FCC PART 15 SUBPART B, SUBPART C SECTION 15.231,
RSS GEN, & RSS 210
TEST REPORT

for

REPEATER
Model: 2GIG-RPTR1-345

Prepared for

2GIG TECHNOLOGIES
1950 CAMINO VIDA ROBLE, SUITE 150
CARLSBAD, CA 92008

Prepared by:_____

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DATE: SEPTEMBER 20, 2016

	REPORT BODY	APPENDICES					TOTAL
		A	***B***	***C***	***D***	***E***	
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NVLAP® TESTING
NVLAP LAB CODE 200527-0

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2	Plot Map And Layout of Test Site Above 1GHz
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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:	Repeater Model: 2GIG-RPTR1-345 S/N: None
Product Description:	The 2GIG Wireless Indoor Repeater (2GIG-RPTR1-345) is a remotely powered wireless indoor repeater. The repeater is a peripheral device that communicates with the 2GIG Panel using a proprietary 345 MHz transmission protocol. The repeater receives and recognizes messages from other 345 MHz devices that are unable to directly communicate with the system, and “repeats” those messages to extend the range of these devices.
Modifications:	The EUT was not modified in order to comply with specifications.
Manufacturer:	2GIG Technologies 1950 Camino Vida Roble, Suite 150 Carlsbad, CA 92008
Test Dates:	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 and 15.231
RSS GEN & RSS 210

Test Procedure: ANSI C63.4 & C63.10

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, & RSS GEN.
2	Radiated RF Emissions & Harmonics, 9 kHz – 3,450 MHz.	Complies with the limits of CFR Title 47, Part 15 Subpart C Section 15.209, 15.231, & RSS GEN.
3	-20 dB Occupied Bandwidth of the Emission	Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231 & RSS 210.
4	Peak Radiated EMI	Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231 & RSS 210.
5	Transmit Timeout	Complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231 & RSS 210.

TABLE 1
SIX HIGHEST RADIATED EMISSIONS READINGS

	Reading Type (PK / QP / AV)	Polarization (Vert / Horz)	Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Delta (dB)	Test Distance
1	AV	H	345.00	77.24	77.26	-0.02	3-Meter
2	AV	V	345.00	75.90	77.26	-1.36	3-Meter
3	AV	H	690.00	39.56	46.00	-6.44	3-Meter
4	QP	V	47.50	30.46	40.00	-9.54	3-Meter
5	QP	V	68.70	29.57	40.00	-10.43	3-Meter
6	QP	V	60.30	28.77	40.00	-11.23	3-Meter

TABLE 2
SIX HIGHEST CONDUCTED EMISSIONS READINGS

	Reading Type (PK / QP / AV)	Line (L/N)	Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Delta (dB)
1	QP	L	0.43	40.41	57.33	-16.92
2	QP	L	0.41	39.59	57.57	-17.98
3	QP	L	0.40	36.02	57.81	-21.79
4	QP	L	0.44	32.77	57.02	-24.25
5	QP	N	0.42	32.01	57.49	-25.47
6	QP	N	0.39	30.33	58.15	-27.81

1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Repeater Model: 2GIG-RPTR1-345. The EMI measurements were performed according to the measurement procedure described in ANSI 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 B section 15.109, Subpart C sections 15.205, 15.209. 15.231, RSS GEN, & RSS 210.

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

2GIG Technologies

Verdin Orozco	Sr. Regulatory Compliance Engineer

Compatible Electronics, Inc.

Matt Harrison	Lab Manager
Torey Oliver	Test Engineer

2.4 Date Test Sample was Received

The test sample was received on September 2nd, 2016.

2.5 Disposition of the Test Sample

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

2.6 Abbreviations and Acronyms

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

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.
ANSI C63.10: 2013	American National Standard for Testing Unlicensed Wireless Devices
RSS GEN	General Requirements for Compliance of Radio Apparatus
RSS 210	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration

The Repeater Model: 2GIG-RPTR1-345 (EUT) was setup in a tabletop configuration. It was connected to the power supply via hardwired connection. The EUT was checked all 3 axes. The worst case was found to be the X-Axis. The EUT was continuously charging the battery during all tests and transmitting during the transmit tests and receiving during the receiver tests.

The EUT 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 (X-Axis Shown)

4.1.2 Cable Construction and Termination

Cable 1:

This is a 2-meter, round, unshielded cable connecting the EUT to the Power Supply. It was hardwired into both ends of the cable. The cable was bundled to a length of 1 meter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

#	EQUIPMENT TYPE	MANU-FACTURER	MODEL	SERIAL NUMBER
1	REPEATER (EUT)	2GIG TECHNOLOGIES	2GIG-RPTR1-345	NONE
2	POWER SUPPLY	ZB POWER	ZB-H140017	NONE
3	BATTERY	GENERIC	HSD14500 2.96Wh 3.7V	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	100172	09/22/2015	09/22/2016
Antenna, Loop	Com Power	AL-130	121049	12/06/2014	12/06/2016
Antenna, CombiLog	Com Power	AC-220	003	05/19/2016	05/19/2017
Antenna, Horn 1-18GHz	Com Power	AH-118	071225	05/17/2016	05/17/2017
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
Power Source	Chroma	61511	615114800078	2/8/2016	2/8/2017
Multi Meter	Fluke	85	62700530	3/16/2016	3/16/2017

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 1.0 meter high on a non-conductive surface, which was placed above the ground plane.

For above 1GHz the EUT was mounted on a 1.5 meter high non-conductive tabletop, which was placed on the ground plane.

The EUT was not grounded.

6.3 Facility Environmental Characteristics

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

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Number and Frequencies

The EUT has one operating channel and the EUT has OOK modulation. The EUT has a fixed output power.

1 == 345 MHz

7.2 Antenna

The antenna is made up of a wire soldered to the PCB.

7.3 EUT Test Software

PN: 10007488 Rev. A

Date: 08/23/2016

Location: Agile Product Lifecycle Management by Oracle.

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.

Test Results:

The EUT complies with the limits of CFR Title 47 Part 15 Subpart Subpart C section 15.207 & RSS GEN. The six highest emissions are listed in table 2.

8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The EMI 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.

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 Fundamental & Harmonic emissions a duty cycle average 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 3450	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 C63.4 & ANSI C63.10. 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 B section 15.109, Subpart C sections 15.205, 15.209, 15.231, RSS GEN & RSS 210. The six highest emissions are listed in table 1.

8.1.3 Peak radiated EMI

The EUT was tested at a 3-meter test distance to obtain the final test data. The final qualification data sheets are located in Appendix E. This data also shows compliance at the band edges.

Duty Cycle Correction Factor = -20.00dB

$$\delta(\mathrm{dB}) = 20\log\left[\sum\left(nt_1 + mt_2 + \ldots + \xi t_x\right)/T\right]$$

where

n is the number of pulses of duration *t*1
m is the number of pulses of duration *t*2
ξ is the number of pulses of duration *tx*
T is the period of the pulse train or 100 ms if the pulse train length is greater than 100 ms

Pulse Type 1 = 62 * 157.314629 µS = 9753.507 µS

Pulse Type 2 = 1 * 293.587174 µS = 293.587 µS

9753.507 µS + 293.587 µS = 10.04709 mS

Total On Time = 10.04709 mS

Pulse train is 99.39 mS

10.04709 / 99.40 mS = 0.1011

20 log (0.1011) = -19.91 dB correction factor

Max Duty Cycle Correction Factor = -19.91 dB

Test Results:

The EUT complies with Part 15, Subpart C, section 15.231 & RSS 210.

8.1.4 Bandwidth of the Fundamental

The -20 dB bandwidth was checked using the MXE Receiver to see that the emissions were wholly within the 0.25% of the operating frequency centered on the fundamental frequency. The RBW was set to 1-5% of the occupied bandwidth and the VBW was set to approximately three times the RBW. The span was to between two and five times the occupied bandwidth. A Plot of the -20 dB bandwidth is located in Appendix E.

Test Results:

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

8.1.5 Occupied Bandwidth

The occupied bandwidth was checked using EMI Receiver. The RBW was set to 1-5% of the occupied bandwidth and the VBW was set to approximately three times the RBW. The span was to between two and five times the occupied bandwidth. A Plot of the Occupied Bandwidth is located in Appendix E.

