

FCC PART 15 SUBPART C SECTION 15.247

&

**RSS 247, RSS GEN
TEST REPORT**

for

BLE MODULE**Model: ATBTLC1000-ZR110CA**

Prepared for

**MICROCHIP TECHNOLOGY INC.
2355 W CHANDLER BLVD.
CHANDLER ARIZONA 85224**

Prepared by: _____

MATT HARRISON

Reviewed by: _____

JOEY MADLANGBAYAN**COMPATIBLE ELECTRONICS INC.
20621 PASCAL WAY
LAKE FOREST, CALIFORNIA 92630
(949) 587-0400**DATE: APRIL 1st, 2016

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	19	2	2	2	15	36	76

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****Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600****Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700****Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400**

TABLE OF CONTENTS

Section / Title	PAGE
GENERAL REPORT SUMMARY	4
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	9
4.1.1 Photograph Test Configuration (X-Axis Shown)	9
4.1.2 Cable Construction and Termination	10
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	11
5.1 EUT and Accessory List	11
5.2 EMI Test Equipment	12
6. TEST SITE DESCRIPTION	13
6.1 Test Facility Description	13
6.2 EUT Mounting, Bonding and Grounding	13
6.3 Facility Environmental Characteristics	13
7. CHARACTERISTICS OF THE TRANSMITTER	14
7.1 Channel Number and Frequencies	14
7.2 Antenna	14
8. TEST PROCEDURES	15
8.1 RF Emissions	15
8.1.1 Conducted Emissions Test	15
8.1.2 Radiated Emissions (Spurious and Harmonics) Test	16
8.1.3 DTS Bandwidth	17
8.1.4 Maximum Peak Conducted Output Power	17
8.1.5 Maximum Peak Power Spectral Density Level In The Fundamental Emission	17
8.1.6 Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth)	18
8.1.7 Emissions in the Restricted Bands (Radiated)	18
8.1.8 Emissions Radiated Outside of the Fundamental Frequency Band	18
9. TEST PROCEDURE DEVIATIONS	19
10. CONCLUSIONS	19



LIST OF APPENDICES

APPENDIX	TITLE
A	Laboratory Accreditations and Recognitions
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagrams, Factors, Charts, and Photos • Test Setup Diagrams • Antenna and Amplifier Factors • Radiated and Conducted Emissions Photos
E	Radiated and Conducted Emissions Data Sheets

LIST OF FIGURES

FIGURE	TITLE
1	Plot Map and Layout of Test Site Below 1GHz
2	Plot Map and Layout of Test Site Above 1GHz
3	Conducted Emissions Test Setup



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: BLE Module
Model: ATBTLC1000-ZR110CA
S/N: None

Product Description: The EUT is a BLE Wireless Shielded Module with a chip antenna.

Modifications: The EUT was not modified in order to comply with specifications.

Manufacturer: Microchip Technology Inc.
2355 W Chandler Blvd.
Chandler Arizona 85224

Test Dates: March 31, April 1, 2, 2016

Test Specifications: 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, and KDB 558074 D01 v03r04.



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

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	DTS 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	Maximum Peak Power Spectral Density Level In The Fundamental Emission	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
6	Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth)	Complies with CFR Title 47 Part 15 Subpart C Section 15.247 and RSS 247
7	Emissions in the Restricted Bands	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 BLE Module Model: ATBTLC1000-ZR110CA. The EMI measurements were performed according to the measurement procedure described in ANSI C63.10 & C63.4. 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.



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

Sanjay Malani

Compatible Electronics Inc.

Torey Oliver
Matt Harrison

Test Technician
Lab Manager

2.4 Date Test Sample was Received

The test sample was received on March 17, 2016.

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 DOCUMENTS

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
KDB 558074 D01 v03r05	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247



4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration

The BLE Module Model: ATBTLC1000-ZR110CA (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.

The voltage was varied $\pm 15\%$ 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 (X-Axis Shown)



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	BLE MODULE(EUT)	MICROCHIP	ATBTLC1000-ZR110CA	N/A
2	DC SUPPLY	MPJA	0-30V / 0-5A	017687
3	EUT CONTROL BOARD	MICROCHIP	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
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 18-26 GHz	Com Power	AH-826	081033	NCR	NCR
Pre-Amp, 1-18GHz	Com Power	PAM-118A	551034	8/25/2015	8/25/2016
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	12/2/2016
Peak Power Sensor	Boonton	57318	3723	12/2/2014	12/2/2016
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

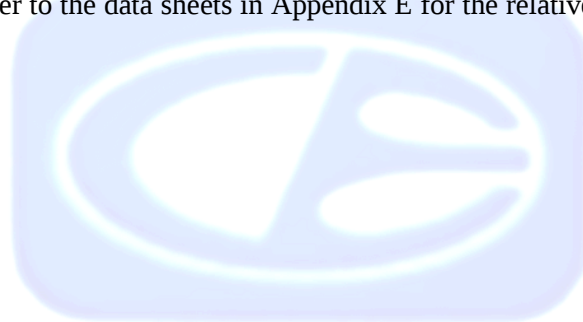
The EUT was mounted on a 1.0 by 1.5 by 0.8 meters high non-conductive table, which was placed on the ground plane.

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

The EUT was grounded through the USB Cable.

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

There is a total of 40 channels. The low channel is at 2402.0 MHz and the high channel is at 2480.0 MHz. There is approximately 2 MHz separation between channels and the EUT uses GFSK modulation. Below are the channels and power settings:

Frequency	Gain Setting
2402 MHz	DigGain= DG= 27
2404-2478 MHz	DigGain= DG= 20
2480 MHz	DigGain= DG= 20

7.2 Antenna

The antenna is a chip antenna.



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

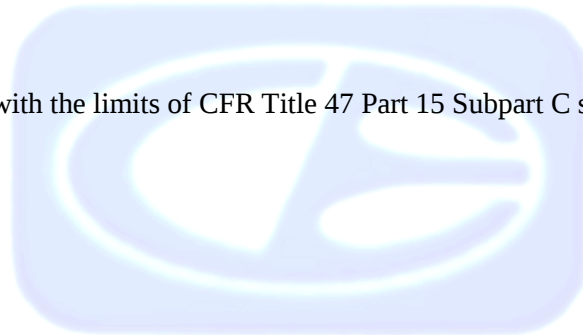
The EMI receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. The LISN output was measured using the EMI receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for 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 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 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 were two Microwave Preamplifier 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 (120kHz for QP Measurements)
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, RSS 247, and RSS GEN.



8.1.3 DTS Bandwidth

The DTS Bandwidth was measured directly connected to the EMI Receiver using a RBW of 100 kHz and a VBW of 300 kHz. 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 6 dB relative to the maximum level measured in the fundamental emission. The automatic bandwidth measurement capability of the EMI Receiver was employed using the n dB bandwidth mode with n set to 6 dB. 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 Peak Power Meter used a resolution bandwidth that is greater than the DTS bandwidth and a video bandwidth greater than 3 x RBW. 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 Maximum Peak Power Spectral Density Level in The Fundamental Emission

The Maximum Peak Power Spectral Density Level in the Fundamental Emission was measured directly connected to the EMI Receiver. Tuned to the center frequency of the DTS channel and set the span to 1.5 times the DTS bandwidth. RBW was set to minimum 3 kHz but not > 100kHz and VBW 3 * RBW. A peak detector was used with the sweep time set to auto. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the maximum amplitude level within the RBW. 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 Non-Restricted Frequency Bands (in 100kHz Bandwidth)

The Emissions in Non-Restricted Frequency Bands (in 100kHz Bandwidth) measurements were performed using the EMI Receiver directly connected to the EUT. A reference level was established by setting the instrument center frequency to DTS channel center frequency. The span was set to ≥ 1.5 times the DTS bandwidth. The RBW was 100 kHz and VBW 300 kHz. A peak detector was used with a sweep time set to auto. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the level and 20dB below that was the reference level. For Emission Level Measurement, the center frequency and span were set to encompass the frequency range to be measured. RBW was set to 100 kHz and VBW to 300 kHz. A peak detector was used with a sweep time set to auto. The number of measurement points were greater than span/RBW. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the maximum amplitude level. 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.

8.1.7 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. 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.

8.1.8 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.



9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from throughout all tests.

10. CONCLUSIONS

The BLE Module Model: ATBTLC1000-ZR110CA 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***

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

LABORATORY ACCREDITATIONS AND RECOGNITIONS



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

For US, Canada, Australia/New Zealand, Taiwan and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025 an ISO 9002 equivalent. Please follow the link to the NIST site for each of our facilities NVLAP certificate and scope of accreditation.

NVLAP listing links

Agoura Division - <http://ts.nist.gov/Standards/scopes/2000630.htm>

Brea Division - <http://ts.nist.gov/Standards/scopes/2005280.htm>

Silverado/Lake Forest Division - <http://ts.nist.gov/Standards/scopes/2005270.htm>



ANSI listing

[CETCB](http://www.ansica.org/wwwversion2/outside/ALLdirectoryDetails.asp?menuID=1&prgID=3&orgID=123&status=4)

<https://www.ansica.org/wwwversion2/outside/ALLdirectoryDetails.asp?menuID=1&prgID=3&orgID=123&status=4>



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



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

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



VCCI Listing, from VCCI site

[Enter "Compatible" in search form](http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html) http://www.vcci.or.jp/vcci_e/activity/registration/setsubi.html



FCC Listing, from FCC OET site

[FCC test lab search](https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm) <https://fjallfoss.fcc.gov/oetcf/eas/reports/TestFirmSearch.cfm>



Compatible Electronics IC listing can be found at:

<http://www.ic.gc.ca/eic/site/ic1.nsf/eng/home>



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

APPENDIX B***MODIFICATIONS TO THE EUT***

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

MODIFICATIONS TO THE EUT

There were no modifications made during testing.



APPENDIX C***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

BLE Module
Model: ATBTLC1000-ZR110CA
S/N: None

No additional models were tested.



