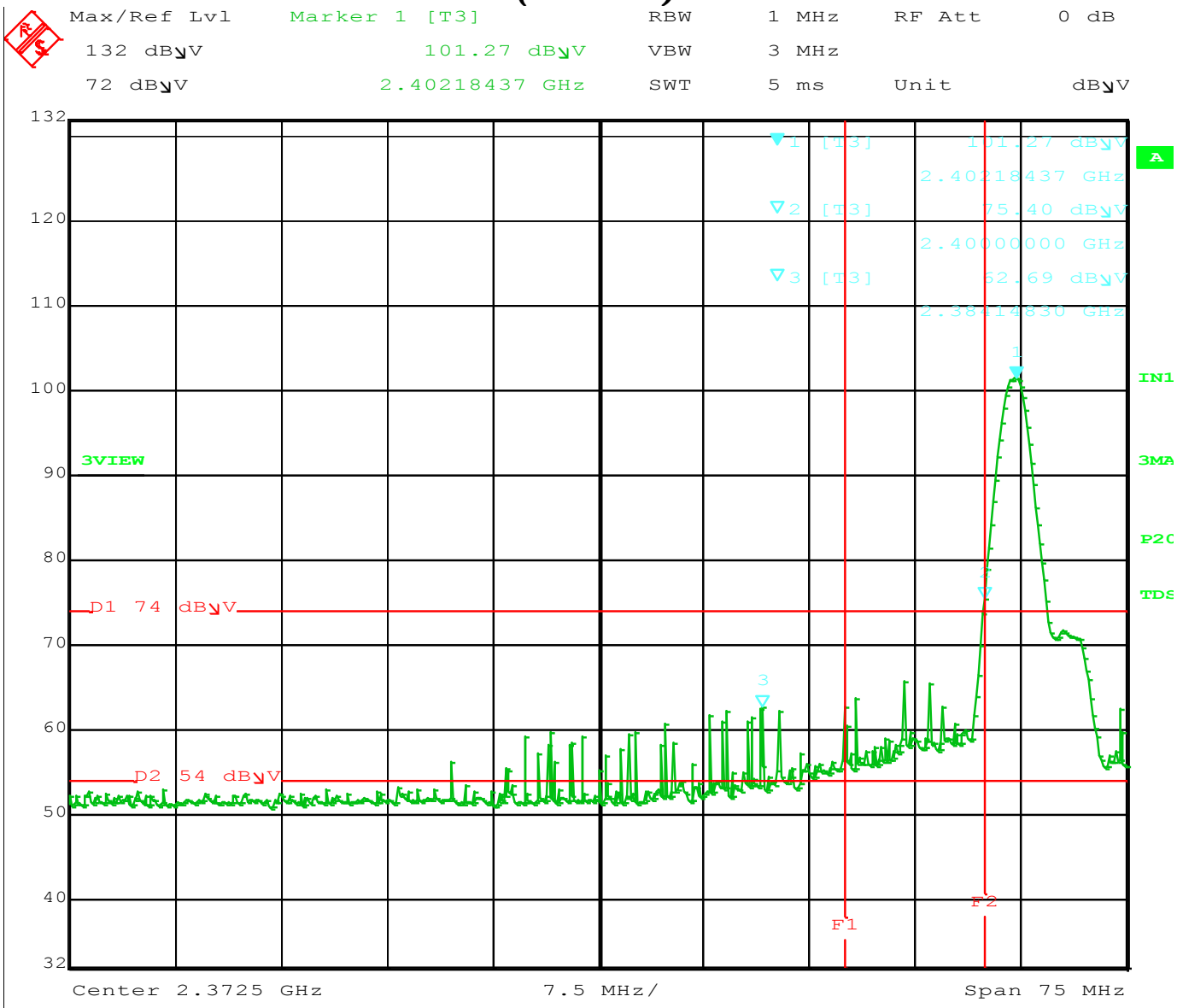
Test distance
3 meter

LOWER BAND EDGE
(Horizontal)



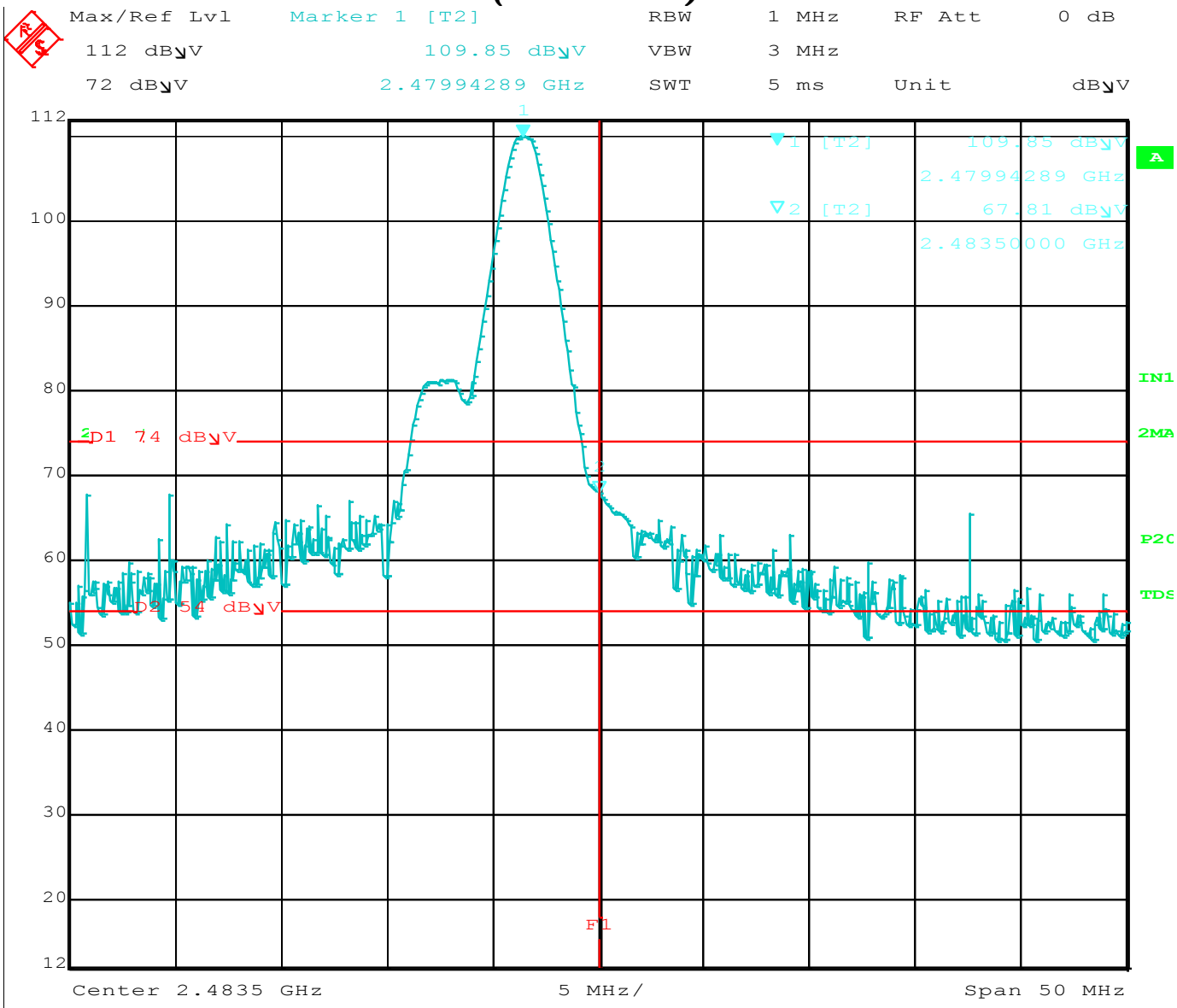
Title:
Comment A: Lower Band Edge Bluetooth Horizontal
Date: 22.SEP.2015 15:15:48