Test Results:

The EUT complies with the requirements of RSS GEN for the -20 dB bandwidth of the fundamental. The EUT has a -20 dB bandwidth that is lies wholly within the 0.25% of the operating frequency centered on the fundamental frequency.

8.1.6 Transmit Timeout

The Transmit timeout test was performed using the EMI Receiver to make sure the transmission coming from the transmitter would cease within 5 seconds after the activation. A Plot of the transmission duration is located in Appendix E.

Test Results:

The EUT complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.231 (c) & RSS 210 for Transmit Timeout less than 5 seconds.

9. TEST PROCEDURE DEVIATIONS

The test procedures were not deviated from throughout all tests.

10. CONCLUSIONS

The Repeater Model: 2GIG-RPTR1-345 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, 15.231, RSS GEN, & RSS 210.

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP® TESTING
NVLAP LAB CODE 200527-0

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

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 were made during testing.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	REPEATER Model: 2GIG-RPTR1-345 S/N: None

No additional models were tested.

APPENDIX D

DIAGRAMS, CHARTS, AND PHOTOS

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

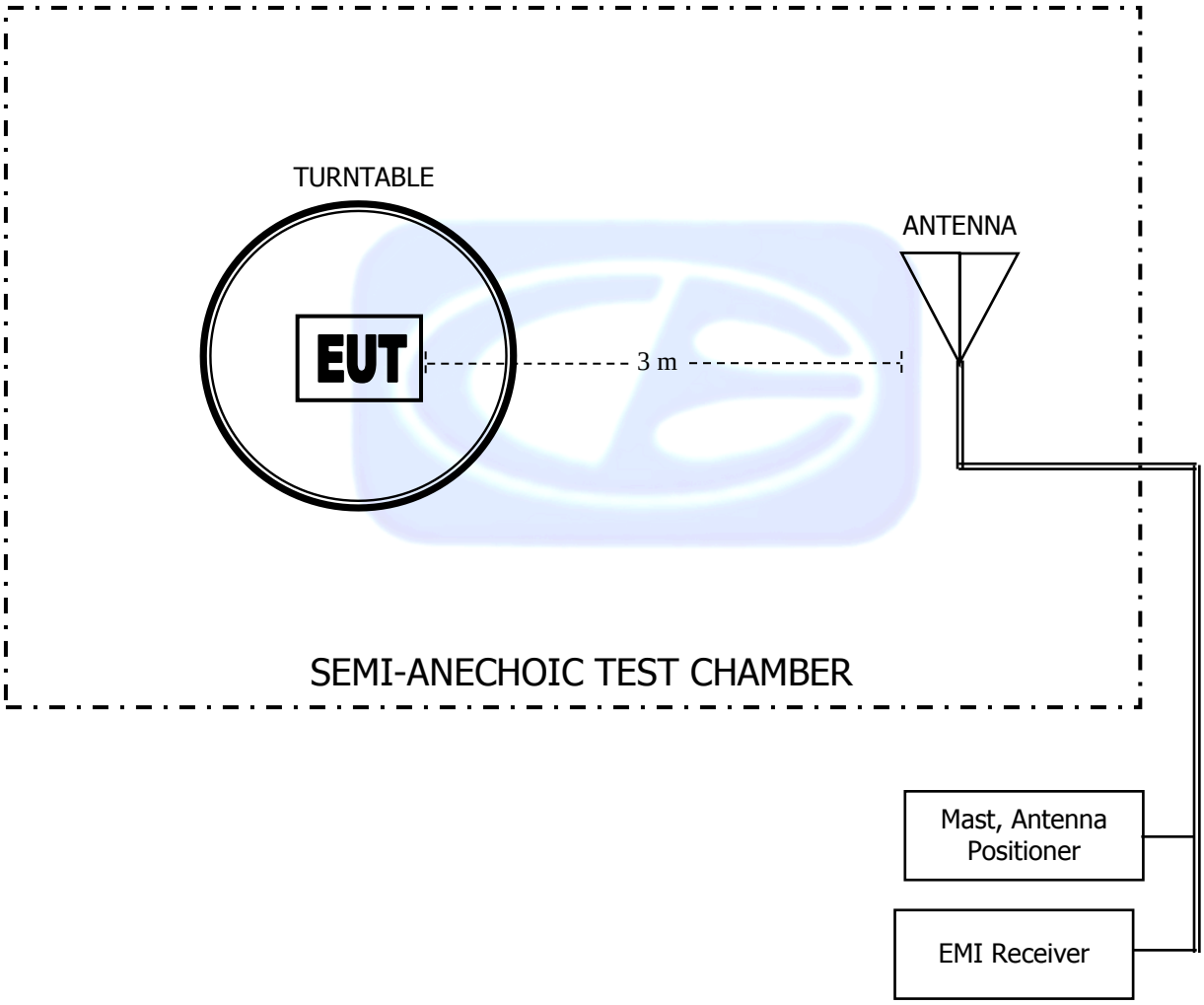


FIGURE 2: PLOT MAP AND LAYOUT OF TEST SITE ABOVE 1GHZ

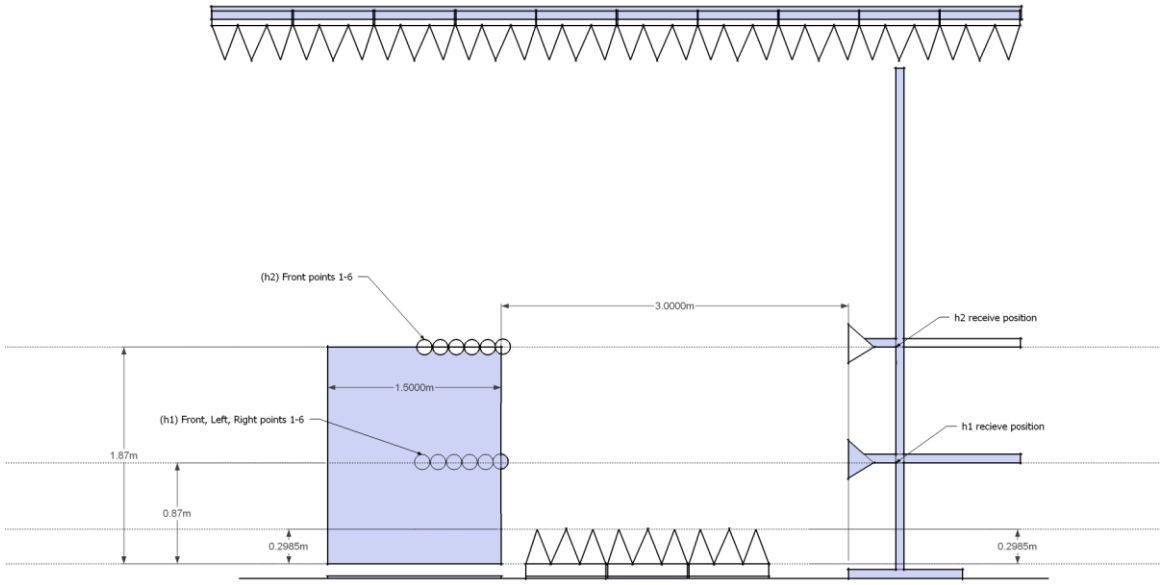
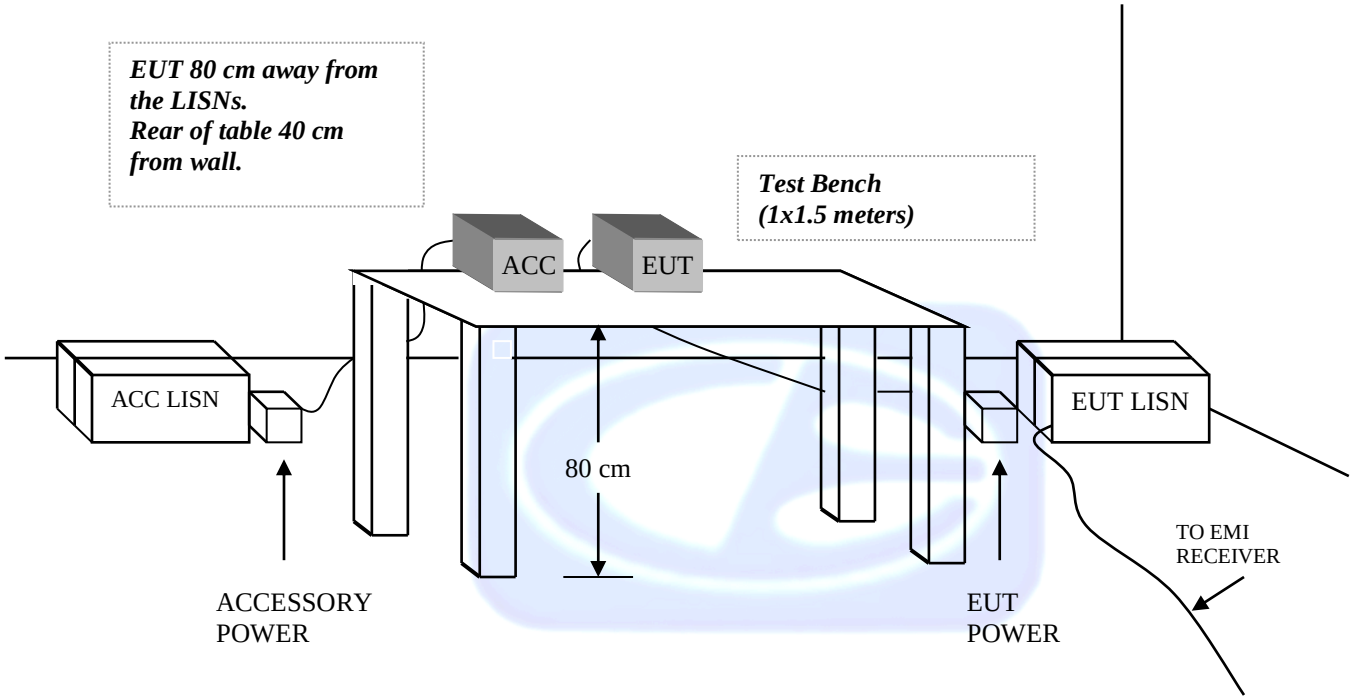