APPENDIX D

DIAGRAMS, FACTORS, CHARTS, AND PHOTOS



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

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

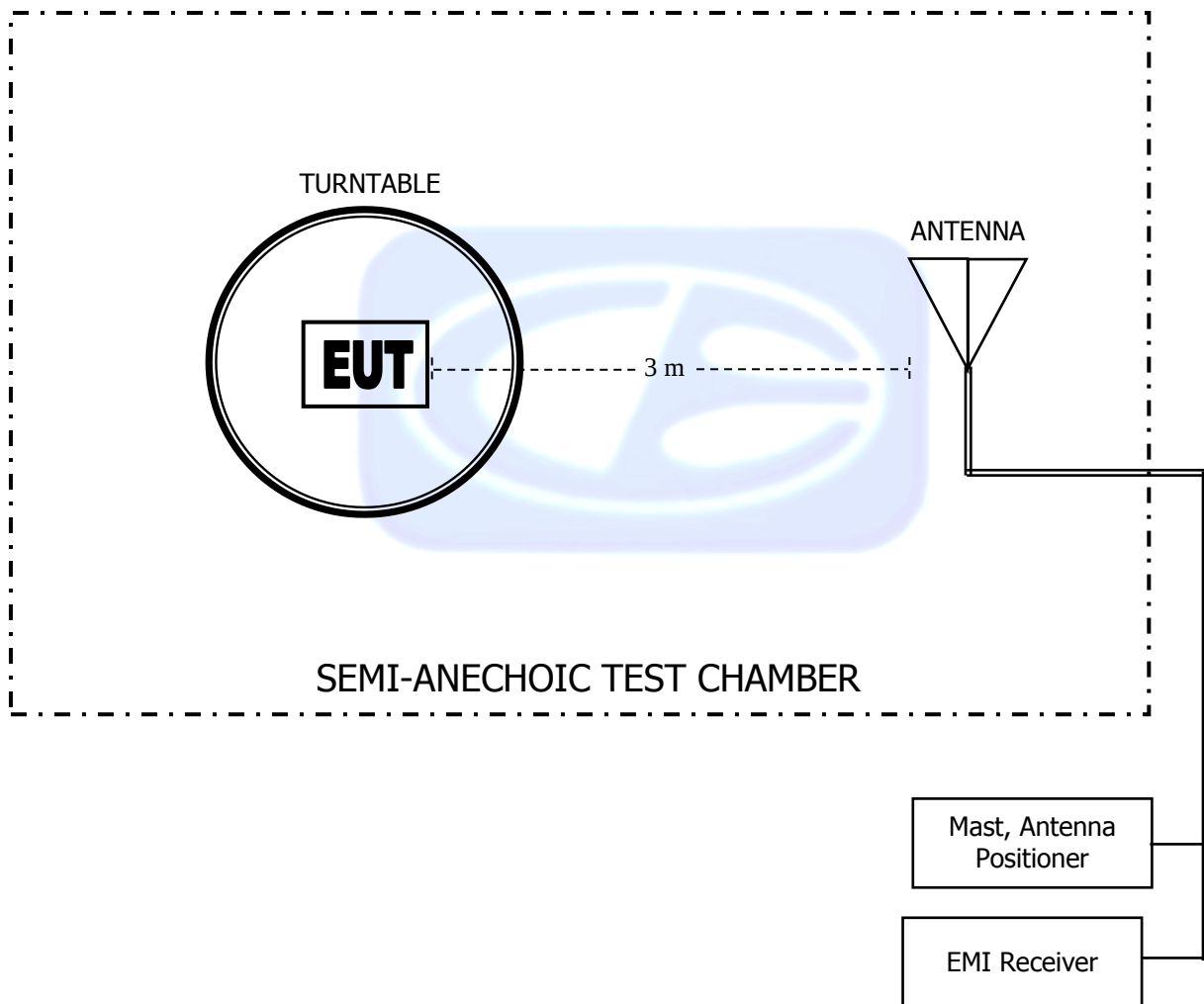


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ

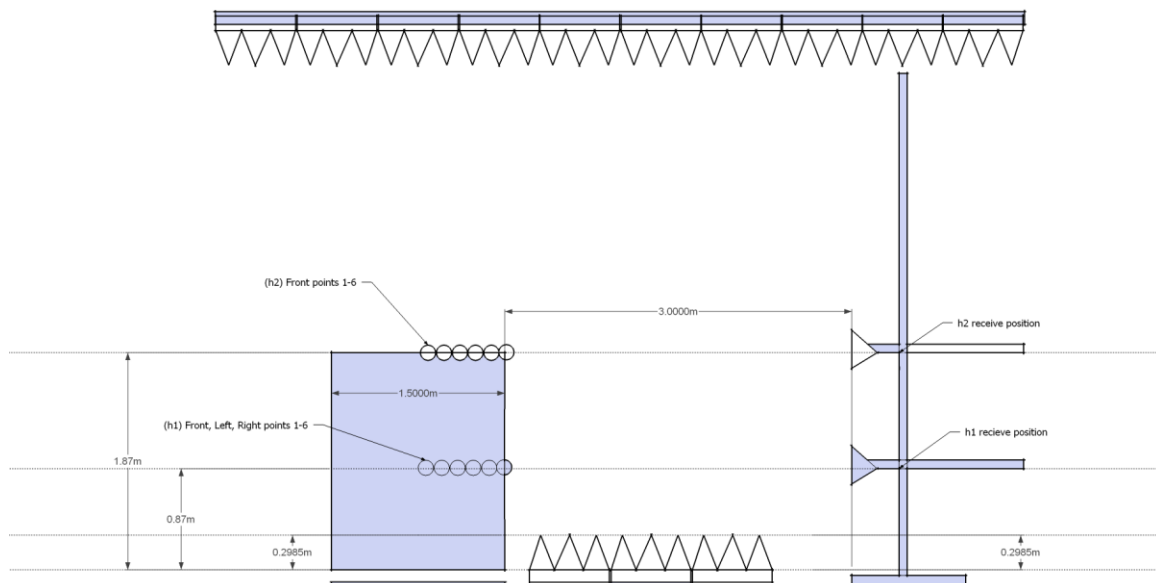
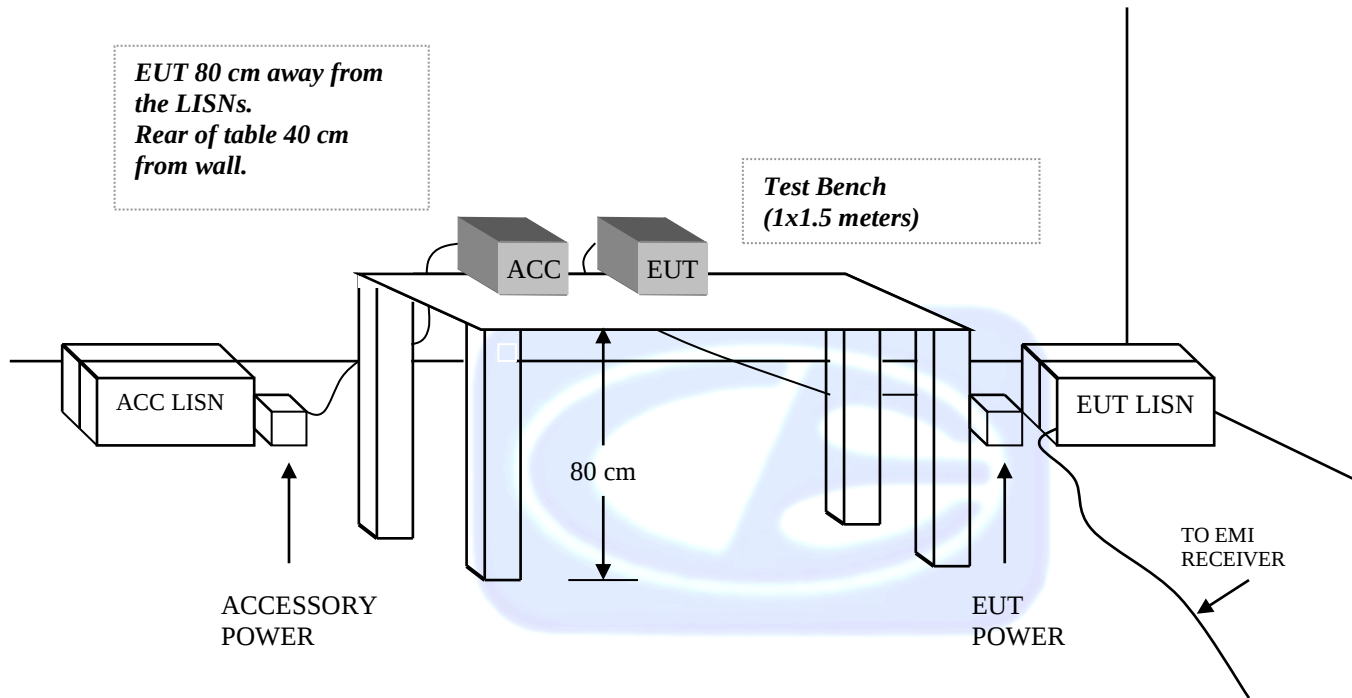


FIGURE 3: CONDUCTED EMISSIONS TEST SETUP



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: AUGUST 251, 2017**

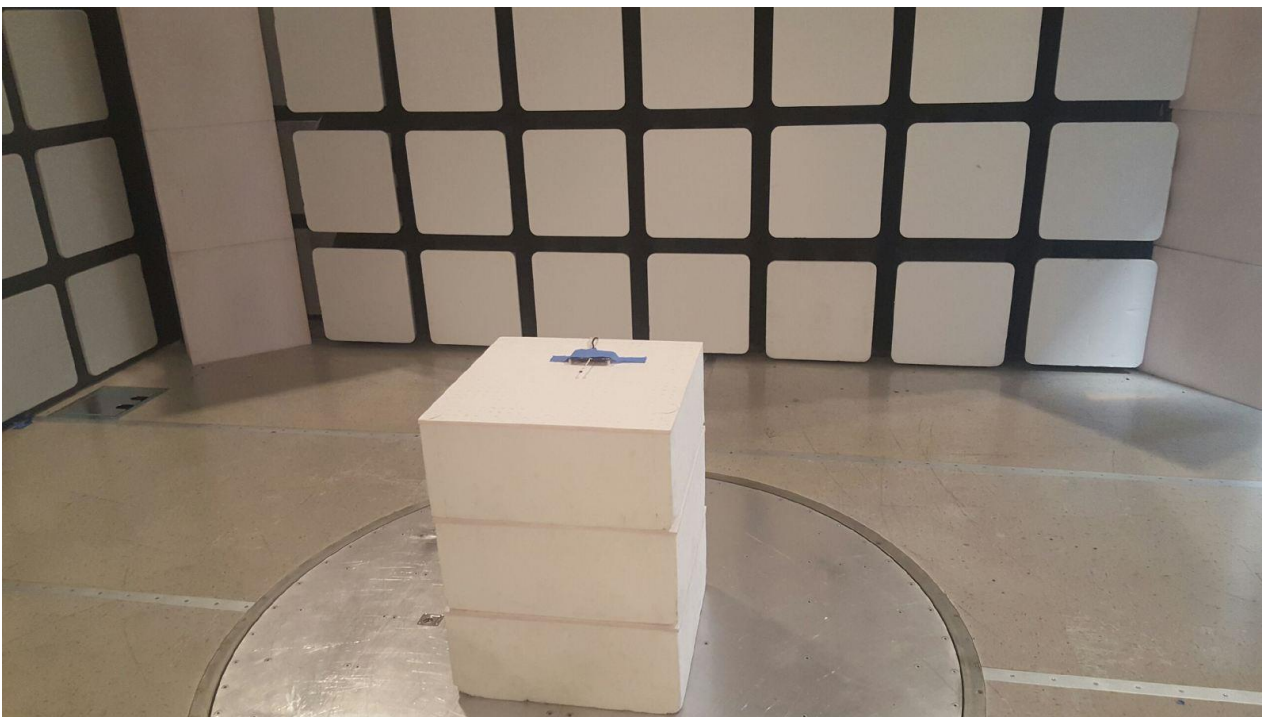
FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
500	36.77	5500	39.82
1000	38.63	6000	38.74
1100	38.72	6500	39.60
1200	38.97	7000	35.52
1300	38.59	7500	36.61
1400	39.18	8000	36.92
1500	38.71	8500	37.13
1600	39.28	9000	36.50
1700	39.25	9500	38.92
1800	39.06	10000	38.74
1900	40.34	11000	35.23
2000	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
BLE MODULE

Model: ATBTLC1000-ZR110CA

FCC SUBPART C - RADIATED EMISSIONS < 1GHz

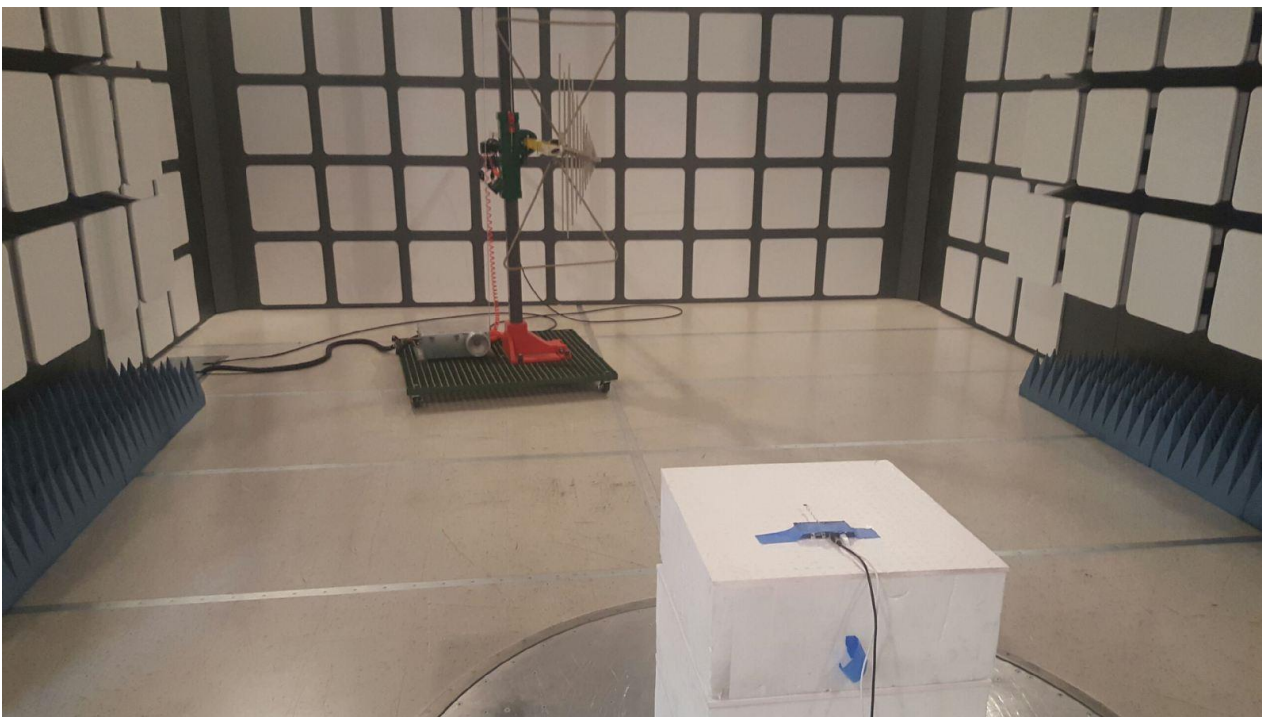
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