LOWER BAND EDGE
(Vertical)



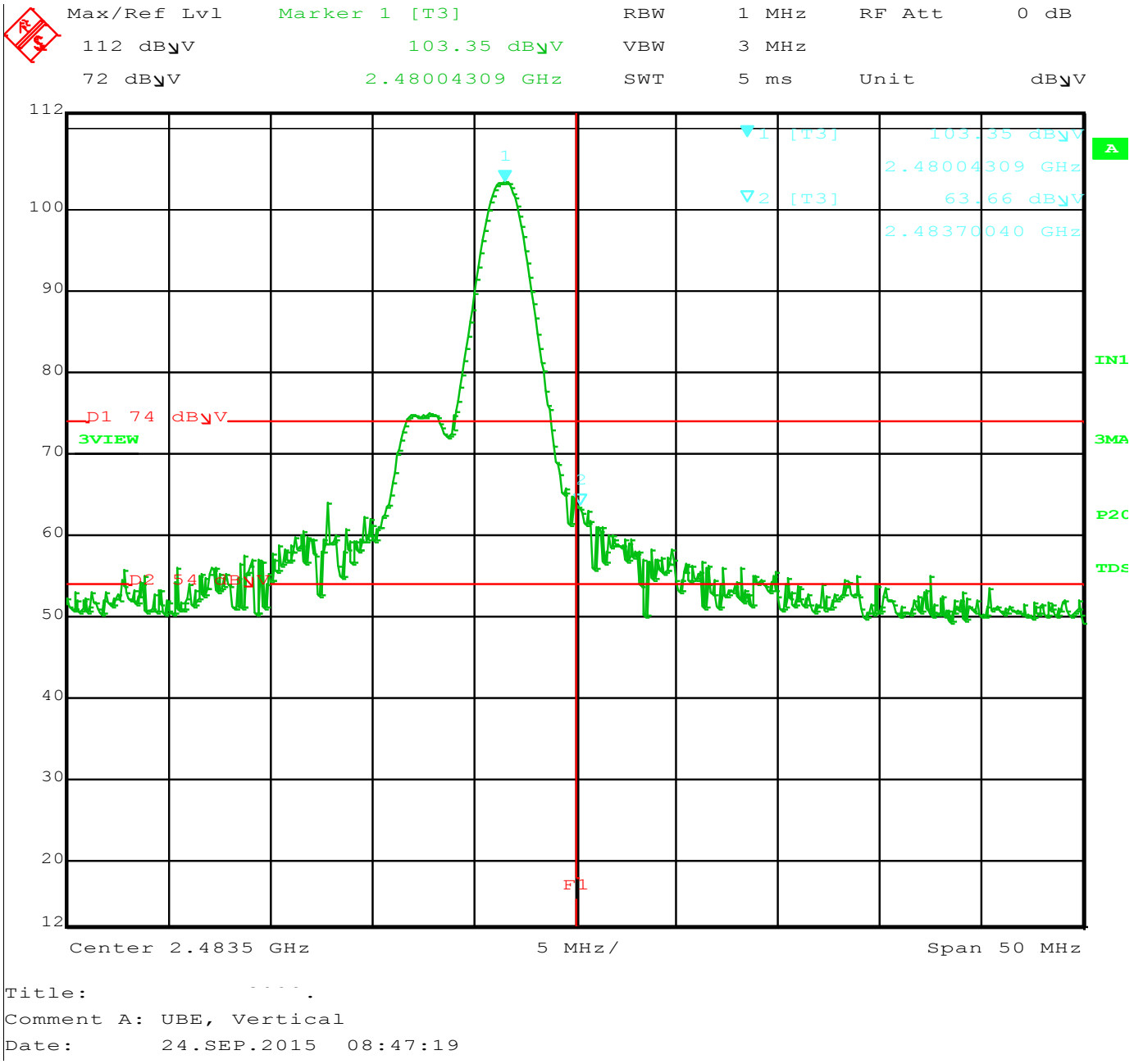
Title:
Comment A: Lower Band Edge Bluetooth Vertical
Date: 22.SEP.2015 15:12:45

UPPER BAND EDGE
(Horizontal)



Title: .
Comment A: UBE, Horizontal.
Date: 24.SEP.2015 08:40:08

UPPER BAND EDGE
(Vertical)



Title: .
Comment A: UBE, Vertical
Date: 24.SEP.2015 08:47:19

BAND EDGES- VERTICAL

FCC 15.247

Company: Microchip Technology
EUT: Modular Transmitter
Model: ATWILC3000-MR110CA
Mode: BT

Date: 11/21/2016
Lab: R
Test ENG: Matt Harrison

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBµV/m)	Pol	Limit (dBµV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402.00	101.98	V	--	--	Peak	1	170	Fundamental of Low Channel
2400.00	76.51	V	81.98	-5.47	Delta	1	170	From Peak
2389.49	52.19	V	73.98	-21.79	Peak	1	170	**No** Marker Delta Method Used
2389.49	36.51	V	53.98	-17.47	Avg	1	170	
2480.00	100.92	V	--	--	Peak	1	166	Fundamental of High Channel
2483.50	60.33	V	73.98	-13.65	Peak	1	166	**No** Marker Delta Method Used
2483.50	46.67	V	53.98	-7.31	Avg	1	166	