FIGURE 3: CONDUCTED EMISSIONS TEST SETUP



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 P - COMBILOG ANTENNA

S/N: 003

CALIBRATION DUE: MAY 21, 2016

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.90	**160**	15.20
35	22.80	**180**	14.40
40	23.50	**200**	14.10
45	21.90	**250**	15.90
50	22.00	**300**	18.20
60	18.10	**400**	19.40
70	12.80	**500**	21.50
80	12.10	**600**	22.00
90	12.70	**700**	23.90
100	13.00	**800**	25.80
120	15.50	**900**	27.00
140	14.40	**1000**	27.90

COM-POWER AH-118

HORN ANTENNA

S/N: 071225

CALIBRATION DUE: MAY 17, 2017

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
1000	24.40	9500	39.11
1500	25.61	10000	39.38
2000	28.71	10500	39.55
2500	29.09	11000	39.66
3000	30.24	11500	40.28
3500	30.94	12000	40.26
4000	31.77	12500	40.64
4500	32.29	13000	41.33
5000	33.70	13500	41.74
5500	34.28	14000	41.52
6000	34.83	14500	41.80
6500	35.07	15000	43.51
7000	36.79	15500	41.03
7500	37.45	16000	40.88
8000	37.67	16500	40.18
8500	37.75	17000	42.59
9000	38.15	17500	44.49
		18000	45.27

FRONT VIEW

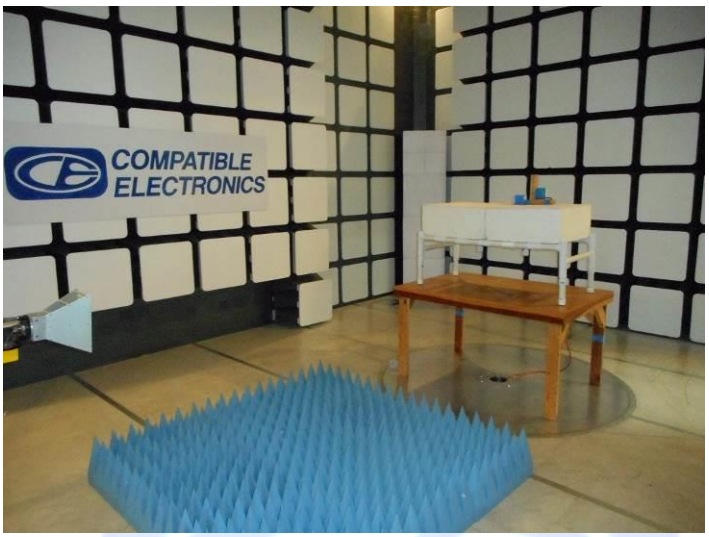
2GIG TECHNOLOGIES
REPEATER
Model: 2GIG-RPTR1-345
FCC SUBPART C - RADIATED EMISSIONS < 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

2GIG TECHNOLOGIES
REPEATER
Model: 2GIG-RPTR1-345
FCC SUBPART C - RADIATED EMISSIONS < 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

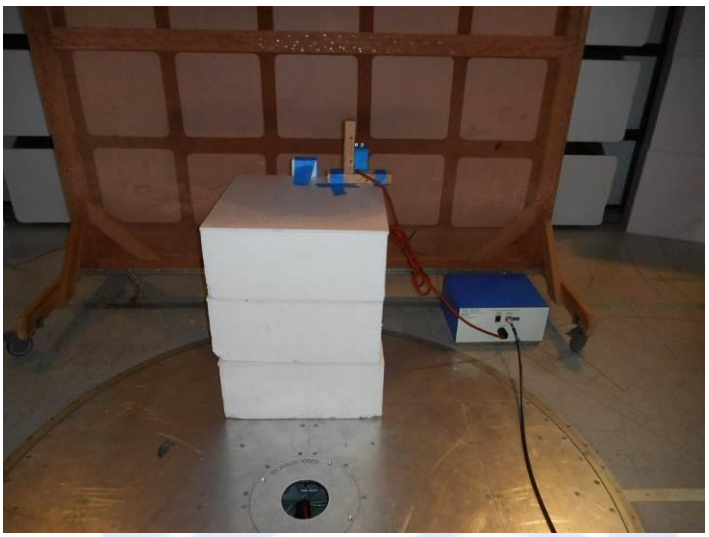
2GIG TECHNOLOGIES
REPEATER
Model: 2GIG-RPTR1-345
FCC SUBPART C - RADIATED EMISSIONS > 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

2GIG TECHNOLOGIES
REPEATER
Model: 2GIG-RPTR1-345
FCC SUBPART C - RADIATED EMISSIONS > 1GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

2GIG TECHNOLOGIES
REPEATER
Model: 2GIG-RPTR1-345
FCC SUBPART C - CONDUCTED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