**REAR VIEW**

MICROCHIP
BLE MODULE

Model: ATBTLC1000-ZR110CA

FCC SUBPART C - RADIATED EMISSIONS < 1GHz

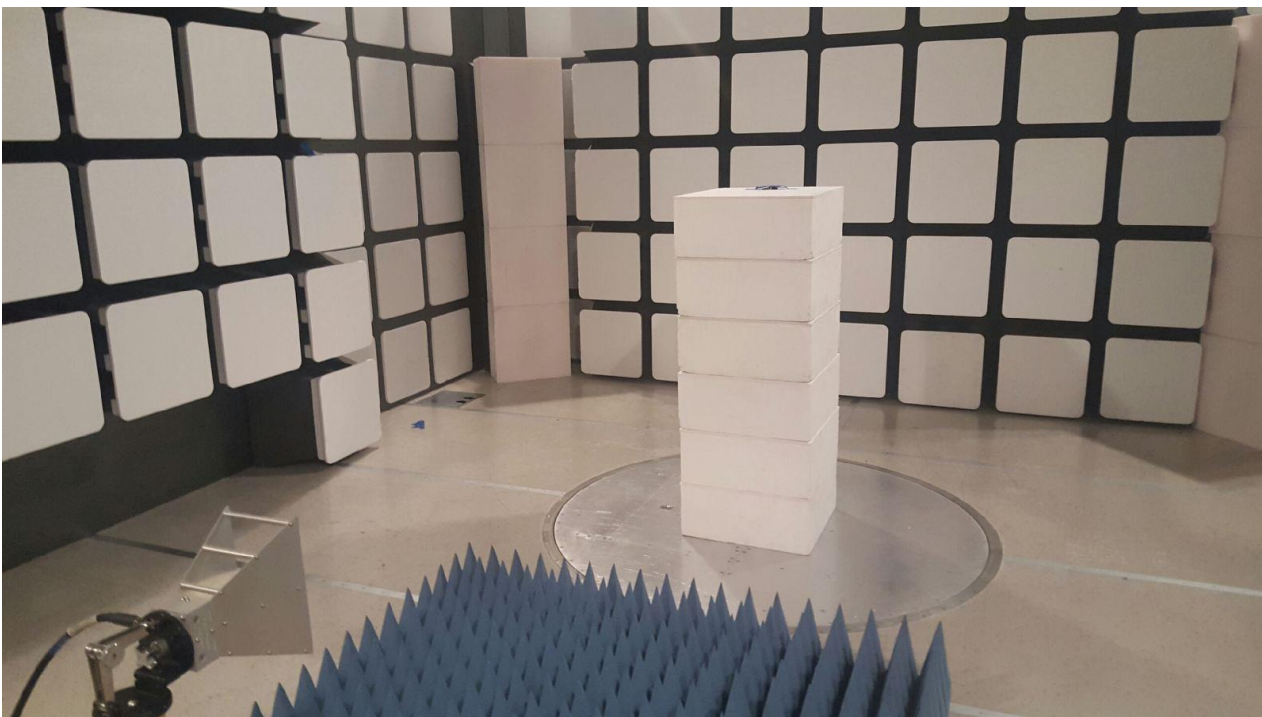
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

**FRONT VIEW**

MICROCHIP
BLE MODULE

Model: ATBTLC1000-ZR110CA

FCC SUBPART C - RADIATED EMISSIONS > 1GHz

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

**REAR VIEW**

MICROCHIP
BLE MODULE

Model: ATBTLC1000-ZR110CA

FCC SUBPART C - RADIATED EMISSIONS > 1GHz

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



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

**FRONT VIEW**

MICROCHIP
BLE MODULE

Model: ATBTLC1000-ZR110CA
FCC SUBPART C - CONDUCTED EMISSIONS

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

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

**REAR VIEW**

MICROCHIP
BLE MODULE

Model: ATBTLC1000-ZR110CA
FCC SUBPART C - CONDUCTED EMISSIONS

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



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

APPENDIX E***RADIATED EMISSIONS DATA SHEETS***

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

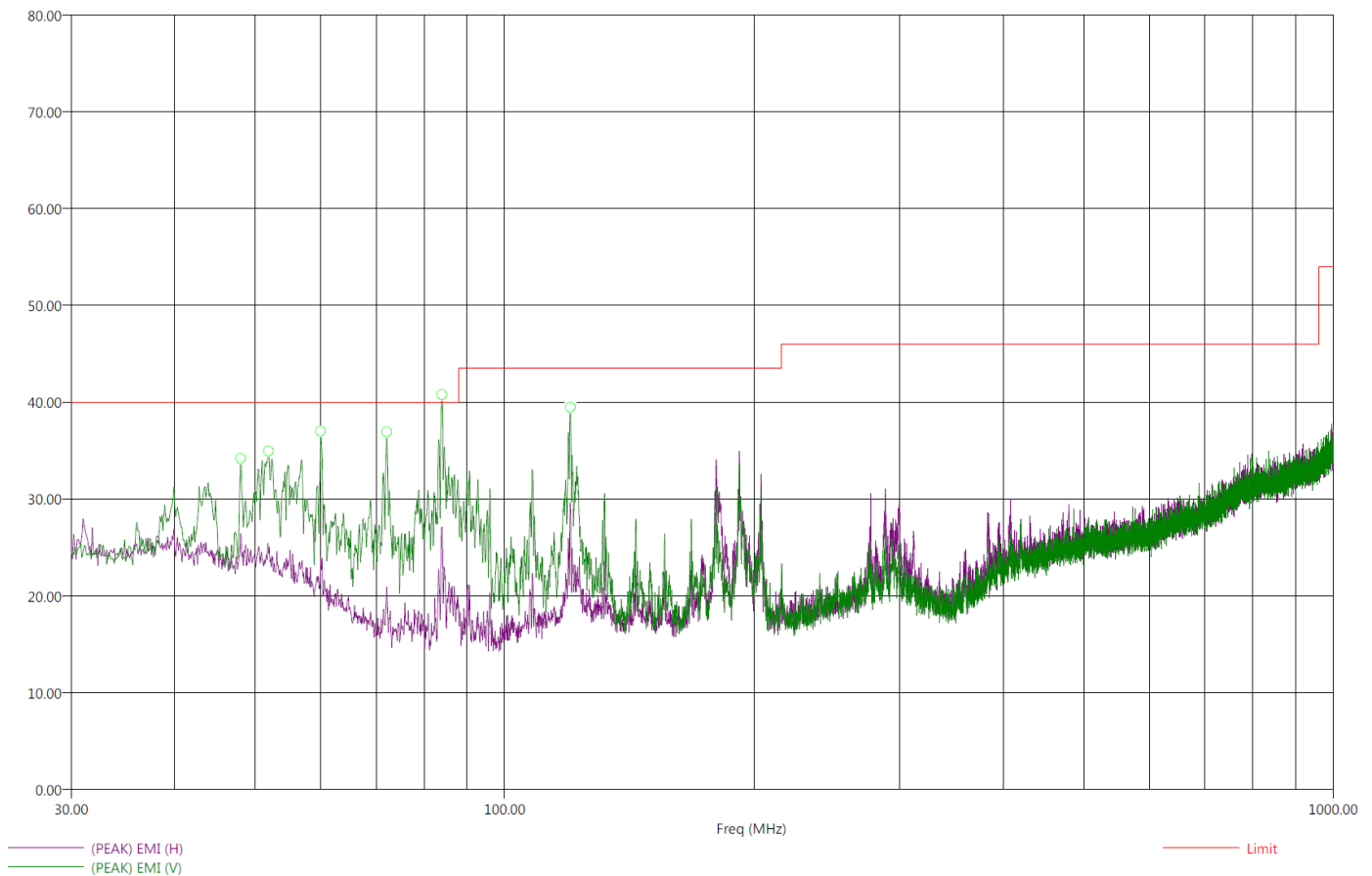
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.209 & RSS GEN
File: Radiated Pre-Scan 30-1000Mhz.set
Operator: Torey Oliver
EUT Type: BLE Module / ATBTLC1000-ZR110CA
EUT Condition: The EUT is constantly transmitting 2440 MHz.
Comments: Connected to remote laptop.
Temp: 71f
Hum: 43%
5VDC

4/1/2016 8:33:59 AM
Sequence: Preliminary Scan

Compatible Electronics, Inc. FAC-3 (Lab R)Electric Field Strength (dB μ V/m)

This was worst case for all modes and channels

There were no radiated emissions besides harmonics found between 9kHz-30 MHz or 1GHz-25GHz.



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.209 & RSS GEN

4/1/2016 9:10:24 AM

File: Radiated Final 30-1000Mhz.set

Sequence: Final Measurements

Operator: Torey Oliver

EUT Type: BLE Module / ATBTLC1000-ZR110CA

EUT Condition: The EUT is constantly transmitting 2440 MHz.

Comments: Connected to remote laptop.

Temp: 71f

Hum: 43%

5VDC

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)
48.00	-6.48	33.52	36.07	40.00	V	250.50	100.56	21.38	0.68
51.90	-6.74	33.26	36.18	40.00	V	15.00	104.86	20.67	0.70
60.00	-6.06	33.94	37.24	40.00	V	131.00	128.98	18.20	0.70
72.10	-5.79	34.21	37.88	40.00	V	155.25	137.64	12.85	0.82
84.00	-0.49	39.51	43.00	40.00	V	185.50	117.28	11.72	0.94
120.00	-7.02	36.50	39.35	43.52	V	121.75	145.58	15.10	1.25

*This was worst case for all modes and channels**There were no radiated emissions besides harmonics found between 9kHz-30 MHz or 1GHz-25GHz.***Brea Division**
114 Olinda Drive
Brea, CA 92823
(714) 579-0500**Agoura Division**
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600**Silverado Division**
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700**Lake Forest Division**
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

APPENDIX E
CONDUCTED EMISSIONS DATA SHEETS

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.207 & RSS GEN
File: Conducted Pre-Line.set

4/1/2016 10:38:33 AM

Sequence: Preliminary Scan

Operator: Torey Oliver

EUT Type: BLE Module / ATBTLC1000-ZR110CA

EUT Condition: The EUT is constantly transmitting 2440 MHz.