Test distance
3 meter

BAND EDGES- HORIZONTAL

BT Mode

FCC 15.247

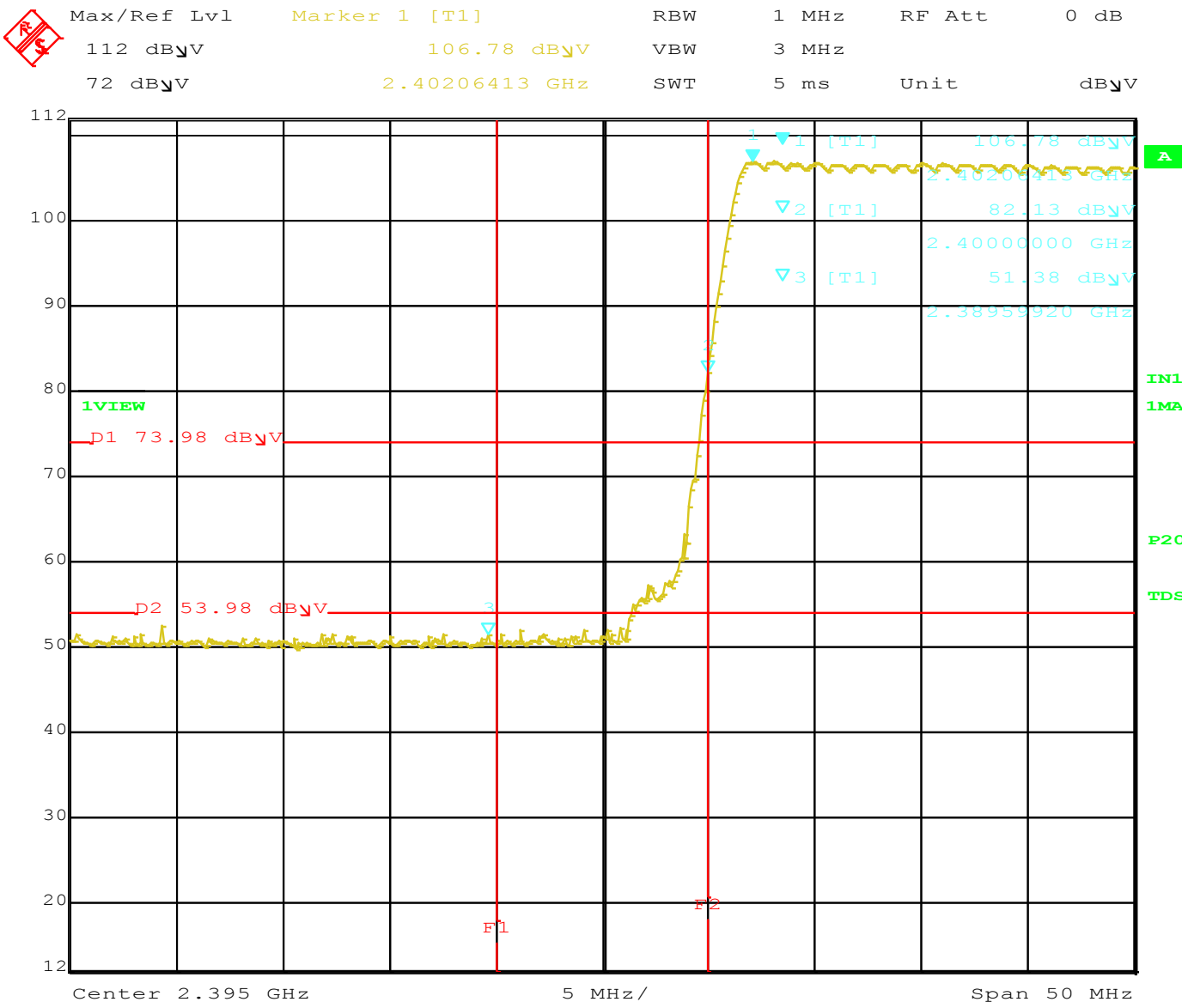
Company:	Microchip Technology	Date:	11/21/2016
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Matt Harrison
Mode:	BT		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Level (dBµV/m)	Pol	Limit (dBµV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402.00	106.78	H	--	--	Peak	1.54	208	Fundamental of Low Channel
2400.00	82.13	H	86.78	-4.65	Delta	1.54	208	
2389.59	51.38	H	73.98	-22.60	Peak	1.54	208	**No** Marker Delta Method Used
2389.59	36.56	H	53.98	-17.42	Avg	1.54	208	
2480.00	108.53	H	--	--	Peak	1.34	205	Fundamental of High Channel
2483.50	67.74	H	73.98	-6.24	Peak	1.34	205	**No** Marker Delta Method Used
2483.50	46.75	H	53.98	-7.23	Avg	1.34	205	