2GIG TECHNOLOGIES
REPEATER
Model: 2GIG-RPTR1-345
FCC SUBPART C - CONDUCTED EMISSIONS

PHOTOGRAPH SHOWING THE EUT CONFIGURATION

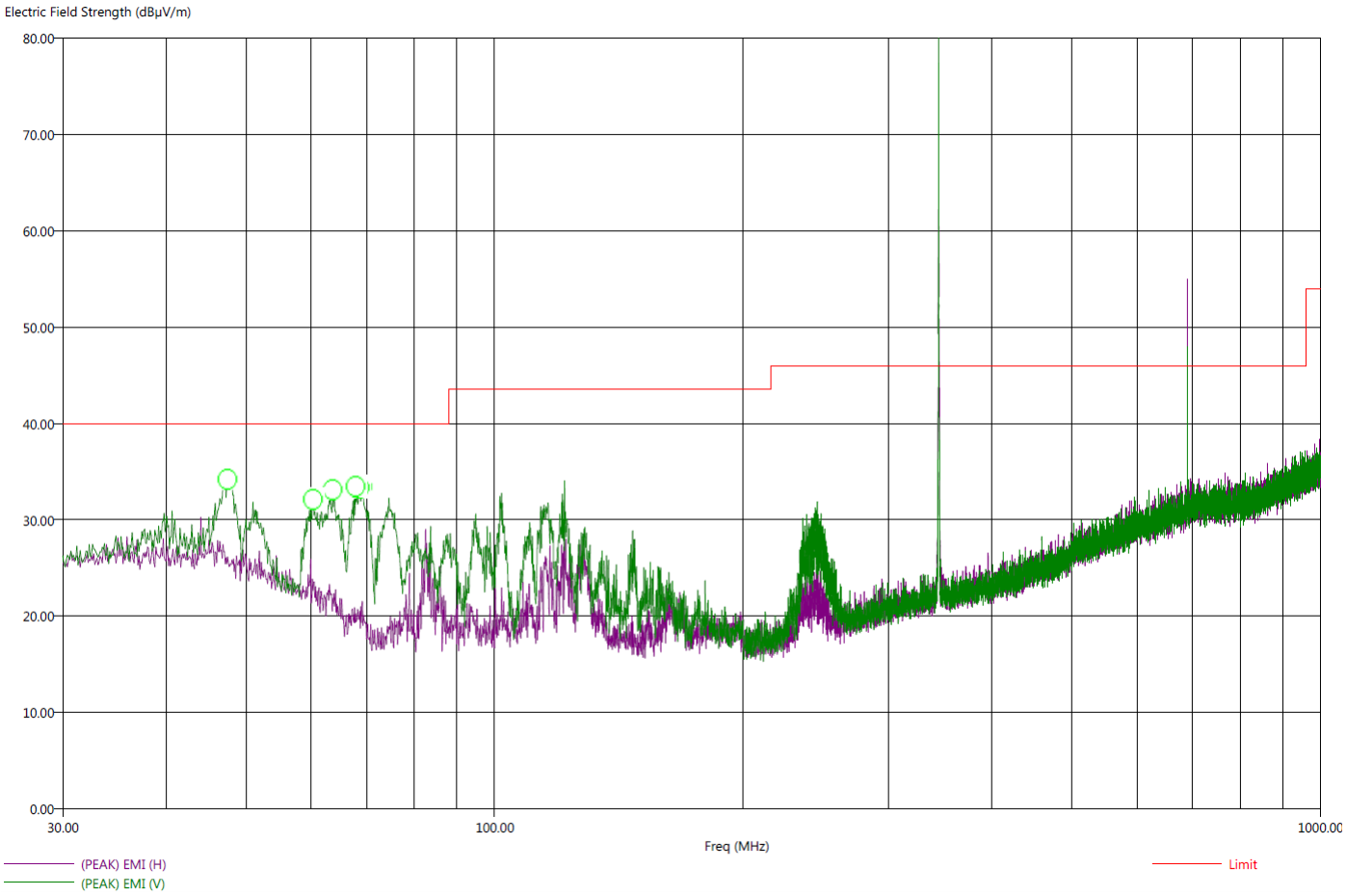
FOR MAXIMUM EMISSIONS

APPENDIX E

RADIATED EMISSIONS DATA SHEETS

Title: FCC 15.209 9/2/2016 2:09:57 PM
File: Radiated Pre-Scan 30-1000Mhz Sequence: Preliminary Scan
Operator: Matt Harrison
EUT Type: Repeater / 2GIG-RPTR1-345
EUT Condition: The EUT is constantly transmitting 345 MHz and charging the battery.
Comments: Connected to PSU. (X-Axis)
Temp: 73f
Hum: 43%
120V 60Hz

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



There were no radiated emissions other than harmonics found below 30 MHz or above 1GHz.
This is the worst case mode.
No additional emissions were found in receive mode.

Title: FCC 15.209 9/2/2016 2:22:36 PM
File: Radiated Final 30-1000Mhz Sequence: Final Measurements
Operator: Matt Harrison
EUT Type: Repeater / 2GIG-RPTR1-345
EUT Condition: The EUT is constantly transmitting 345 MHz and charging the battery.
Comments: Connected to PSU.
Temp: 73f
Hum: 43%
120V 60Hz

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

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)
47.50	-9.54	30.46	35.96	40.00	V	328.00	119.00	23.38	0.60
60.30	-11.23	28.77	33.71	40.00	V	133.25	107.05	18.92	0.67
63.70	-11.40	28.60	34.06	40.00	V	199.75	108.64	17.02	0.67
67.90	-11.40	28.60	34.14	40.00	V	112.25	101.76	14.83	0.67
68.70	-10.43	29.57	34.21	40.00	V	166.75	111.29	14.47	0.67
69.20	-12.84	27.16	32.20	40.00	V	0.25	231.47	14.24	0.67

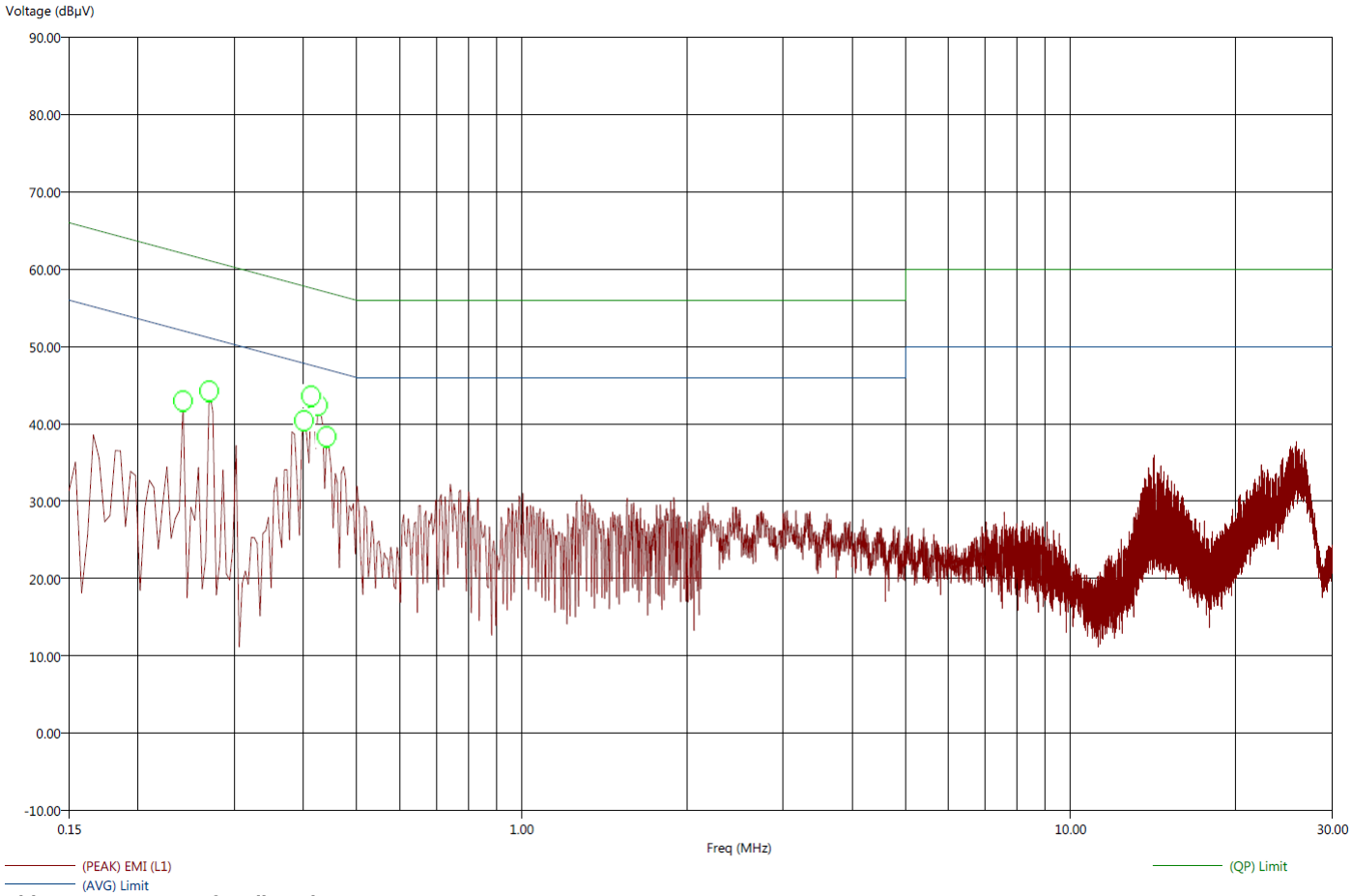
There were no radiated emissions other than harmonics found below 30 MHz or above 1GHz.
This is the worst case mode.
No additional emissions were found in receive mode.