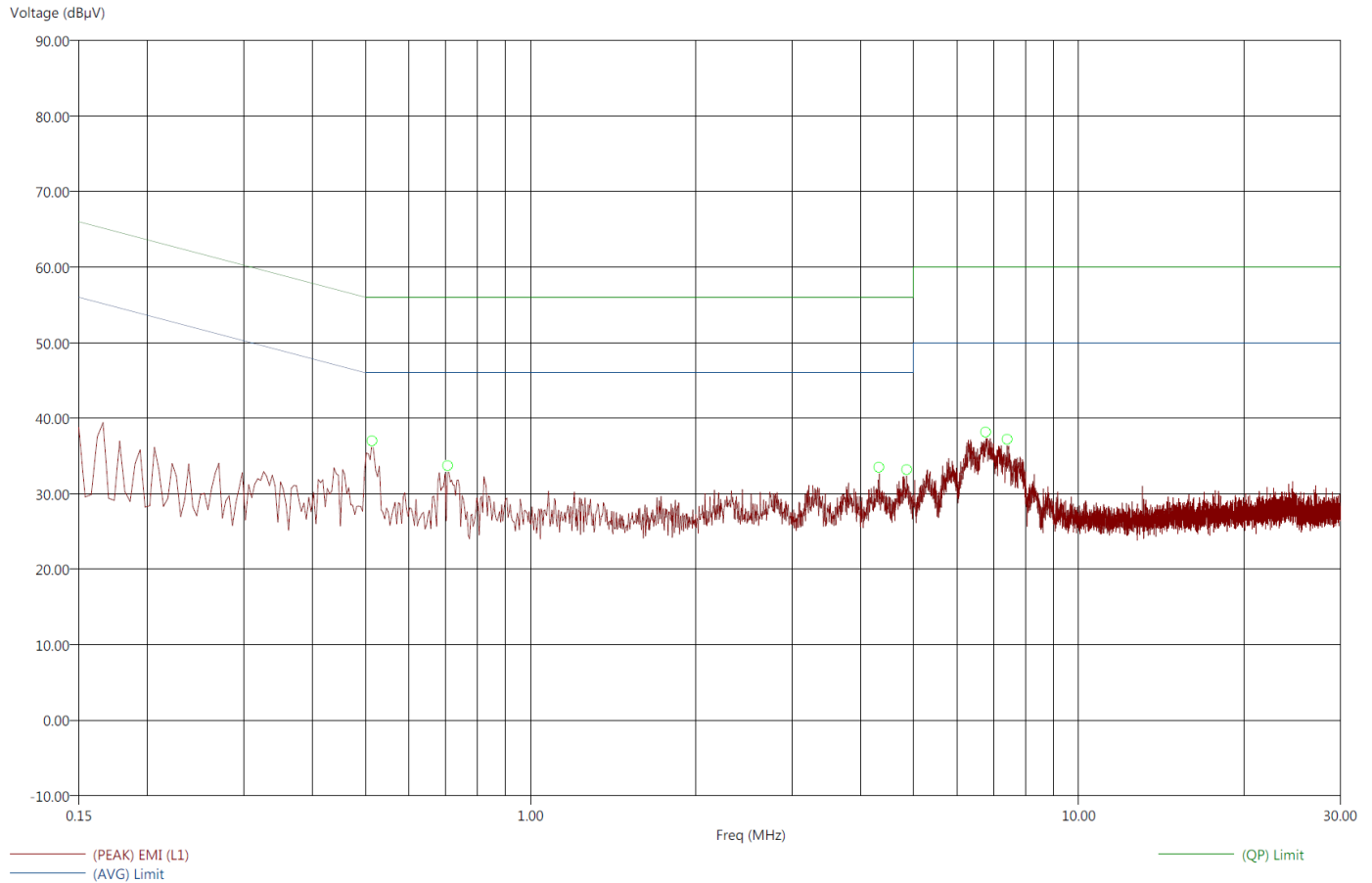
Comments: Connected to remote laptop.

Temp: 71f

Hum: 43%

5VDC

Host: 120V 60Hz

Compatible Electronics, Inc. FAC-3 (LAB R)***This was worst case for all modes and channels***

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.207 & RSS GEN
File: Conducted Final-Line.set
Operator: Torey Oliver

4/1/2016 10:41:07 AM

Sequence: Final Measurements

EUT Type: BLE Module / ATBTLC1000-ZR110CA
EUT Condition: The EUT is constantly transmitting 2440 MHz.
Comments: Connected to remote laptop.
Temp: 71f
Hum: 43%
5VDC
Host: 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)
0.51	-22.98	-24.86	23.02	31.14	36.21	46.00	56.00	0.03	0.10
0.71	-27.16	-29.66	18.84	26.34	31.95	46.00	56.00	0.03	0.10
4.33	-31.12	-34.16	14.88	21.84	26.56	46.00	56.00	0.04	0.17
4.85	-30.20	-33.10	15.80	22.90	28.14	46.00	56.00	0.04	0.19
6.78	-26.97	-28.87	23.03	31.13	36.46	50.00	60.00	0.03	0.20
7.40	-29.61	-31.81	20.39	28.19	33.11	50.00	60.00	0.02	0.20

This was worst case for all modes and channels



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

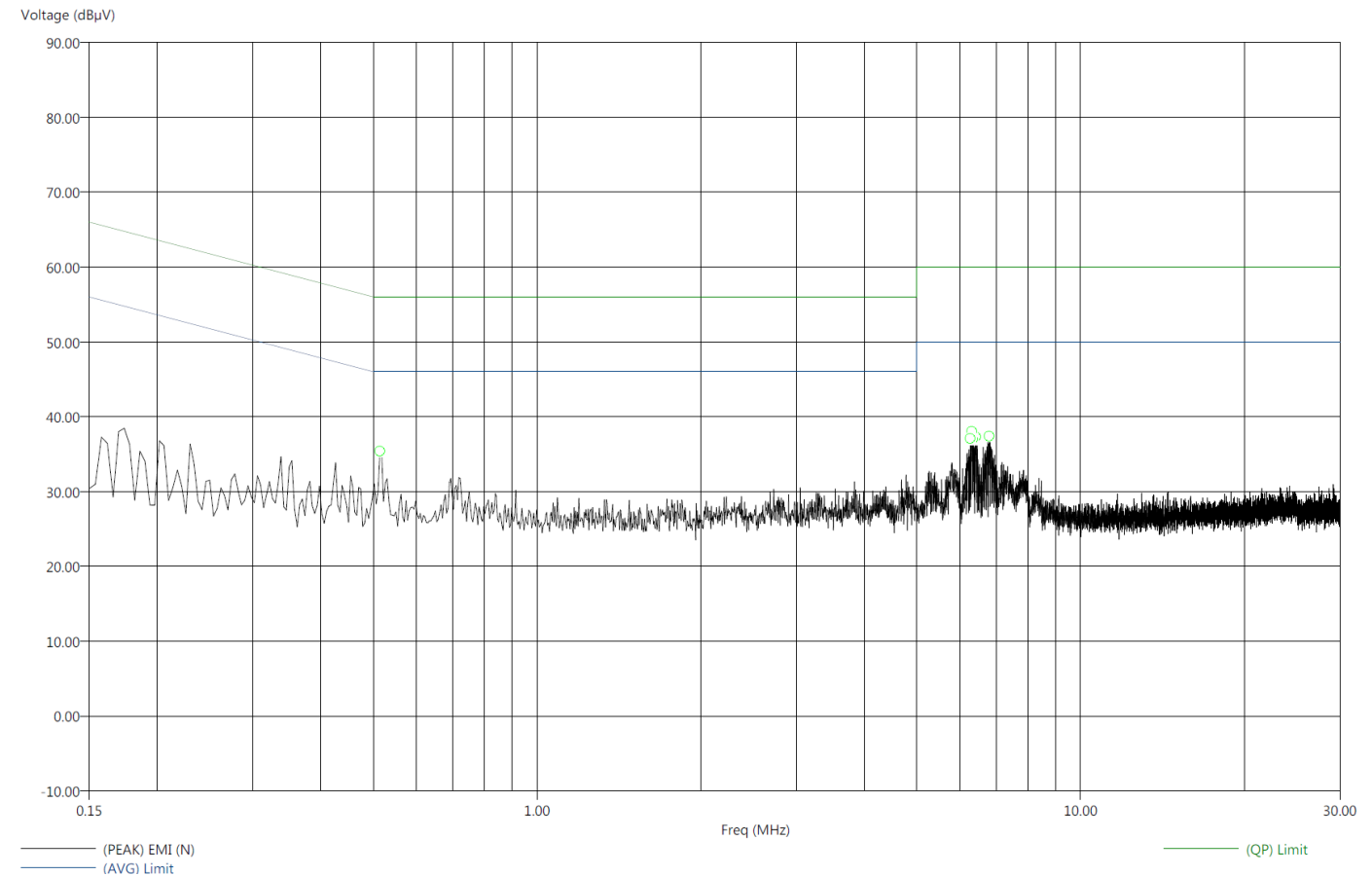
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.207 & RSS GEN
File: Conducted Pre-Neutral.set
Operator: Torey Oliver
EUT Type: BLE Module / ATBTLC1000-ZR110CA
EUT Condition: The EUT is constantly transmitting 2440 MHz.
Comments: Connected to remote laptop.
Temp: 71f
Hum: 43%
5VDC
Host: 120V 60Hz

4/1/2016 10:44:00 AM
Sequence: Preliminary Scan

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

This was worst case for all modes and channels



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

Title: FCC 15.207 & RSS GEN

4/1/2016 10:47:28 AM

File: Conducted Final-Neutral.set

Sequence: Final Measurements

Operator: Torey Oliver

EUT Type: BLE Module / ATBTLC1000-ZR110CA

EUT Condition: The EUT is constantly transmitting 2440 MHz.

Comments: Connected to remote laptop.

Temp: 71f

Hum: 43%

5VDC

Host: 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)
0.51	-25.47	-27.30	20.53	28.70	36.01	46.00	56.00	0.03	0.10
6.27	-34.89	-30.85	15.11	29.15	35.16	50.00	60.00	0.01	0.20
6.31	-34.16	-29.96	15.84	30.04	35.89	50.00	60.00	0.01	0.20
6.34	-34.50	-30.10	15.50	29.90	36.05	50.00	60.00	0.01	0.20
6.41	-35.84	-31.72	14.16	28.28	34.84	50.00	60.00	0.01	0.20
6.79	-32.85	-29.96	17.15	30.04	36.49	50.00	60.00	0.01	0.20

This was worst case for all modes and channels**Brea Division**
114 Olinda Drive
Brea, CA 92823
(714) 579-0500**Agoura Division**
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600**Silverado Division**
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700**Lake Forest Division**
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

DTS BANDWIDTH***DATA SHEETS***

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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