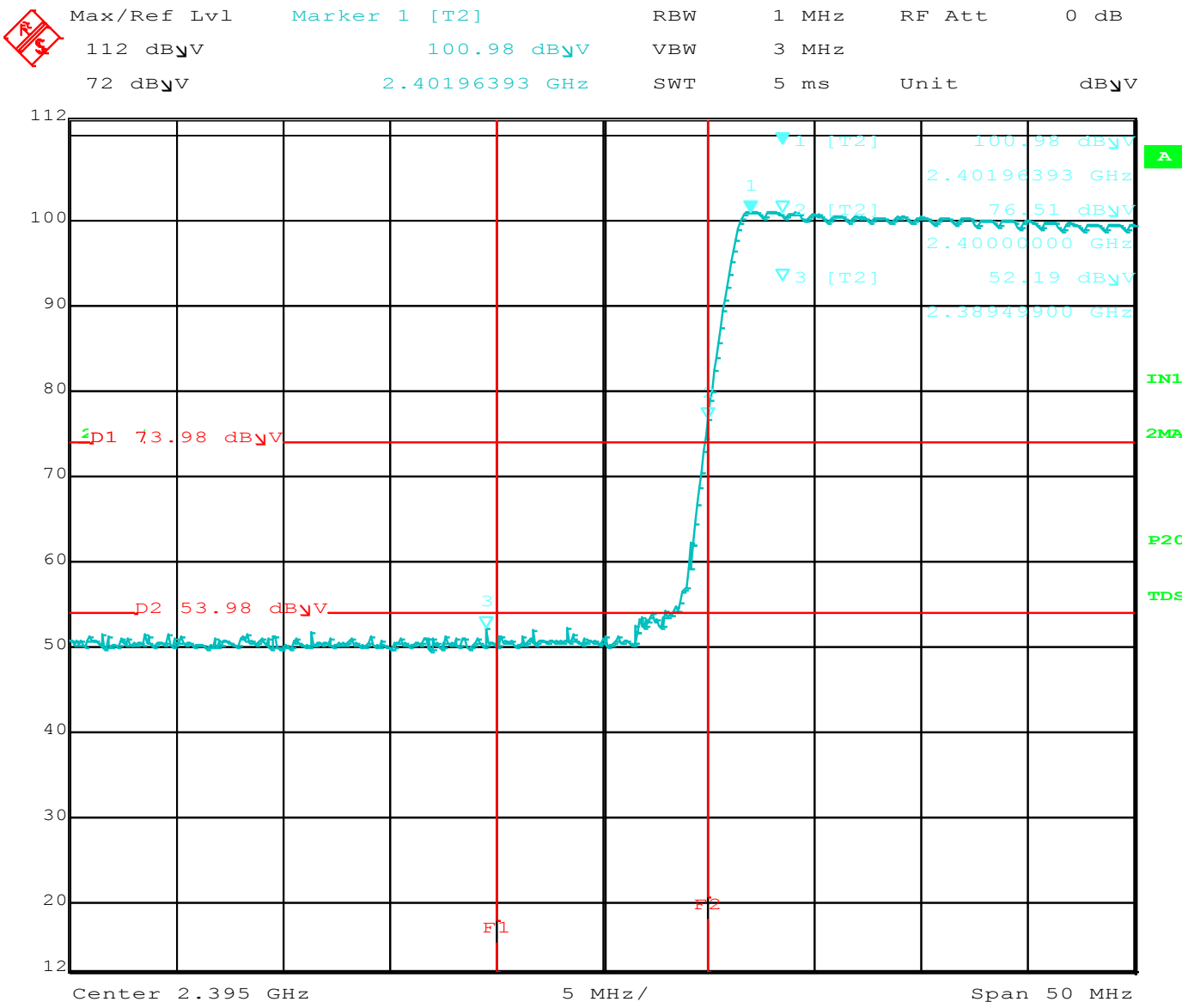
Test distance
3 meter

LOWER BAND EDGE
(Horizontal)



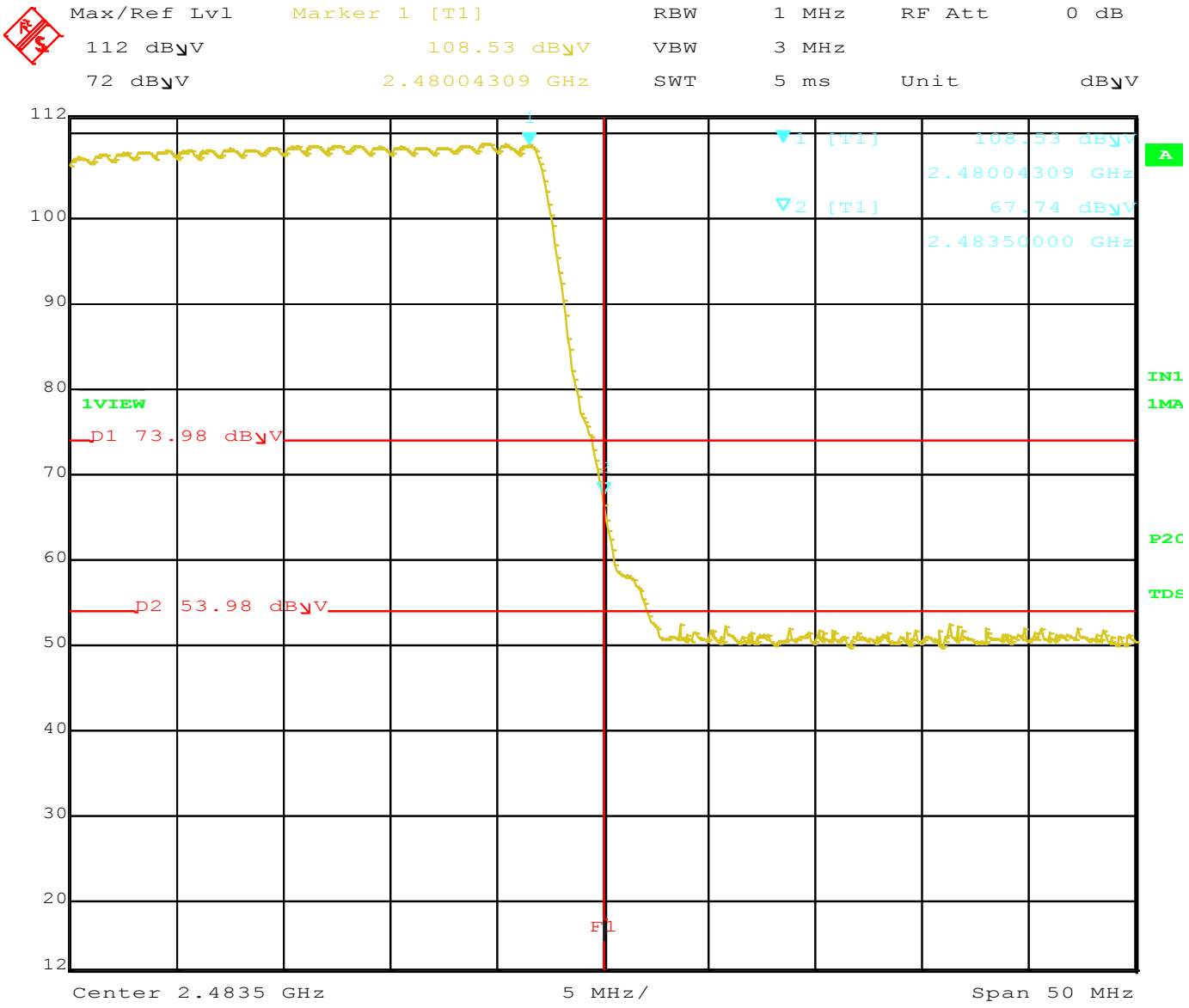
Comment A: ATWILC3000

LOWER BAND EDGE
(Vertical)



