

**ELECTRO MAGNETIC TEST, INC.**1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

*FCC PART 15, SUBPART C
TEST REPORT*

*for**the*

HDMI DONGLE

MODEL: REV. E4

Prepared for

ALWAYS INNOVATING, INC.
1245 BRODERICK STREET
SAN FRANCISCO, CALIFORNIA 94115

Prepared by: 
GEORGE HSU

Approved by: 
KEVIN BOTHMANN

ELECTRO MAGNETIC TEST, INC.
1547 PLYMOUTH STREET
MOUNTAIN VIEW, CALIFORNIA 94043
(650) 965-4000

DATE: MARCH 5, 2013

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
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GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Electro Magnetic Test, Inc., which is an independent testing and consulting firm. The test report is based on testing performed Electro Magnetic Test, Inc. personnel according to the measurement procedure described in the test specification 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.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government.

The measurement data and conclusions contained in this test report are deemed satisfactory evidence of compliance with Industry Canada Interference-Causing Equipment Standard ICES-003, Issue 5, August 2012.

Electro Magnetic Test, Inc. is recognized by the following agencies for performing EMI/EMC testing:

COUNTRY	AGENCY	IDENTIFYING #
USA	Federal Communications Commission (FCC) (EMT's test site is recognized by the FCC)	Registration Number: 90576
USA, Canada, Taiwan, Australia/New Zealand, European Community	National Voluntary Lab Accreditation Program (NVLAP) (EMT is accredited by NVLAP. A copy of the NVLAP Scope Of Accreditation is available upon request.)	Lab Code: 200147-0
Canada	Industry Canada	File No.: IC 2804
Japan	Voluntary Control Council For Interference (VCCI)	A-0018
	Open Field Test Site "A"	-
	Mains Conducted Emissions Test Site "A"	-
	Telecom Conducted Emissions Test Site "A"	-
	3 Meter Semi-Anechoic Chamber Site "E"	-
	3 Meter Semi-Anechoic Chamber Site "E" (1GHz – 6GHz)	-
	Mains Conducted Emissions Test Site "E"	-
	Telecom Conducted Emissions Test Site "E"	-
Korea	Ministry of Information and Communication's Radio Research Laboratory (RRL) under the Asia Pacific Economic Cooperation (APEC) Mutual Recognition Arrangement (A copy of the Scope Of Accreditation is available upon request)	US0036
Taiwan	Bureau Of Standards, Metrology and Inspection (BSMI)	Reference Number: SL2-IN-E-1024
Australia / New Zealand	Australian Communications Authority (AUSTEL)	*

*These agencies do not issue an identifying number to test labs.

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GENERAL REPORT SUMMARY (CONTINUED)

Device Tested: HDMI Dongle
Model: Rev. E4
S/N: N/A

Product Description: The HDMI Dongle is a portable set-top box. The dongle should be plugged in the HDMI port of a TV. The USB port should only be connected to provide power to the unit. A DC-to-USB adapter should be used (not provided) or an available USB port of the TV can also be used. The device then offers an Android experience on the TV.

Modifications: The EUT was modified in order to meet the specifications listed in Appendix D.

Manufacturer: Always Innovating, Inc.
1245 Broderick Street
San Francisco, CA 94115

Test Date(s): January 16, 22, February 13, 27, 2013

Test Specifications: EMI requirements
Limits: FCC Title 47, Part 15 Subpart C
Test Procedure: ANSI C63.4: 2009

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	REMARKS	RESULTS
7.1	Radiated Emissions	Radiated	PASS
7.2	Conducted Emissions	Conducted	PASS
7.3	Occupied Bandwidth	Conducted	PASS
7.4	Carrier Frequency Separation	Conducted	PASS
7.5	Hopping Channel	Conducted	PASS
7.6	Dwell Time	Conducted	PASS
7.7	Maximum Peak Output Power	Conducted	PASS
7.8	Band Edge	Conducted	PASS
7.9	Conducted Spurious Emissions	Conducted	PASS
7.10	Antenna Requirement	N/A	N/A

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TECHNICAL DESCRIPTION OF THE EUT