DTS BANDWIDTH

FCC 15.247 & RSS 247

Company: Microchip
EUT: BLE Module
Model: ATBTLC1000-ZR110CA

Date: 4/1/2016
Lab: R
Test ENG: Torey Oliver

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

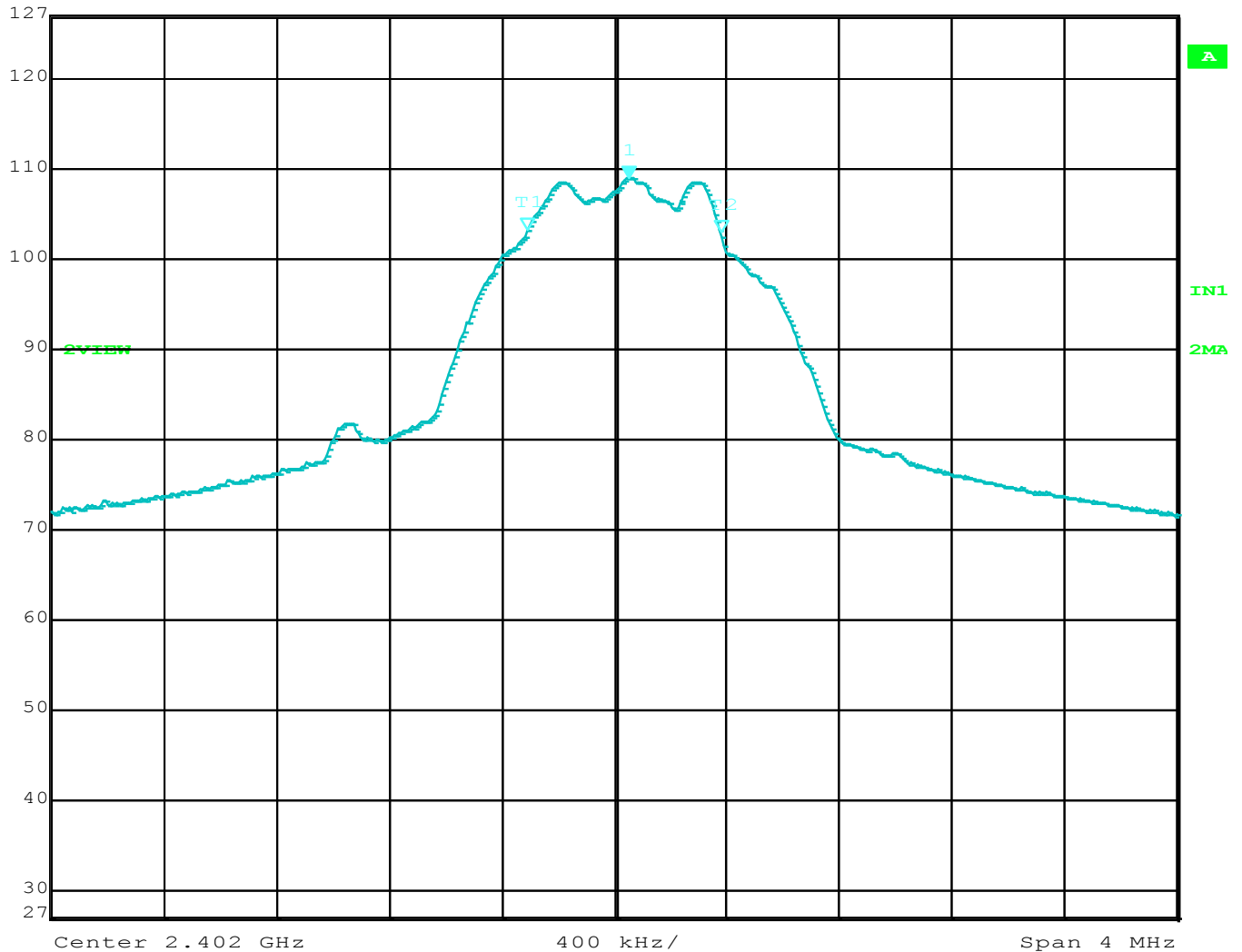
DTS Bandwidth

Freq. (MHz)	Measured BW (kHz)	Limit (Min) (kHz)	Margin (kHz)	Peak / QP / Avg	Comments
2402	689.38	500.00	189.38	Peak	
2440	689.38	500.00	189.38	Peak	
2480	689.38	500.00	189.38	Peak	





Marker 1 [T2 ndB] RBW 100 kHz RF Att 30 dB
Ref Lvl ndB 6.00 dB VBW 300 kHz
127 dBμV BW 689.37875751 kHz SWT 5 ms Unit dBμV



Comment A: DTS Bandwidth 2402 MHz

Date: 1.APR.2016 09:04:20



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

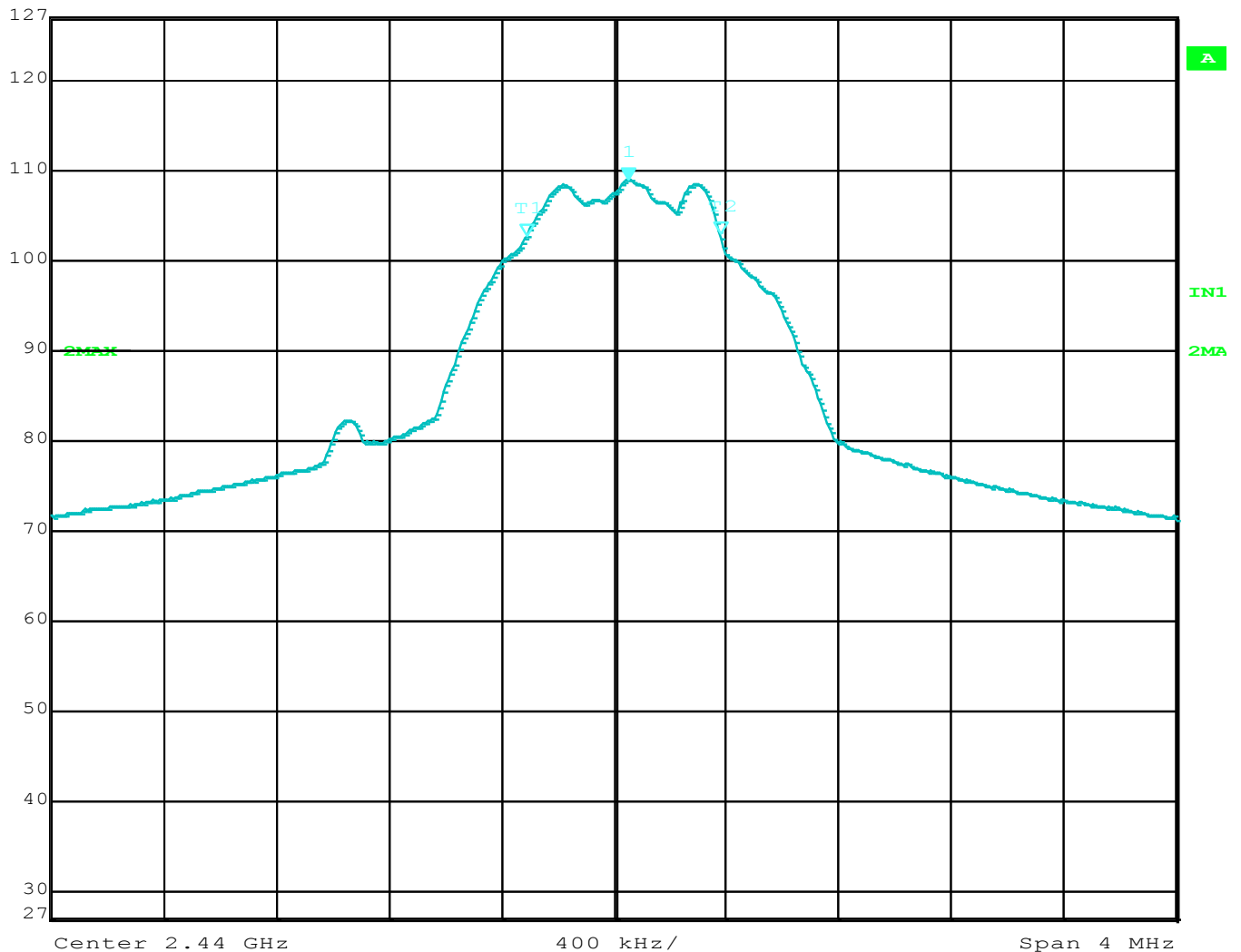
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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



Ref Lvl	Marker 1 [T2 ndB]	RBW	100 kHz	RF Att	30 dB
127 dB μ V	ndB 6.00 dB	VBW	300 kHz		
	BW 689.37875751 kHz	SWT	5 ms	Unit	dB μ V



Comment A: DTS Bandwidth 2440 MHz

Date: 1.APR.2016 09:05:51



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

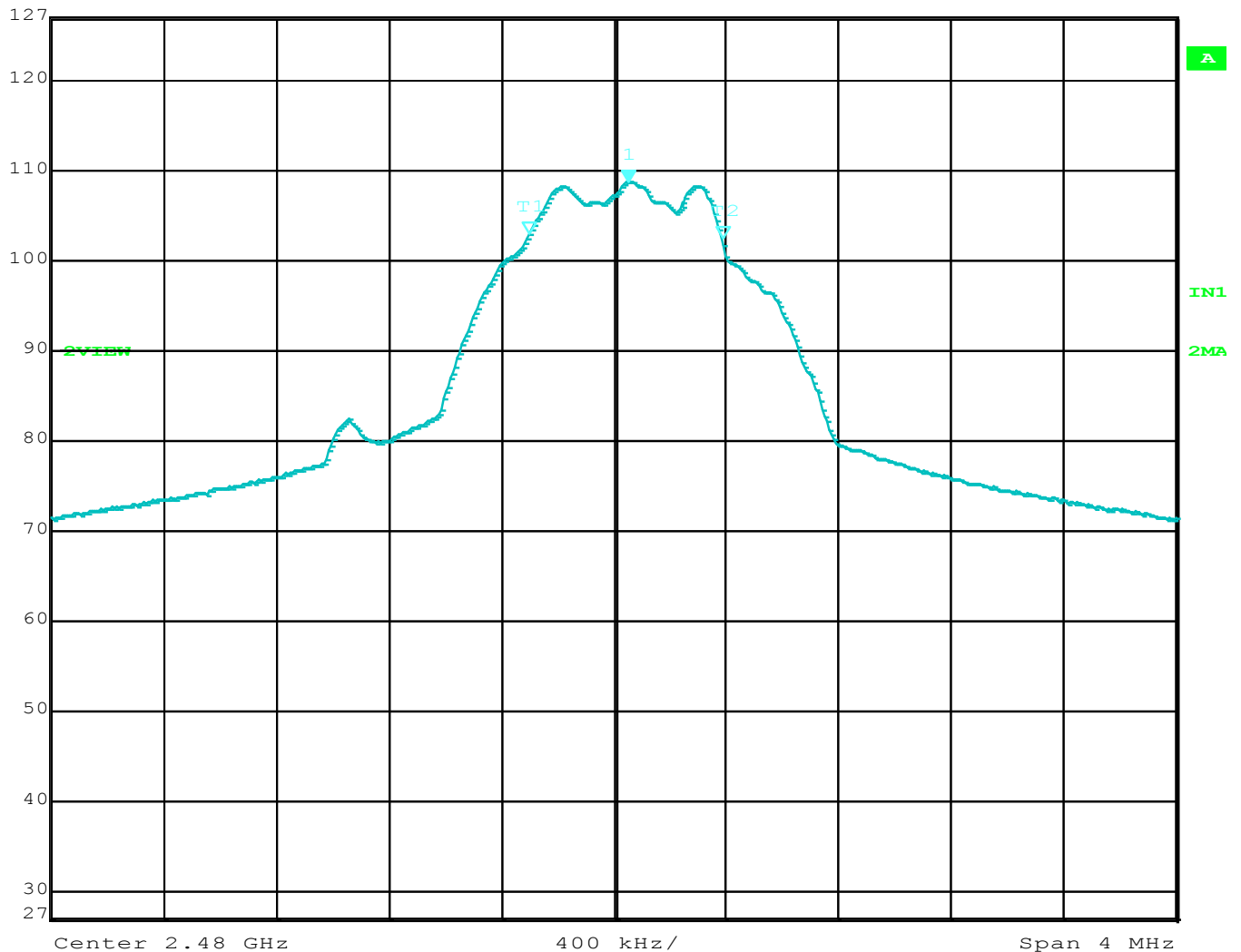
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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



Ref Lvl	Marker 1 [T2 ndB]	RBW	100 kHz	RF Att	30 dB
127 dBμV	ndB 6.00 dB	VBW	300 kHz		
	BW 689.37875752 kHz	SWT	5 ms	Unit	dBμV



Comment A: DTS Bandwidth 2480 MHz
Date: 1.APR.2016 09:07:54



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

MAXIMUM PEAK CONDUCTED OUTPUT POWER

DATA SHEETS



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

MAXIMUM PEAK CONDUCTED OUTPUT POWER

FCC 15.247

Company: Microchip
EUT: BLE Module
Model: ATBTLC1000-ZR110CA
Mode: BLE

Date: 3/31/2016
Lab: R
Test ENG: Torey Oliver

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

Freq. (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2402	2.70	30.00	-27.30	Peak	
2440	2.64	30.00	-27.36	Peak	
2480	2.52	30.00	-27.48	Peak	