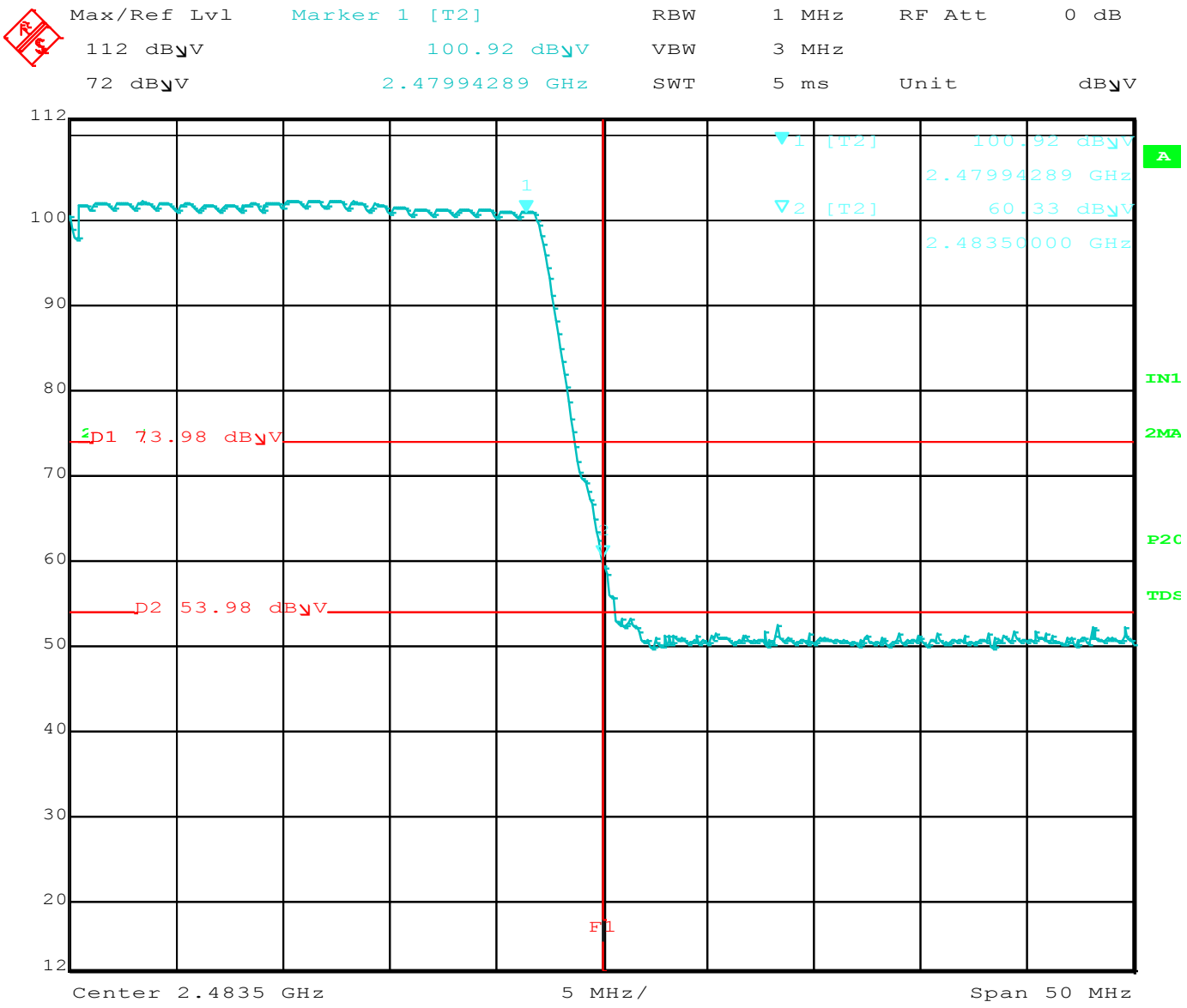
Comment A: ATWILC3000

UPPER BAND EDGE
(Horizontal)



Comment A: ATWILC3000

UPPER BAND EDGE
(Vertical)



Comment A: ATWILC3000

AVERAGE TIME OF OCCUPANCY / DWELL TIME

DATA SHEETS

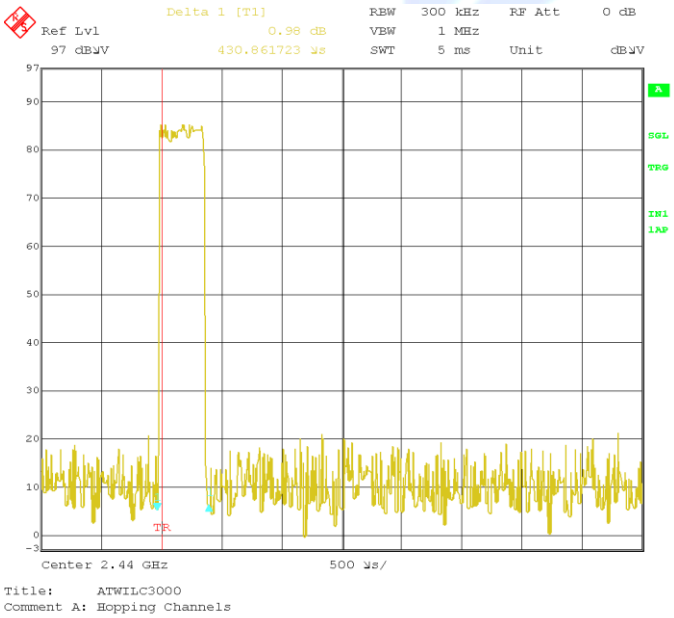
TIME OF OCCUPANCY / DWELL TIME

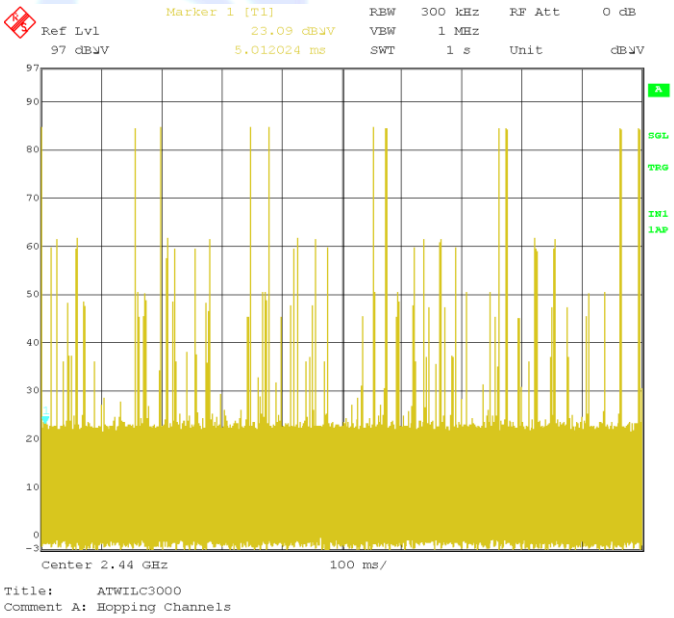
FCC 15.247

Company:	Atmel Corporation	Date:	11/21/2016
EUT:	Modular Transmitter	Lab:	R
Model:	ATWINC3000-MR110CA	Test ENG:	Matt H.
Mode:	Bluetooth		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Measured Pulse (mS)	Pulses in (1S)	Pulses in (31.6S)	Dwell Time (mS)	Limit (mS)	Margin (mS)	Comments
2440	0.43	11.00	347.60	149.77	400.00	-250.23	