APPENDIX E

CONDUCTED EMISSIONS DATA SHEETS

Title: FCC 15.207 9/2/2016 4:24:49 PM
File: Conducted Pre-Line 120V Sequence: Preliminary Scan
Operator: Matt Harrison
EUT Type: 2GIG-RPTR1-345.
EUT Condition: The EUT is constantly transmitting 345 MHz and charging the battery.
Comments: Connected to PSU
Temp: 74f
Hum: 52%
120V 60Hz

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



This was worst case for all modes
No additional emissions were found in receive mode.

Title: FCC 15.207 9/2/2016 4:27:57 PM
File: Conducted Final-Line 120V Sequence: Final Measurements
Operator: Matt Harrison
EUT Type: 2GIG-RPTR1-345.
EUT Condition: The EUT is constantly transmitting 345 MHz and charging the battery.
Comments: Connected to PSU
Temp: 74f
Hum: 52%
120V 60Hz

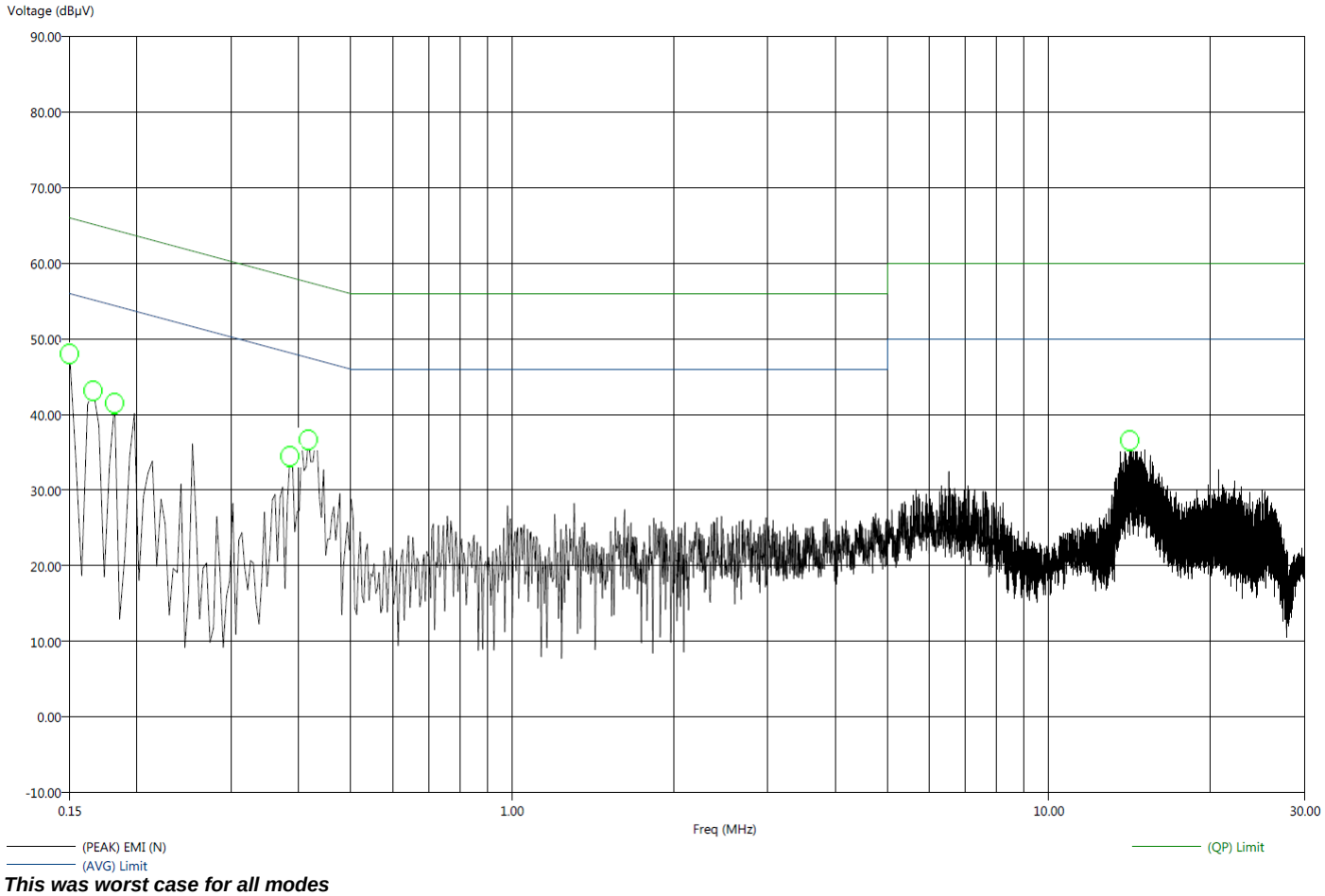
Compatible Electronics, Inc. FAC-3 (LAB P)

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)
0.24	-34.23	-30.44	17.80	31.59	51.56	52.03	62.03	0.21	0.01
0.27	-34.39	-31.50	16.73	29.61	49.66	51.12	61.12	0.16	0.01
0.40	-26.92	-21.79	20.89	36.02	45.59	47.81	57.81	0.03	0.01
0.41	-23.75	-17.98	23.82	39.59	45.39	47.57	57.57	0.03	0.01
0.43	-21.66	-16.92	25.67	40.41	44.89	47.33	57.33	0.03	0.01
0.44	-27.90	-24.25	19.13	32.77	40.56	47.02	57.02	0.03	0.01

This was worst case for all modes
No additional emissions were found in receive mode.

Title: FCC 15.207 9/2/2016 4:34:46 PM
File: Conducted Pre-Neutral 120V Sequence: Preliminary Scan
Operator: Matt Harrison
EUT Type: 2GIG-RPTR1-345.
EUT Condition: The EUT is constantly transmitting 345 MHz and charging the battery.
Comments: Connected to PSU
Temp: 74f
Hum: 52%
120V 60Hz

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



This was worst case for all modes
No additional emissions were found in receive mode.

Title: FCC 15.207 9/2/2016 4:40:28 PM
File: Conducted Final-Neutral 120V Sequence: Final Measurements
Operator: Matt Harrison
EUT Type: 2GIG-RPTR1-345.
EUT Condition: The EUT is constantly transmitting 345 MHz and charging the battery.
Comments: Connected to PSU
Temp: 74f
Hum: 52%
120V 60Hz

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

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)
0.15	-39.79	-30.49	16.21	35.51	53.49	56.00	66.00	0.44	0.01
0.17	-38.73	-31.17	16.42	33.99	51.25	55.16	65.16	0.39	0.01
0.18	-38.76	-32.07	15.63	32.32	48.91	54.39	64.39	0.35	0.01
0.39	-34.39	-27.81	13.76	30.33	36.84	48.15	58.15	0.04	0.01
0.42	-30.32	-25.47	17.17	32.01	41.77	47.49	57.49	0.04	0.01
14.16	-35.17	-33.42	14.83	26.58	36.49	50.00	60.00	0.04	0.30

This was worst case for all modes
No additional emissions were found in receive mode.