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

MAXIMUM PEAK POWER SPECTRAL DENSITY LEVEL IN THE FUNDAMENTAL EMISSION

DATA SHEETS



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

PEAK POWER SPECTRAL DENSITY

FCC 15.247

Company: Microchip
EUT: BLE Module
Model: ATBTLC1000-ZR110CA

Date: 4/1/2016
Lab: R
Test ENG: Torey Oliver

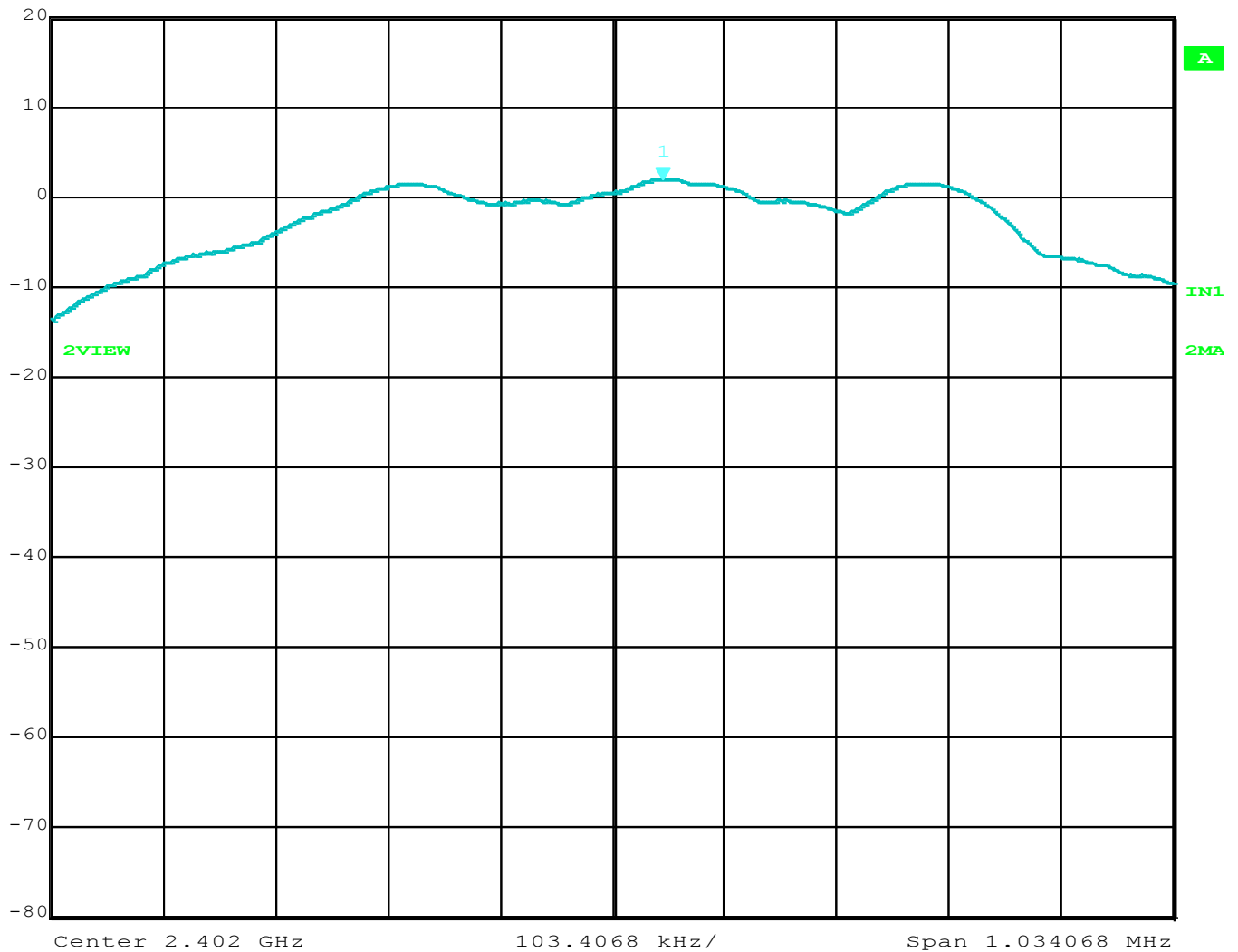
Compatible Electronics, Inc. FAC-3 (Lab R)

Freq. (MHz)	Peak (dBm)	Limit (dBm)	Margin (dB)	Peak / QP / Avg	Comments
2402	1.84	8.00	-6.16	Peak	
2440	1.79	8.00	-6.21	Peak	
2480	1.71	8.00	-6.29	Peak	





Marker 1 [T2] RBW 100 kHz RF Att 30 dB
Ref Lvl 1.84 dBm VBW 300 kHz
20 dBm 2.40204663 GHz SWT 5 ms Unit dBm



Comment A: Power Spectral Density 2402 MHz
Date: 1.APR.2016 09:12:16



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

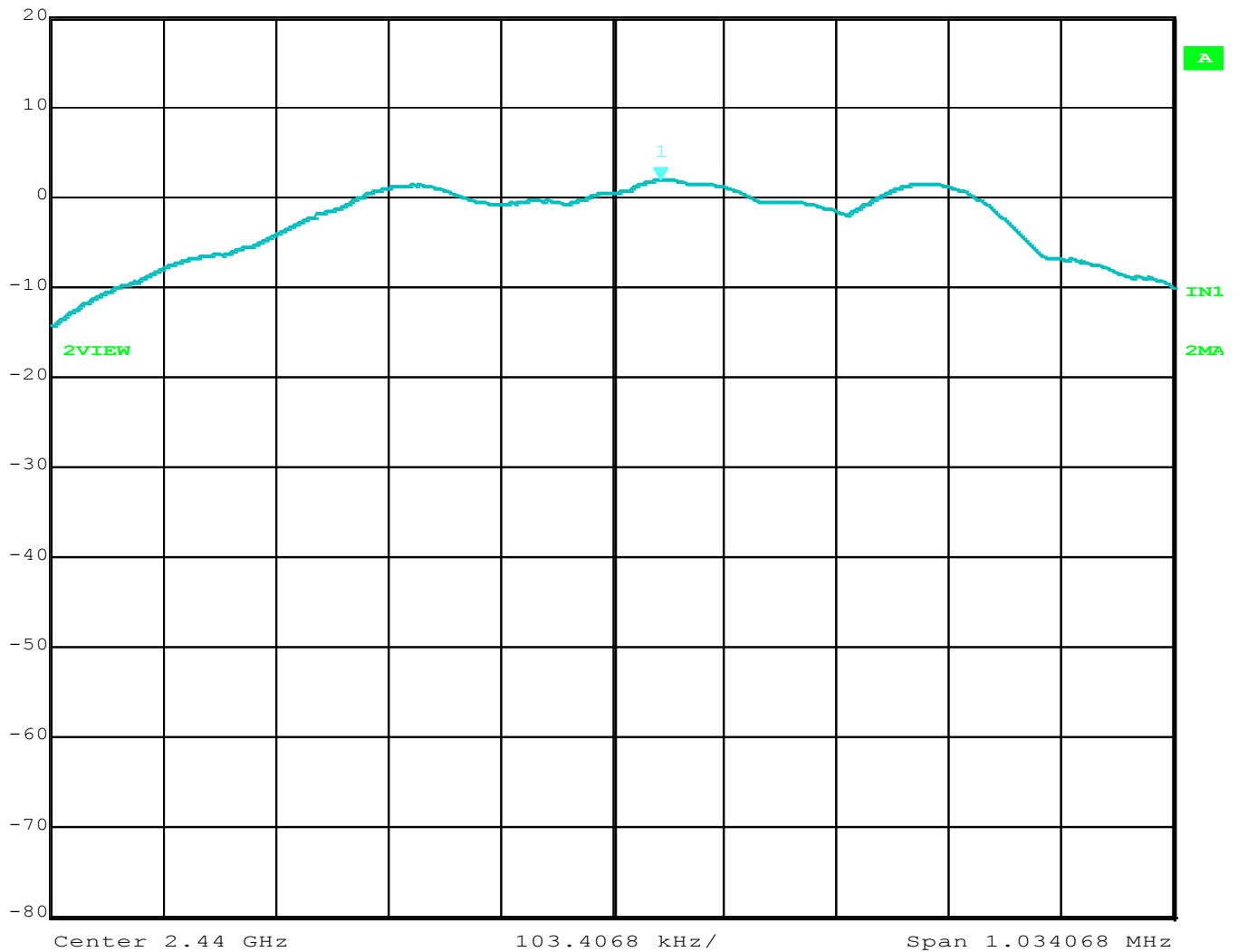
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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



Marker 1 [T2] RBW 100 kHz RF Att 30 dB
Ref Lvl 1.79 dBm VBW 300 kHz
20 dBm 2.44004455 GHz SWT 5 ms Unit dBm



Comment A: Power Spectral Density 2440 MHz
Date: 1.APR.2016 09:11:33



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

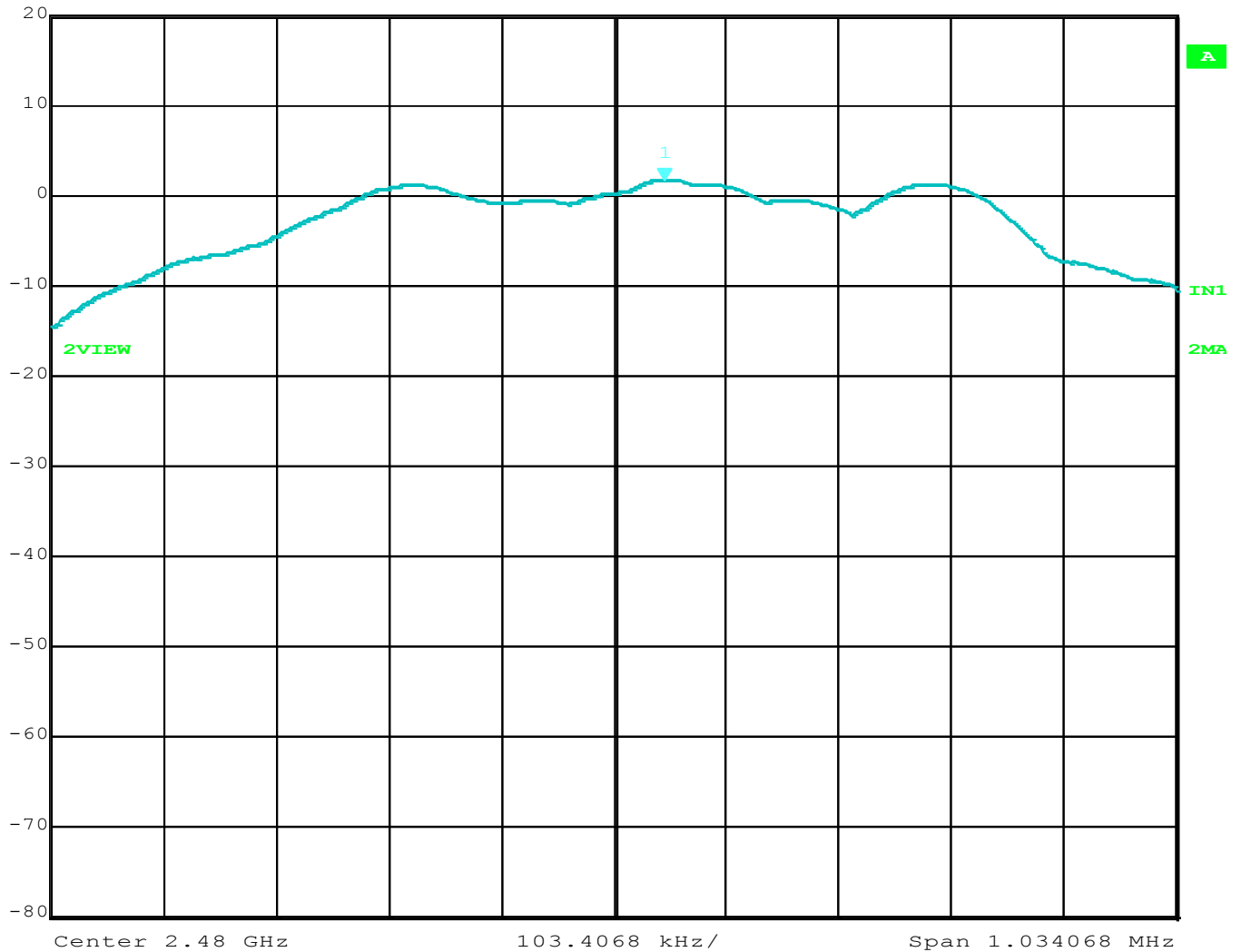
Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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