CARRIER FREQUENCY SEPARATION

DATA SHEETS

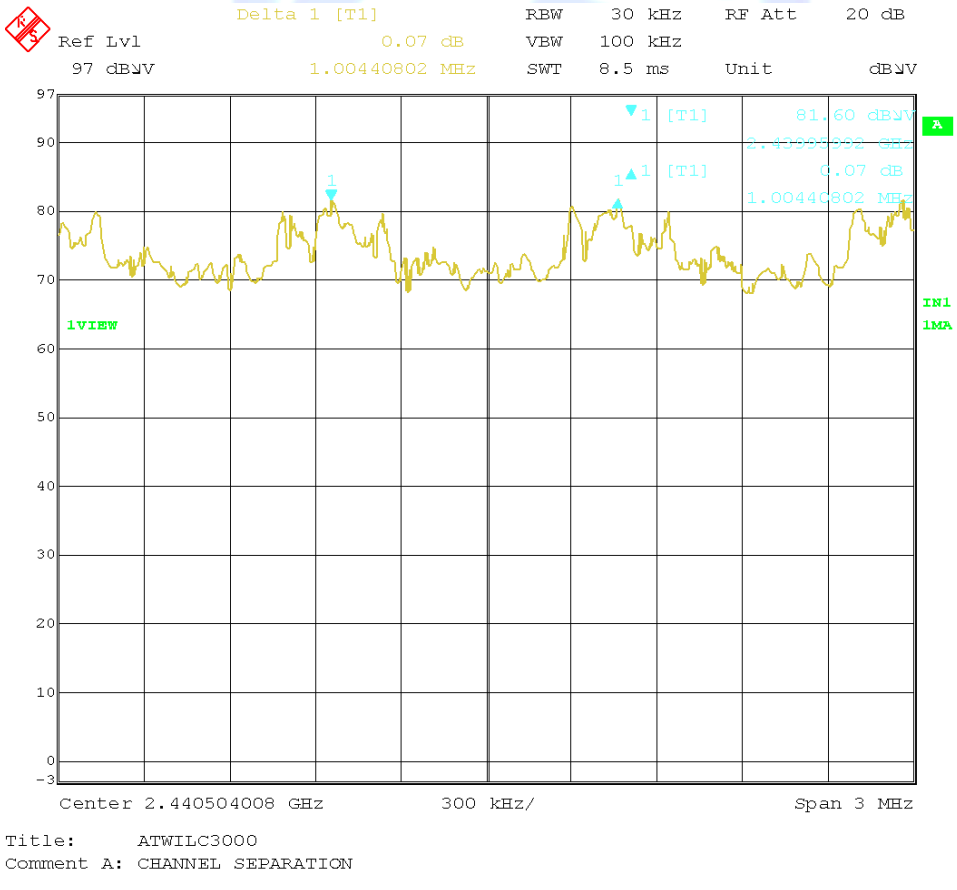
CARRIER FREQUENCY SEPARATION

FCC 15.247

Company:	Microchip Technology	Date:	9/2/2016
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Matt H.
Mode:	Bluetooth		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Measured Delta (kHz)	Limit (2/3rds 20dB BW) (KHz)	Margin (kHz)	Peak / QP / Avg	Comments
2440-2441	1004.40	789.62	-214.78	Peak	