FUNDAMENTAL & HARMONICS

DATA SHEETS

FUNDAMENTAL FIELD STRENGTH

FCC 15.231

Company:	2GIG Technologies	Date:	9/2/2016
EUT:	Repeater	Lab:	P
Model:	2GIG-RPTR1-345	Tested By:	Matt H
Duty Cycle Correction Factor:	-19.91		

Compatible Electronics, Inc. FAC-3

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table	Tower	Comments
345.00	97.15	H	97.26	-0.11	Peak	360	1.30	
345.00	77.24	H	77.26	-0.02	Avg	360	1.30	
345.00	95.81	V	97.26	-1.45	Peak	9	1.10	
345.00	75.90	V	77.26	-1.36	Avg	9	1.10	

HARMONICS HORIZONTAL

FCC 15.231

Company:	2GIG Technologies	Date:	9/2/2016
EUT:	Repeater	Lab:	P
Model:	2GIG-RPTR1-345	Tested By:	Matt H
Duty Cycle Factor:	-19.91		

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
690.00	59.47	H	77.26	-17.79	Peak	1.01	338	
690.00	39.56	H	57.26	-17.70	Avg	1.01	338	
1035.00		H	73.98		Peak			No Emissions Found
1035.00		H	53.98		Avg			
1380.00		H	73.98		Peak			No Emissions Found
1380.00		H	53.98		Avg			
1725.00		H	77.26		Peak			No Emissions Found
1725.00		H	57.26		Avg			
2070.00		H	77.26		Peak			No Emissions Found
2070.00		H	57.26		Avg			
2415.00		H	77.26		Peak			No Emissions Found
2415.00		H	57.26		Avg			
2760.00		H	73.98		Peak			No Emissions Found
2760.00		H	53.98		Avg			
3105.00		H	77.26		Peak			No Emissions Found
3105.00		H	57.26		Avg			
3450.00		H	77.26		Peak			No Emissions Found
3450.00		H	57.26		Avg			

Test distance
3 meter

HARMONICS VERTICAL

FCC 15.231

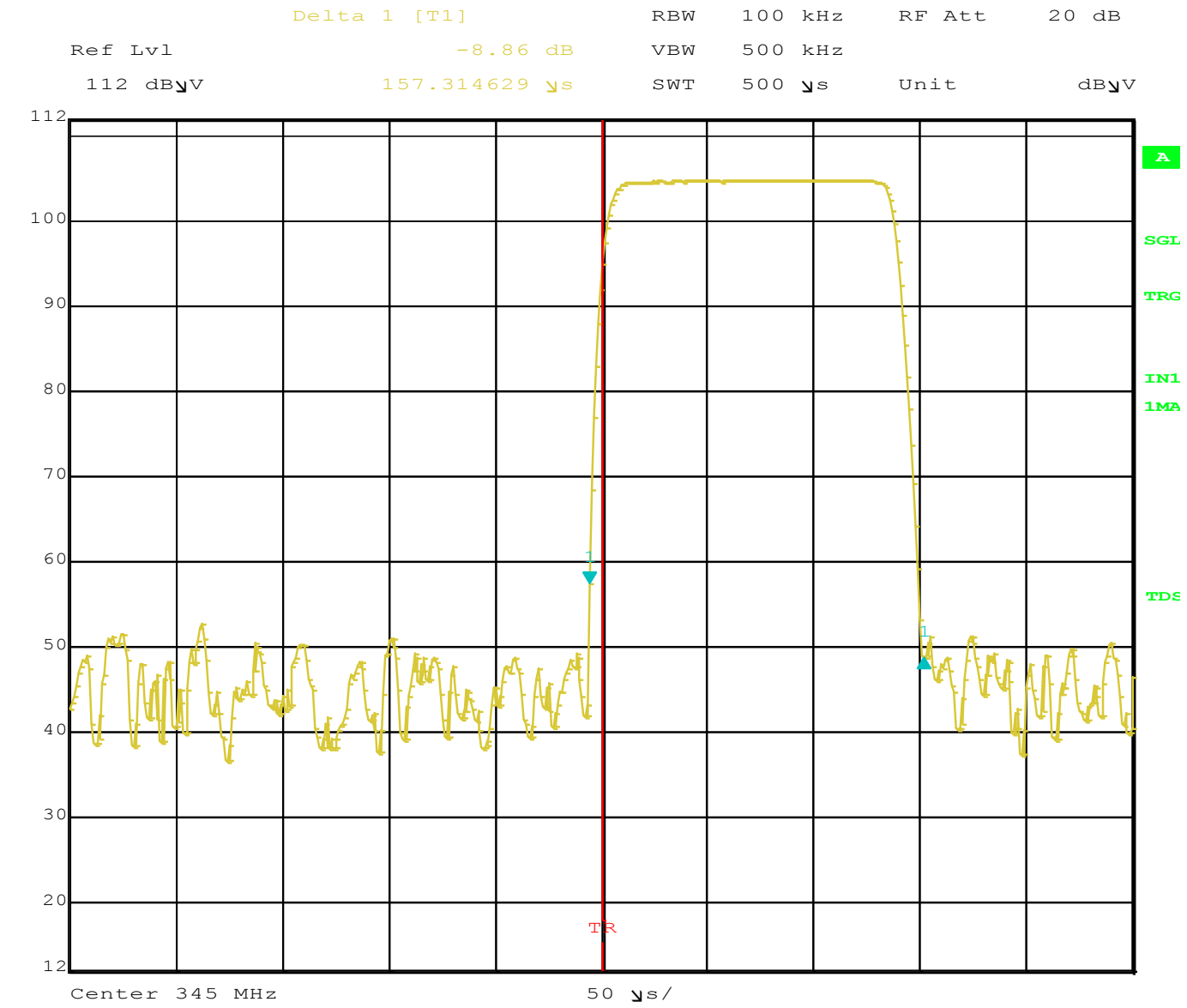
Company:	2GIG Technologies	Date:	9/2/2016
EUT:	Repeater	Lab:	P
Model:	2GIG-RPTR1-345	Tested By:	Matt H.
Duty Cycle Factor:	-19.91		

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
690.00	54.09	V	77.26	-23.17	Peak	1.10	45	
690.00	34.18	V	57.26	-23.08	Avg	1.10	45	
1035.00		V	73.98		Peak			No Emissions Found
1035.00		V	53.98		Avg			
1380.00		V	73.98		Peak			No Emissions Found
1380.00		V	53.98		Avg			
1725.00		V	77.26		Peak			No Emissions Found
1725.00		V	57.26		Avg			
2070.00		V	77.26		Peak			No Emissions Found
2070.00		V	57.26		Avg			
2415.00		V	77.26		Peak			No Emissions Found
2415.00		V	57.26		Avg			
2760.00		V	73.98		Peak			No Emissions Found
2760.00		V	53.98		Avg			
3105.00		V	77.26		Peak			No Emissions Found
3105.00		V	57.26		Avg			
3450.00		V	77.26		Peak			No Emissions Found
3450.00		V	57.26		Avg			