Marker 1 [T2] RBW 100 kHz RF Att 30 dB
Ref Lvl 1.71 dBm VBW 300 kHz
20 dBm 2.48004663 GHz SWT 5 ms Unit dBm



Comment A: Power Spectral Density 2480 MHz
Date: 1.APR.2016 09:10:29



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

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

DATA SHEETS



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

HARMONIC EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

FCC 15.247

Company: Microchip
EUT: BLE Module
Model: ATBTLC1000-ZR110CA
Mode: BLE

Date: 4/1/2016
Lab: R
Test ENG: Torey Oliver

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

Freq. (MHz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Peak / QP / Avg	Comments
7206	52.77	88.84	-36.07	Peak	Low Channel
9760	52.80	88.79	-35.99	Peak	Mid Channel
24800	49.37	88.71	-39.34	Peak	High Channel

PSD reading used for reference level



***EMISSIONS IN RESTRICTED FREQUENCY BANDS (RADIATED
FIELD STRENGTH)
DATA SHEETS***



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Low Channel, Horizontal & Vertical

FCC 15.247

Company: Microchip
EUT: BLE Module
Model: ATBTLC1000-ZR110CA

Date: 3/31/2016
Lab: R
Test ENG: T. Oliver

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	54.75	H	73.98	-19.23	Peak	1.16	286	In Restricted Band
4804.00	40.26	H	53.98	-13.72	Avg	1.16	286	
12010.00	71.95	H	73.98	-2.03	Peak	1.11	72	In Restricted Band
12010.00	52.14	H	53.98	-1.84	Avg	1.11	72	
19216.00		H	73.98		Peak			In Restricted Band
19216.00		H	54.93		Avg			No Emissions Found
4804.00	50.52	V	73.98	-23.46	Peak	1.04	13	In Restricted Band
4804.00	33.61	V	53.98	-20.37	Avg	1.04	13	
12010.00	67.84	V	73.98	-6.14	Peak	1.00	72	In Restricted Band
12010.00	48.66	V	53.98	-5.32	Avg	1.00	72	
19216.00		V	73.98		Peak			In Restricted Band
19216.00		V	54.93		Avg			No Emissions Found

Test distance
3 meter



HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

Mid Channel, Horizontal & Vertical

FCC 15.247

Company: Microchip
EUT: BLE Module
ATBTLC1000-
Model: ZR110CA

Date: 3/31/2016
Lab: R

Test ENG: Torey Oliver

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
4880.00	52.18	H	73.98	-21.80	Peak	1.32	80	In Restricted Band
4880.00	35.37	H	53.98	-18.61	Avg	1.32	80	
7320.00	68.01	H	73.98	-5.97	Peak	1.14	235	In Restricted Band
7320.00	46.77	H	53.98	-7.21	Avg	1.14	235	
12200.00	73.86	H	73.98	-0.12	Peak	1.00	69	In Restricted Band
12200.00	53.36	H	53.98	-0.62	Avg	1.00	69	
19520.00		H	73.98		Peak			In Restricted Band
19520.00		H	53.98		Avg			No Emission Found
4880.00	51.55	V	73.98	-22.43	Peak	1.59	21	In Restricted Band
4880.00	34.75	V	53.98	-19.23	Avg	1.59	21	
7320.00	56.09	V	73.98	-17.89	Peak	1.41	45	In Restricted Band
7320.00	46.78	V	53.98	-7.20	Avg	1.41	45	
12200.00	68.36	V	73.98	-5.62	Peak	1.50	83	In Restricted Band
12200.00	48.12	V	53.98	-5.86	Avg	1.50	83	
19520.00		V	73.98		Peak			In Restricted Band
19520.00		V	53.98		Avg			No emissions found

Test distance
3 meter



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

HARMONIC EMISSIONS IN RESTRICTED FREQUENCY BANDS

High Channel, Horizontal & Vertical

FCC 15.247

Company: Microchip
EUT: BLE Module
ATBTLC1000-
Model: ZR110CA

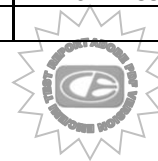
Date: 3/31/2016
Lab: R

Test ENG: Torey Oliver

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
4960.00	59.93	H	73.98	-14.05	Peak	1.54	320	In Restricted Band
4960.00	46.00	H	53.98	-7.98	Avg	1.54	320	
7440.00	67.44	H	73.98	-6.54	Peak	1.58	222	In Restricted Band
7440.00	48.43	H	53.98	-5.55	Avg	1.58	222	
12400.00	73.89	H	73.98	-0.09	Peak	1.06	152	In Restricted Band
12400.00	52.86	H	53.98	-1.12	Avg	1.06	152	
19840.00		H	73.98		Peak			In Restricted Band
19840.00		H	53.98		Avg			No Emission Found
22320.00		H	73.98		Peak			In Restricted Band
22320.00		H	53.98		Avg			No Emission Found
4960.00	55.01	V	73.98	-18.97	Peak	1.47	33	In Restricted Band
4960.00	41.46	V	53.98	-12.52	Avg	1.47	33	
7440.00	66.77	V	73.98	-7.21	Peak	1.34	135	In Restricted Band
7440.00	48.14	V	53.98	-5.84	Avg	1.34	135	
12400.00	73.76	V	73.98	-0.22	Peak	1.27	89	In Restricted Band
12400.00	51.66	V	53.98	-2.32	Avg	1.27	89	
19840.00		V	73.98		Peak			In Restricted Band
19840.00		V	53.98		Avg			No Emission Found
22320.00		V	73.98		Peak			In Restricted Band
22320.00		V	53.98		Avg			No Emission Found

Test distance
3 meter



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

***EMISSIONS RADIATED OUTSIDE OF THE FUNDAMENTAL
FREQUENCY BAND AT BAND EDGES
DATA SHEETS***



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

BAND EDGES- VERTICAL

FCC 15.247

Company: Microchip
EUT: BLE Module
Model: ATBTLC1000-ZR110CA
Mode: BLE

Date: 3/31/2016
Lab: R
Test ENG: Torey Oliver

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

Freq. (MHz)	Level (dBμV)	Pol	Limit (dBμV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402.00	79.96	V	--	--	Peak	2.84	123	
2400.00	51.16	V	59.96	-8.80	Delta	2.84	123	From Peak
2384.02	52.60	V	73.98	-21.38	Peak	2.84	123	
2384.02	38.41	V	53.98	-15.57	Avg	2.84	123	
2480.00	76.06	V	--	--	Peak	1.00	196	
2489.64	52.11	V	73.98	-21.87	Peak	1.00	196	
2489.64	38.66	V	53.98	-15.32	Avg	1.00	196	

Test distance

3 meter



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

BAND EDGES- HORIZONTAL

FCC 15.247

Company: Microchip

Date: 3/31/2016

EUT: BLE Module

Lab: R

Model: ATBTLC1000-ZR110CA

Test ENG: Torey Oliver

Mode: BLE

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

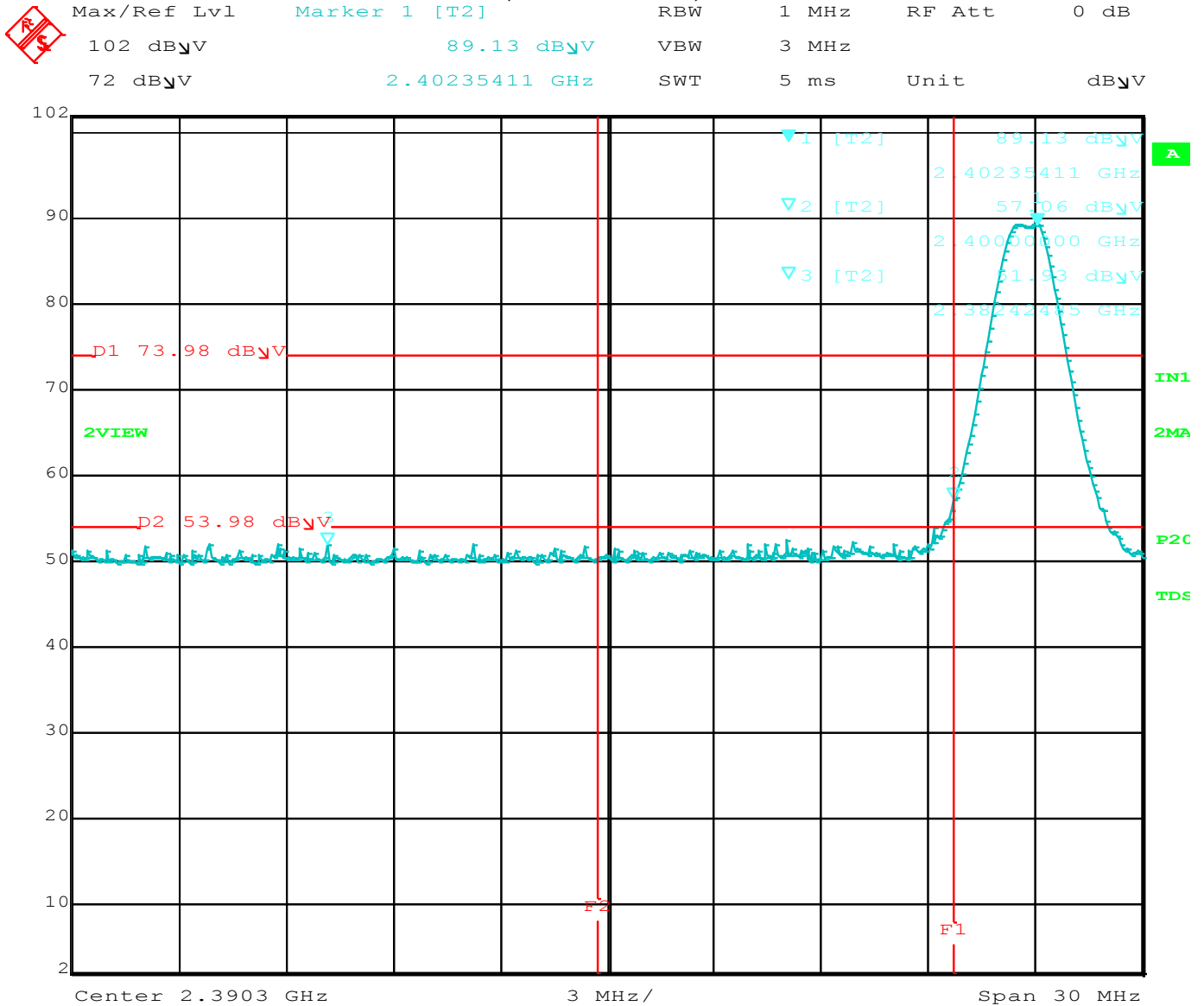
Freq. (MHz)	Level (dBµV)	Pol	Limit (dBµV)	Margin (dB)	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
2402.00	89.13	H	--	--	Peak	1.53	290	
2400.00	57.06	H	69.13	-12.07	Delta	1.53	290	From Peak
2382.42	51.93	H	73.98	-22.05	Peak	1.53	290	
2382.42	38.42	H	53.98	-15.56	Avg	1.53	290	
2480.00	88.63	H	--	--	Peak	1.72	210	
2491.27	52.02	H	73.98	-21.96	Peak	1.72	210	
2491.27	39.05	H	53.98	-14.93	Avg	1.72	210	

Test distance

3 meter



LOWER BAND EDGE (Horizontal)