99% BANDWIDTH

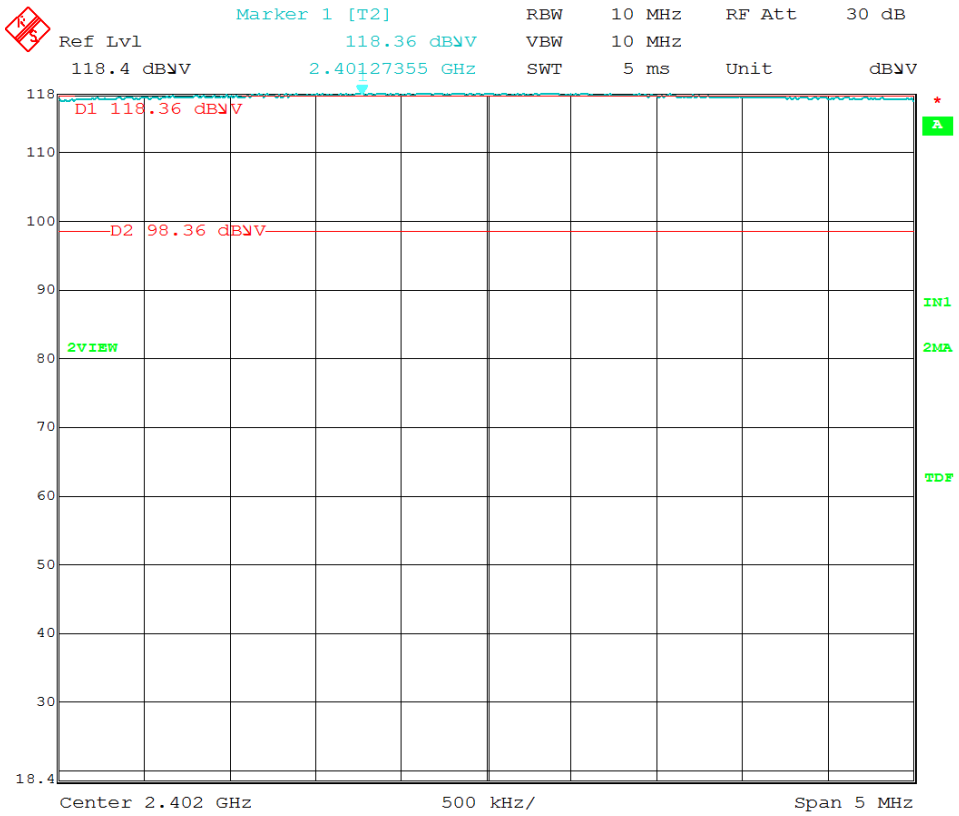
RSS 247

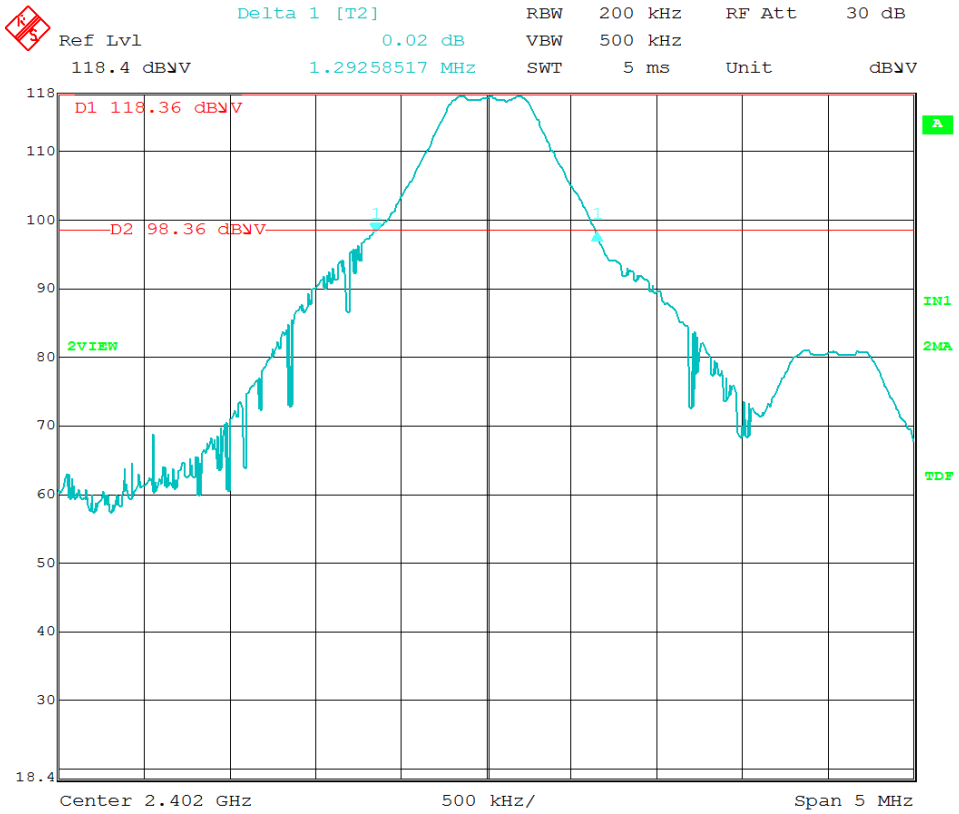
Company:	Microchip Technology	Date:	9/28/2015
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	M. Harrison
Mode:	BT		

Compatible Electronics, Inc. FAC-3 (Lab R)

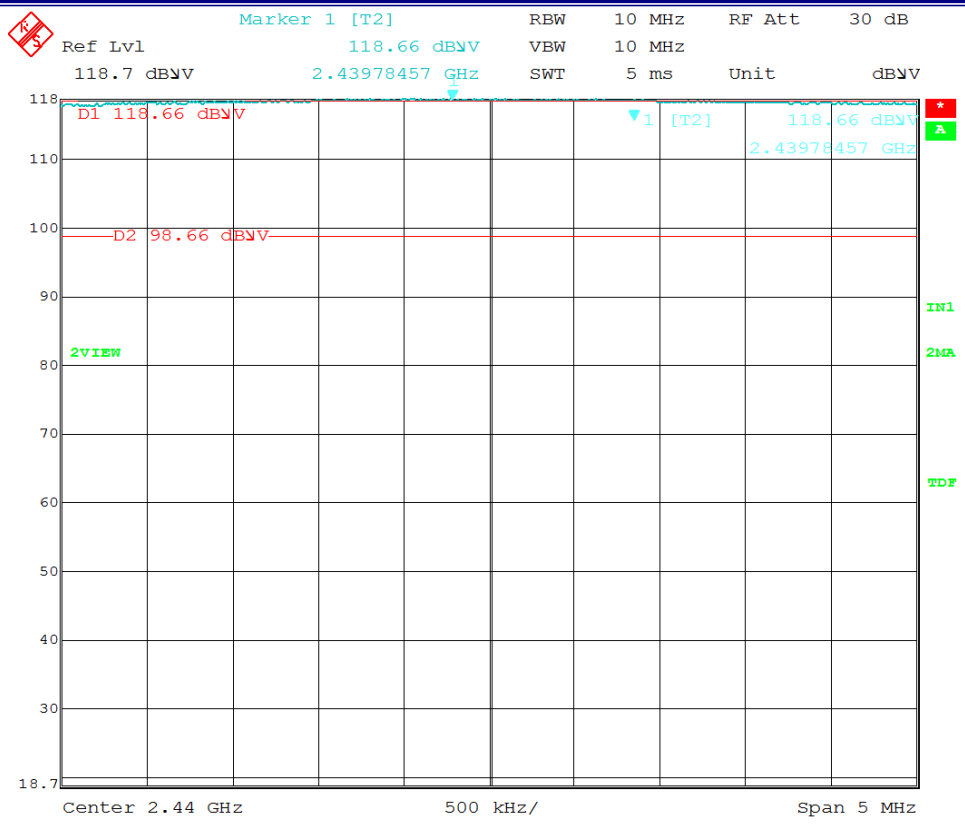
99% Bandwidth

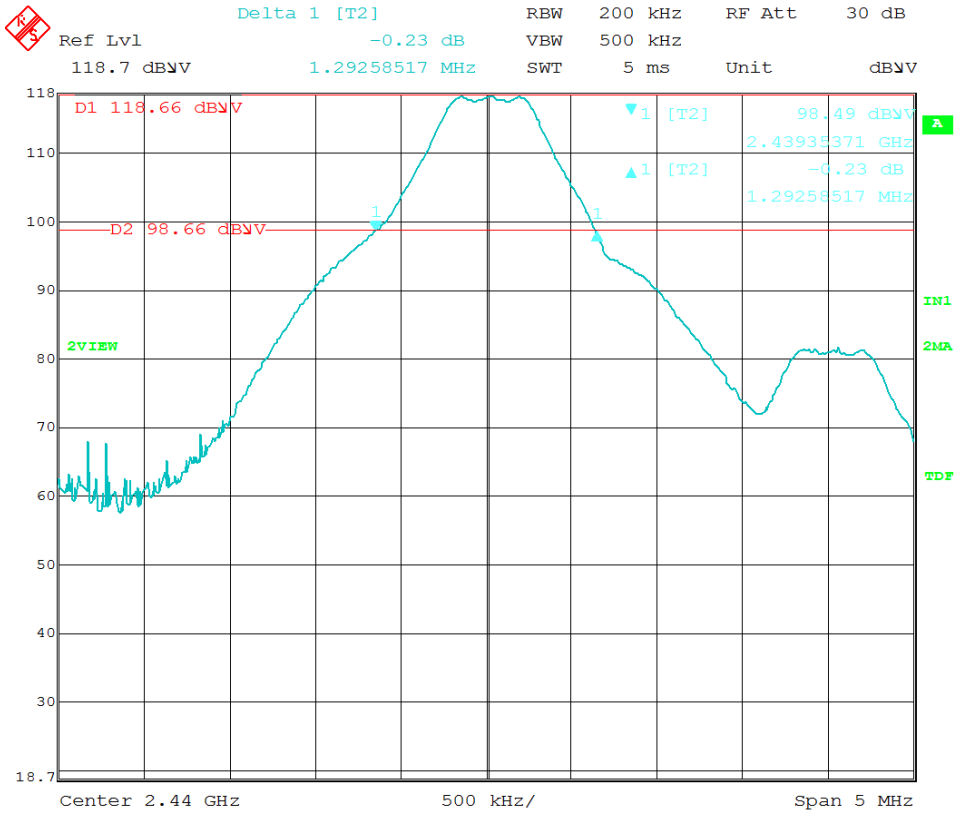
Freq. (MHz)	Measured BW (kHz)	Peak / QP / Avg	Comments
2412	1292.58	Peak	
2442	1292.58	Peak	
2462	1302.60	Peak	