Test distance
3 meter

DUTY CYCLE PLOTS

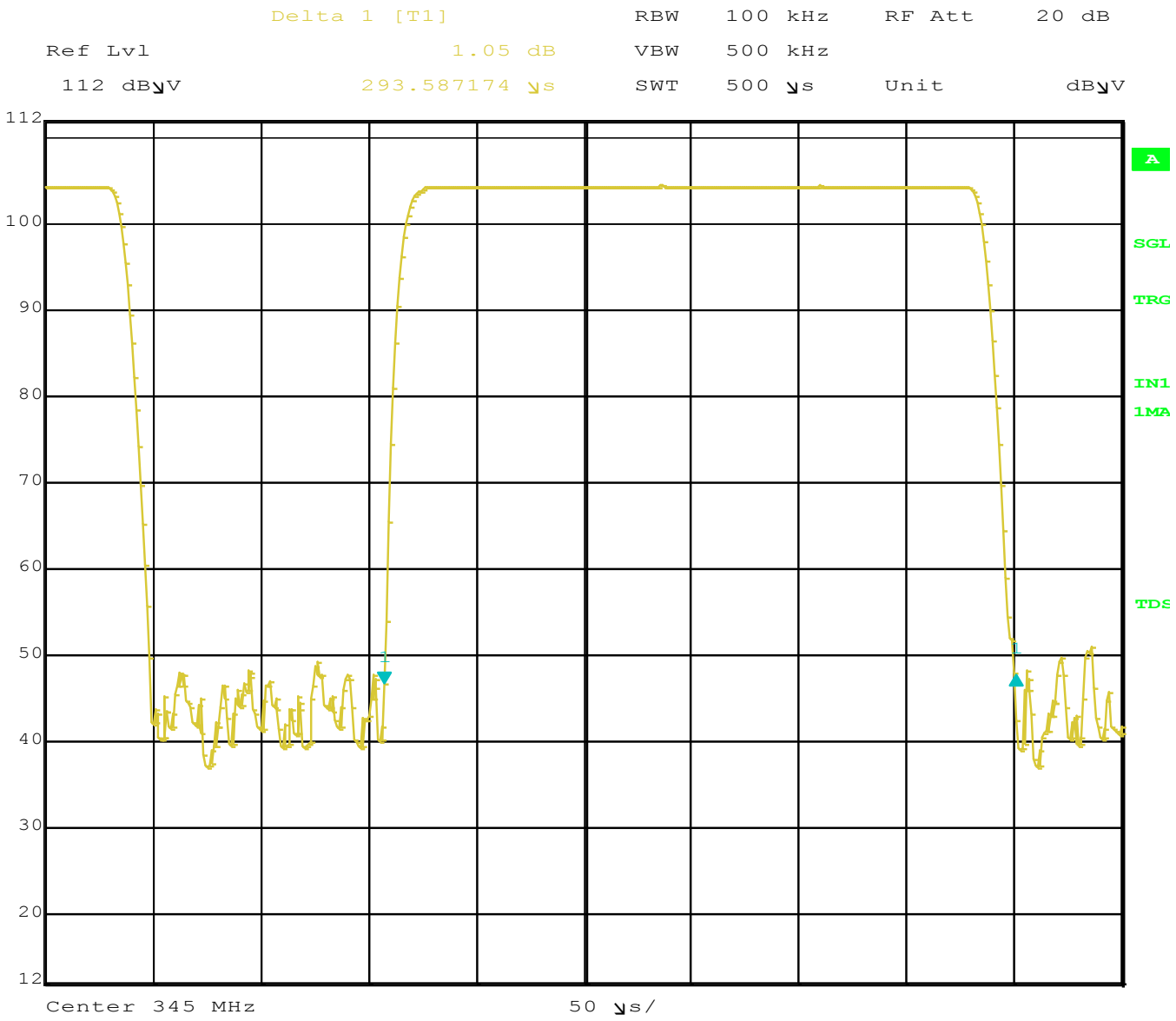
DUTY CYCLE



Title: 2GIG-RPTR-345

Time of Pulse Type 1 = 157.314629 µS

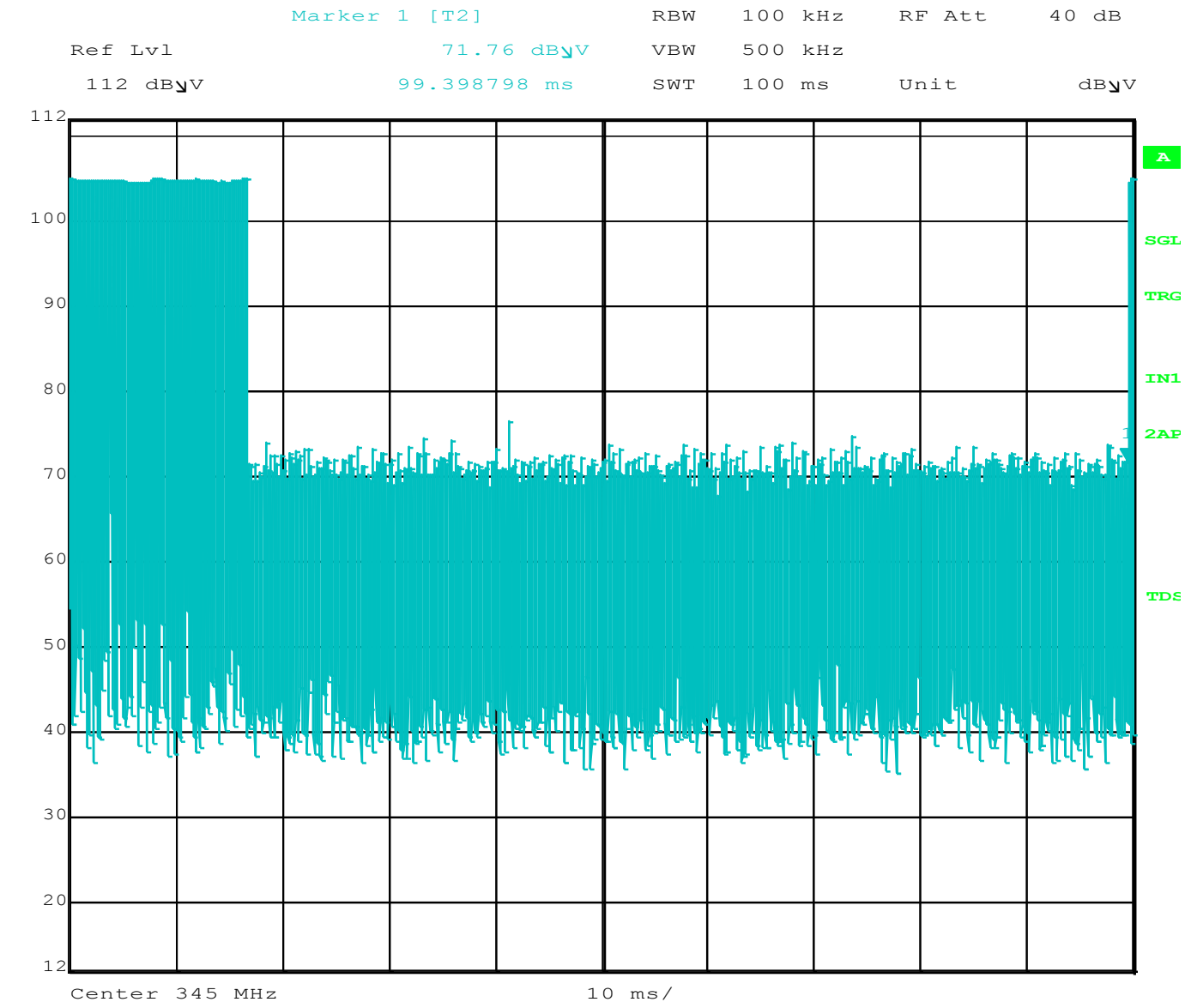
DUTY CYCLE



Date: 30.AUG.2016 12:34:06

Time of Pulse Type 2 = 293.587174 µS

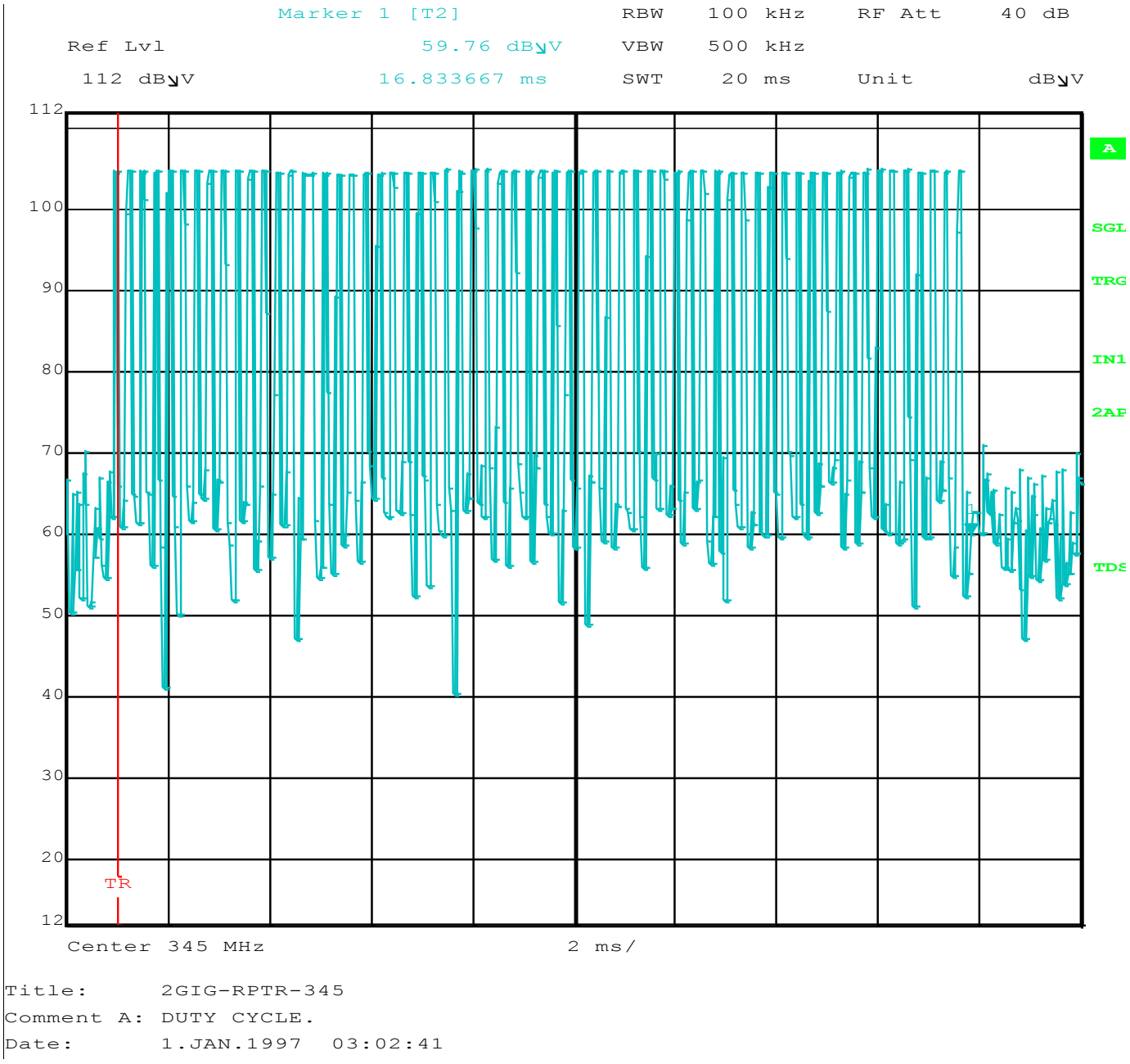
DUTY CYCLE



Title: 2GIG-RPTR-345

Total On Time in a 99.39ms Span = 10.047094 mS

Duty Cycle



Number of Pulses in Worst Case 100 mS = 63

Pulse Type 1 On Time = 157.314629 µS *62 = 9753.507 µS
Pulse Type 2 On Time = 293.587174 µS *1 = 293.5872 µS
9753.507 µS + 293.5872 µS = 10.047094 mS
Duty Cycle = 10.047094 mS / 99.39 mS = 0.1011
The Peak to Average Duty Cycle Correction = -19.91dB