Comment A: Lower Band Edge Horizontal

Date: 31.MAR.2016 18:21:22



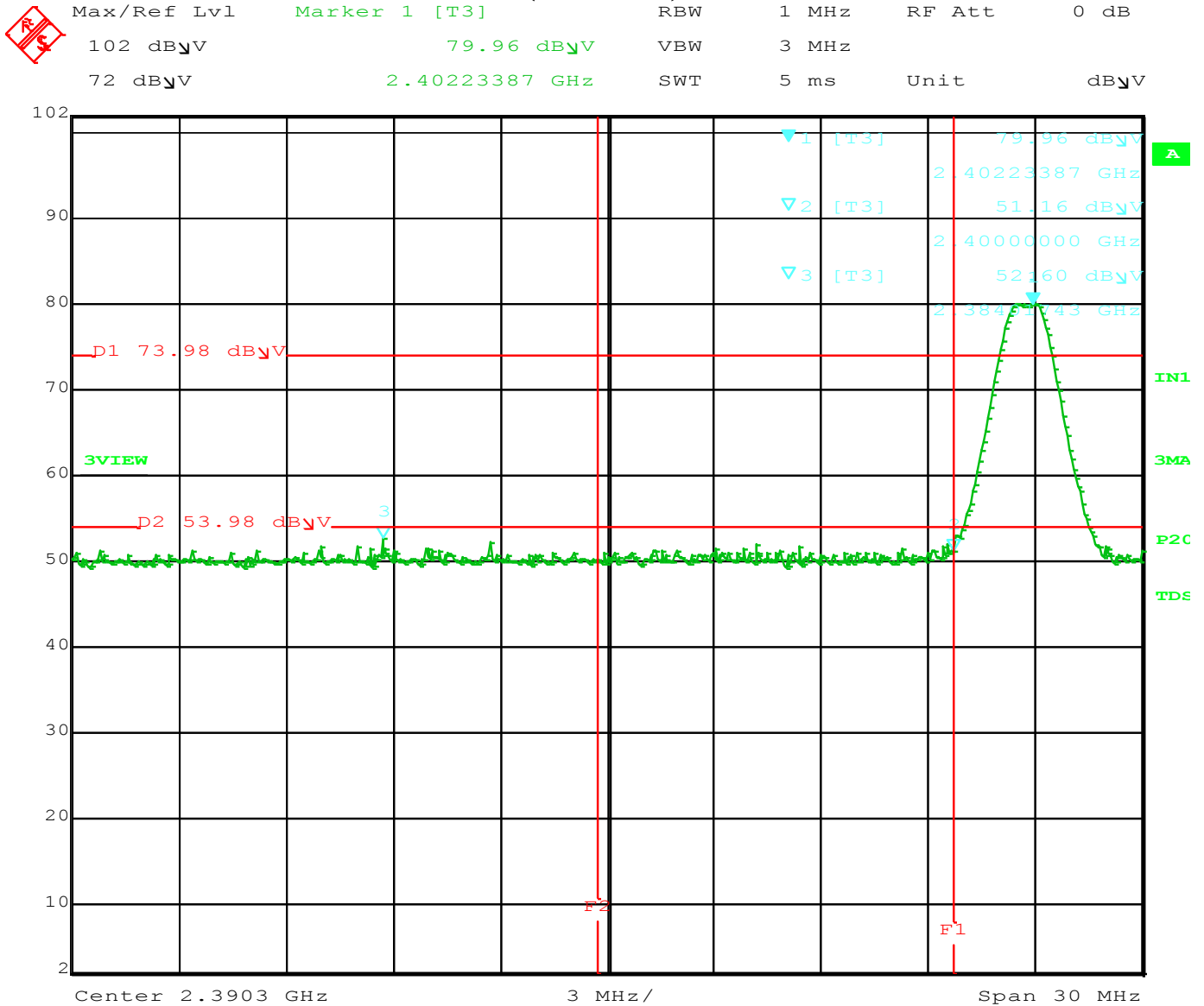
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

LOWER BAND EDGE (Vertical)



Comment A: Lower Band Edge Vertical

Date: 31.MAR.2016 18:25:21



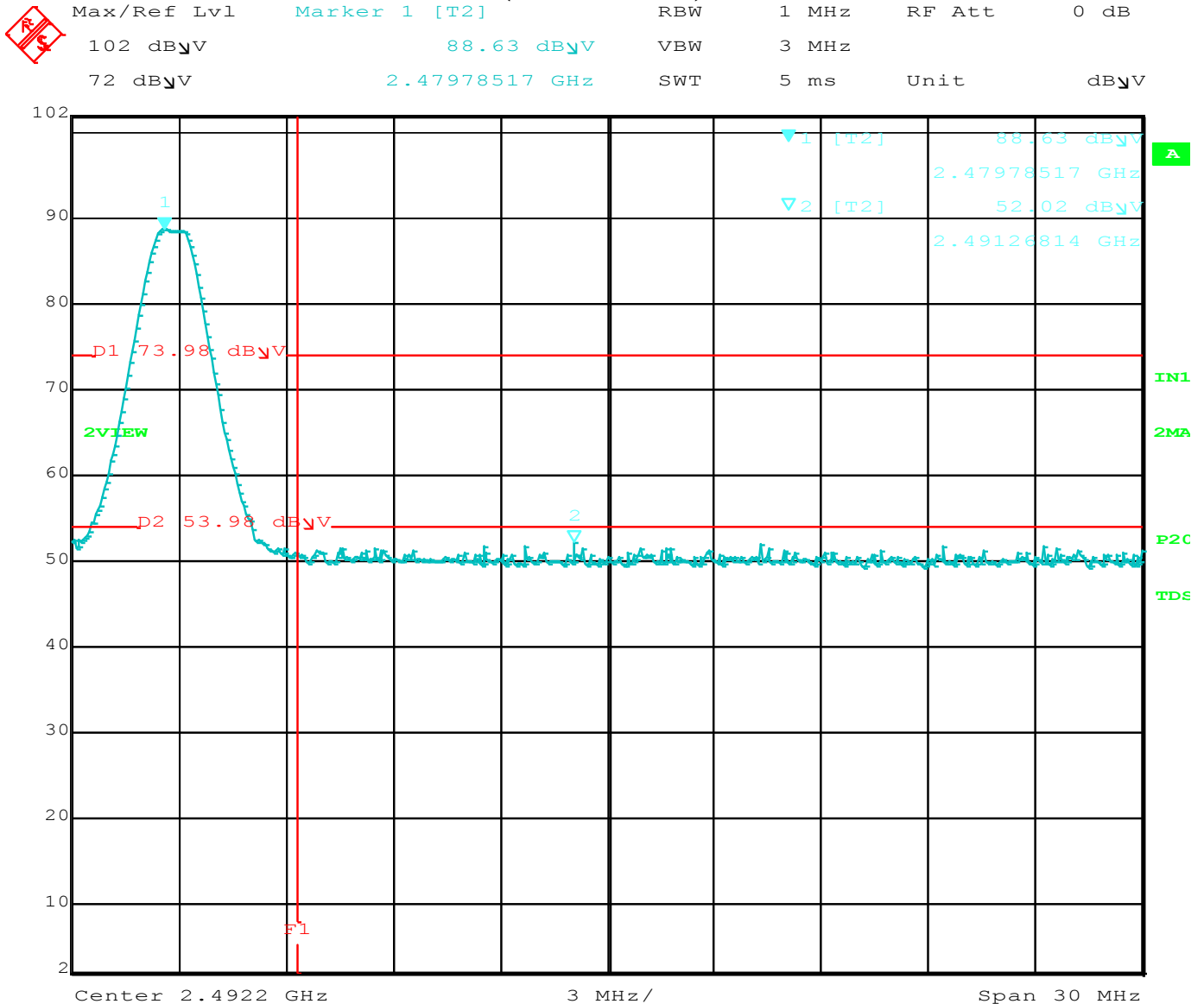
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

UPPER BAND EDGE (Horizontal)



Comment A: Upper Band Edge Horizontal

Date: 31.MAR.2016 18:32:00



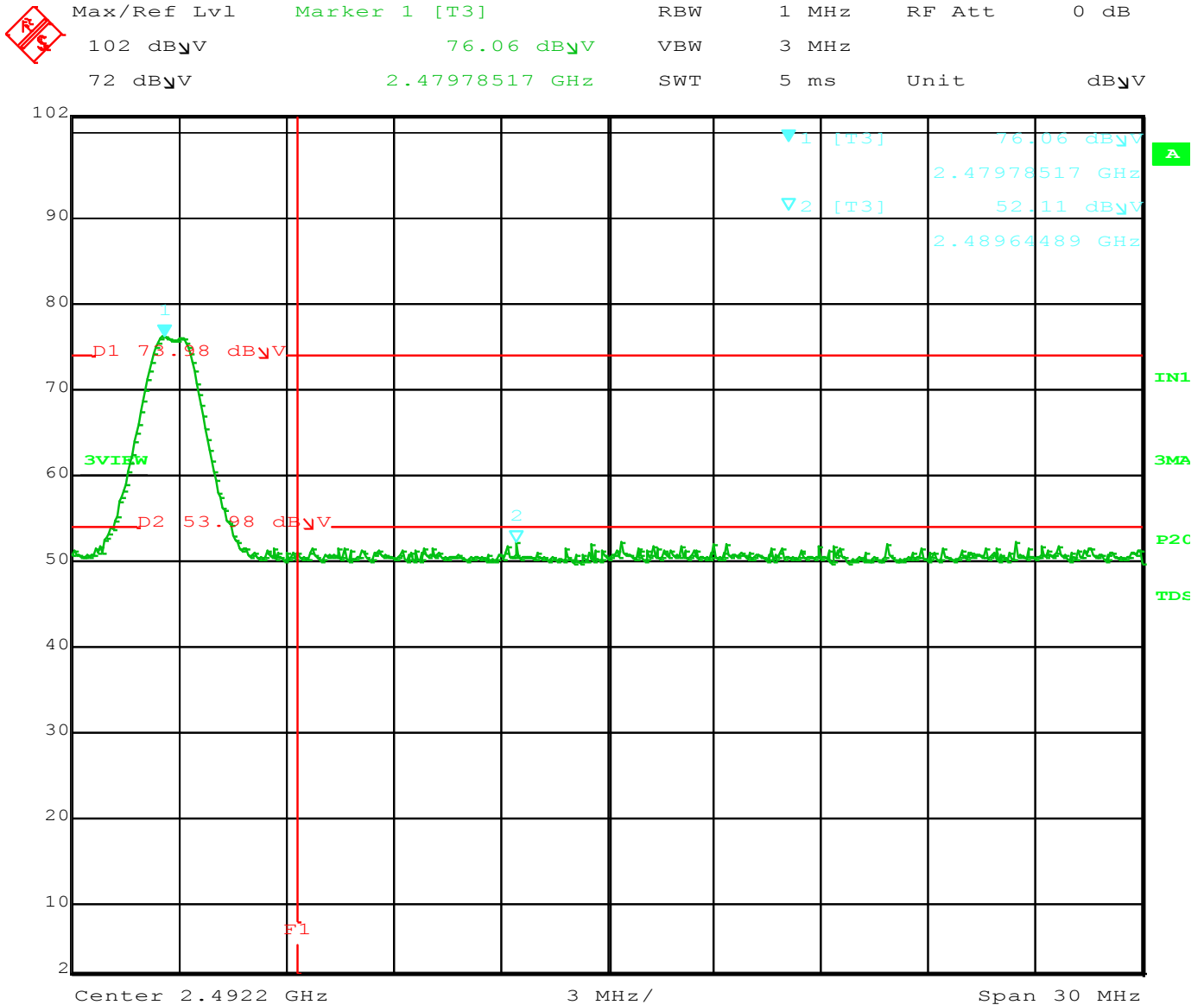
Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

UPPER BAND EDGE
(Vertical)



Comment A: Upper Band Edge Vertical

Date: 31.MAR.2016 18:35:13



OCCUPIED BANDWIDTH



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

Agoura Division
2337 Troutdale Drive
Agoura, CA 91301
(818) 597-0600

Silverado Division
19121 El Toro Road
Silverado, CA 92676
(949) 589-0700

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

IC BANDWIDTH

RSS GEN

Company: Microchip Date: 4/2/2016
EUT: BLE Module Lab: R
Model: ATBTLC1000-ZR110CA Test ENG: Torey Oliver
Mode: BLE

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

Freq. (MHz)	Measured BW (kHz)	Comments
2402	1070.60	
2440	1067.40	
2480	1070.70	