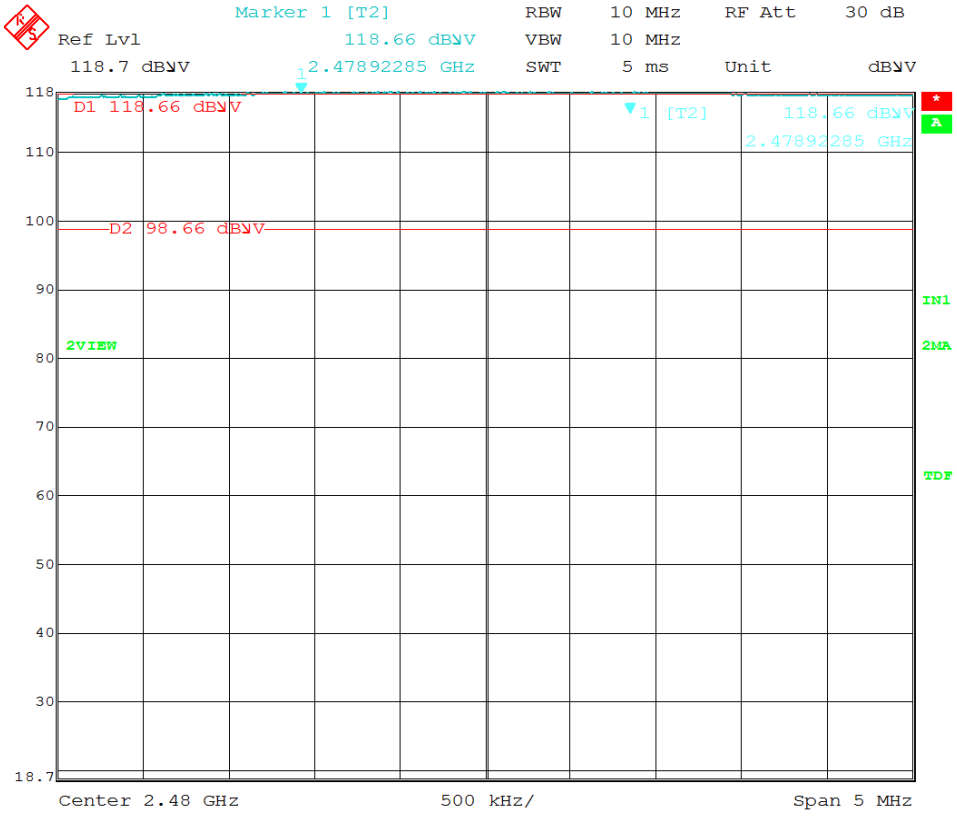


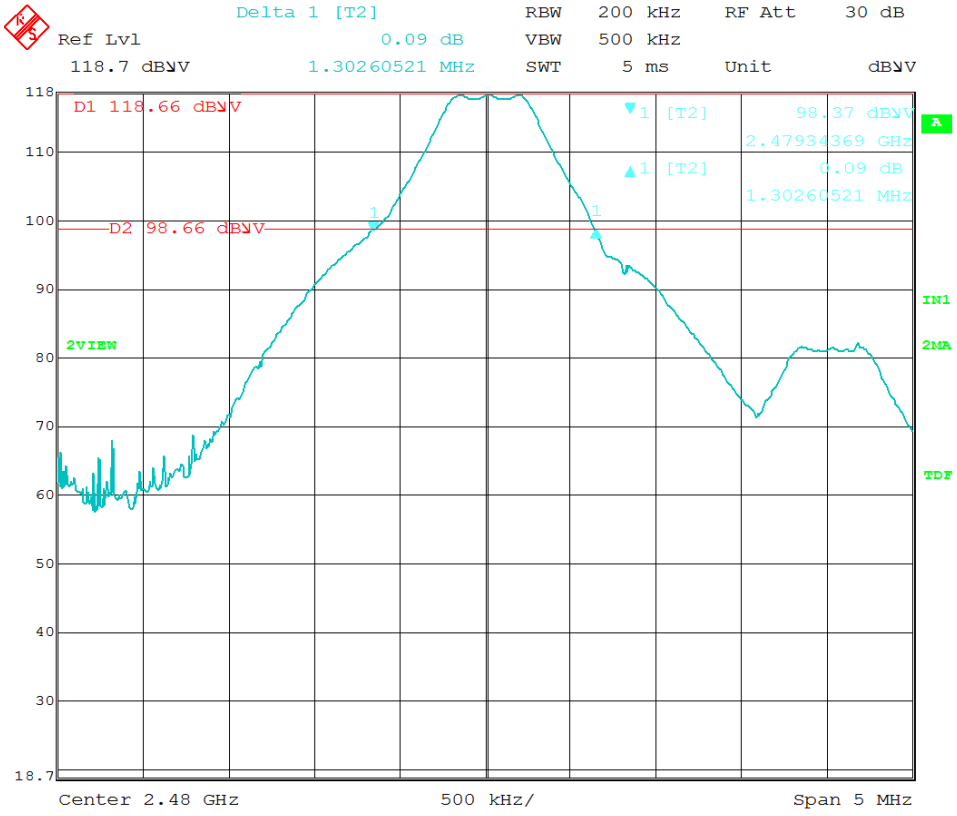
Title: ATWILC3000
Comment A: ICBW Bluetooth 2402 MHz
Date: 23.SEP.2015 13:27:13





Title: ATWILC3000
Comment A: ICBW Bluetooth 2440 MHz
Date: 23.SEP.2015 13:59:30





Title: ATWILC3000
Comment A: ICBW Bluetooth 2480 MHz
Date: 23.SEP.2015 14:32:26

HOPPING CHANNELS

DATA SHEET

HOPPING CHANNELS

FCC 15.247

Company:	Microchip Technology	Date:	9/2/2016
EUT:	Modular Transmitter	Lab:	R
Model:	ATWILC3000-MR110CA	Test ENG:	Matt H.
Mode:	Bluetooth		

Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Channel Separation (MHz)	Total Channels	Peak / QP / Avg	Comments
2402-2480	1	79	Peak