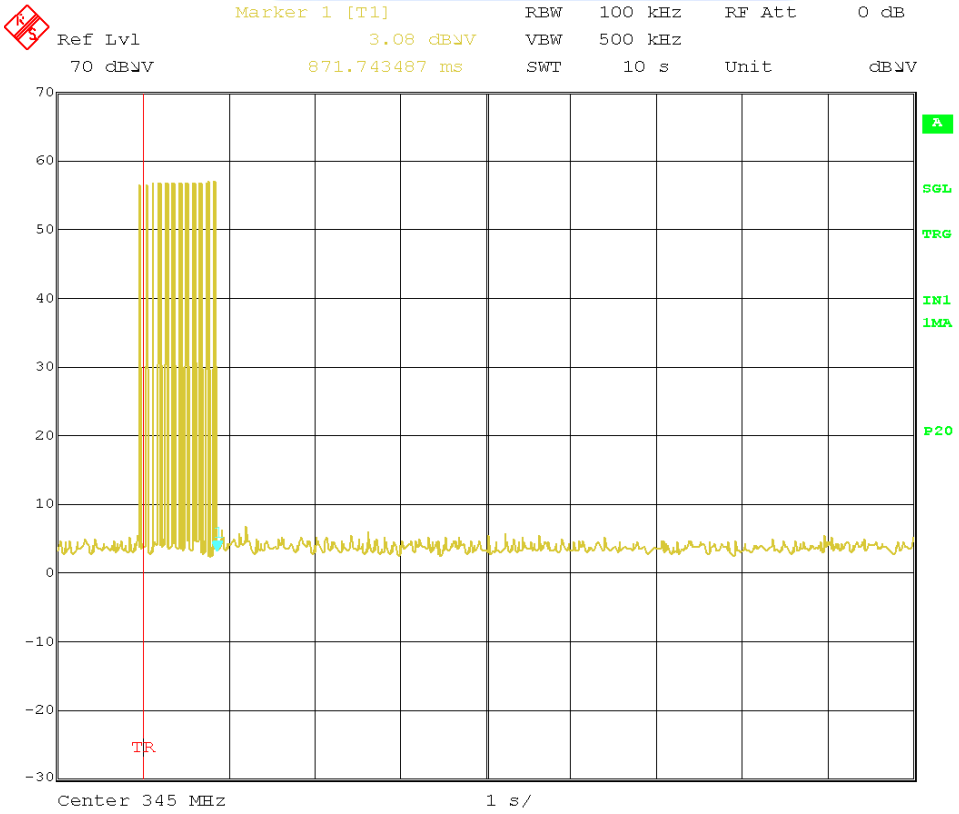
TRANSMIT TIMEOUT DATA

TRANSMIT TIMEOUT

FCC 15.231

Company:	2GIG Technologies	Date:	9/2/2016
EUT:	Repeater	Lab:	P
Model:	2GIG-RPTR1-345	Tested By:	Matt H.

Freq. (MHz)	Time (S)	Limit (S)	Margin	Comments
345.00	0.87	5.00	-4.13	

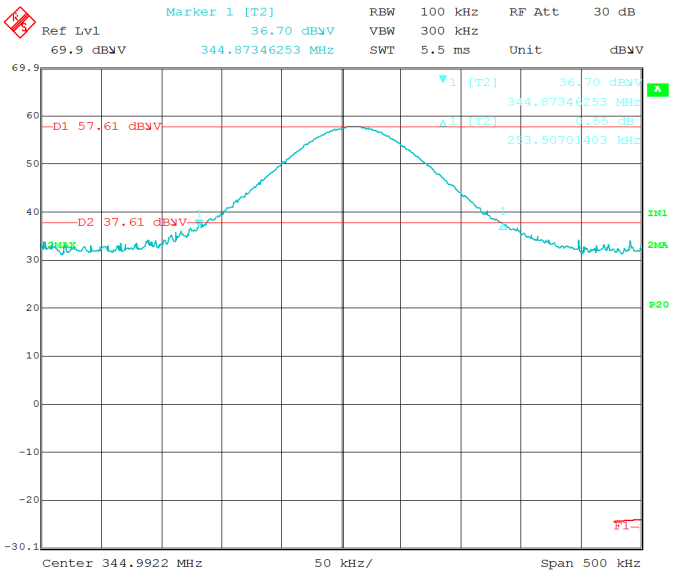
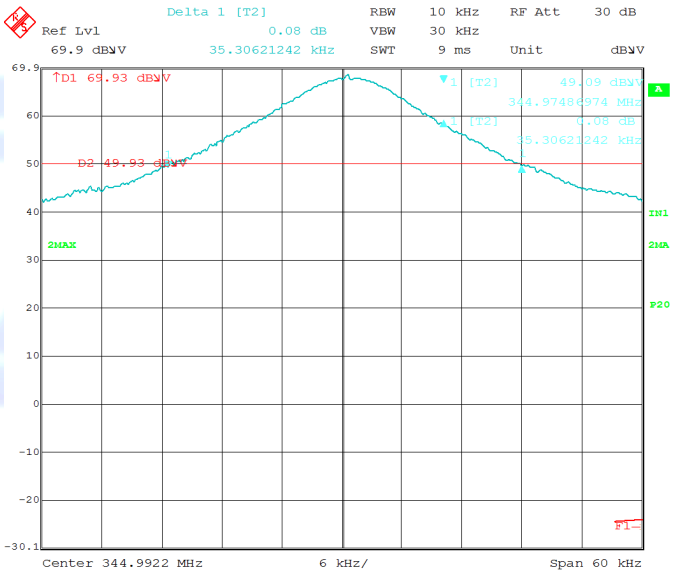


Title: 2GIG-RPTR1-345.
Comment A: TTO

15.231 -20 dB Bandwidth & RSS210 Occupied Bandwidth DATA

-20dB & 99% BANDWIDTHS

FCC 15.231

Company:	Nortek	Date:	10/10/2016
EUT:	Repeater	Lab:	P
Model:	2GIG-RPTR1-345	Tested By:	Torey O.

Freq. (MHz)	Time (kHz)	Limit (kHz)	Margin	Comments
345.00	344.87	8625.00	-8280.13	-20dB
345.00	35.31	N/A	N/A	99%