Manufacturer:	Always Innovating, Inc.
Manufacturer Address:	1245 Broderick Street, San Francisco, CA, 94115
EUT Name:	HDMI Dongle
Model No:	REV. E4
Operation frequency:	2402 MHz to 2480 MHz
Channel Number:	79 (Bluetooth),
Modulation Technology:	Bluetooth: CW (1 Mbps), GFSK (1 Mbps), EDR2 (2 Mbps), EDR3 (3Mbps)
Antenna Type:	Internal Antenna
Antenna Gain:	
Serial No:	N/A
Power Supply Range:	5.0V DC
Power Supply:	5.0V DC
Power Cord:	Micro USB Cable
Maximum Output Power:	Bluetooth: -32.55 dBm


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Description of Channel:					
Bluetooth					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	27	2456	54	2431
1	2404	28	2458	55	2433
2	2406	29	2460	56	2435
3	2408	30	2462	57	2437
4	2410	31	2464	58	2439
5	2412	32	2466	59	2441
6	2414	33	2468	60	2443
7	2416	34	2470	61	2445
8	2418	35	2472	62	2447
9	2420	36	2474	63	2449
10	2422	37	2476	64	2451
11	2424	38	2478	65	2453
12	2426	39	2480	66	2455
13	2428	40	2403	67	2457
14	2430	41	2405	68	2459
15	2432	42	2407	69	2461
16	2434	43	2409	70	2463
17	2436	44	2411	71	2465
18	2438	45	2413	72	2467
19	2440	46	2415	73	2469
20	2442	47	2417	74	2471
21	2444	48	2419	75	2473
22	2446	49	2421	76	2475
23	2448	50	2423	77	2477
24	2450	51	2425	78	2479
25	2452	52	2427		
26	2454	53	2429		

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1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the HDMI Dongle Model: REV. E4. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2009. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined in FCC Title 47, Part 15, Subpart C.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Electro Magnetic Test, Inc., 1547 Plymouth Street, Mountain View, California, 94043.

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 measurement results in this report and the calibration of the test equipment are traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Always Innovating, Inc.

Gregoire Gentil Founder

Electro Magnetic Test, Inc.

George Hsu	Test Technician
Joe Vang	Test Technician
Mario Garcia	Test Technician
Kevin Bothmann	Lab Manager

2.4 Date Test Sample was Received

The test sample was received on January 15, 2013.

2.5 Disposition of the Test Sample

The test sample has not yet been returned to Always Innovating, Inc..

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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
CISPR	International Special Committee On Radio Interference
FCC	Federal Communications Commission

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3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
FCC Title 47, Part 15, Subpart C	FCC Rules - Radio frequency devices (including digital devices).
ANSI C63.4 2009	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz.
FCC Public Notice DA 00-705	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

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4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – EMI

The HDMI Dongle was connected to an LCD TV and USB power adapter through the HDMI Dongle's HDMI Connector, and Micro USB ports, respectively. The remote was placed on the edge of the table opposite the LCD TV. The unit was started and was running Android 4.x. The LCD TV displayed the output of the EUT, continuously. The Dongle was transmitting on the modes as noted on the data sheets.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The cables were moved to maximize the emissions. The final conducted as well as radiated data was taken in this mode of operation. All initial investigations were performed with the EMI receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the photographs in Appendix B.

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4.1.1 Cable Construction and Termination

Cables #1

This is a 6 foot foil shielded USB cable connecting the EUT to a USB power supply. It has a micro USB metallic connector at the EUT end, and a “Type A” metallic USB connector at the USB power supply end. The shield of the cable was grounded to the chassis via the connectors.

Cable #2

This is a 4.5 ft. unshielded power cable connecting the LCD TV to its AC power supply. It has a 1/4 inch round power connector on the TV end and is hardwired into the AC power supply.

Cable #3

This is a 6 foot unshielded power cable connecting the LCD TV’s AC power supply to the AC outlet.

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

EQUIPMENT TYPE	MANUFACTURER	MODEL	SERIAL NUMBER	FCC ID
HDMI DONGLE (EUT)	ALWAYS INNOVATING, INC.	REV E4	N/A	N/A
REMOTE	ALWAYS INNOVATING, INC.	REV E5	N/A	N/A
LCD TV	LG	M2342D	205MXQA3W796	BEJM2352D
TV POWER ADAPTER	LG	P5AB-L101A	LC#LT62710401000 6(H)	N/A
USB POWER ADAPTER	SAMSUNG	ETAOU8OJBE	SC2BC23FS1A-E	N/A


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5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
Spectrum Analyzer	Hewlett Packard	8566B	3013A07296	July 31, 2012	1 Year
RF Preselector	Hewlett Packard	85685A	3010A01157	July 31, 2012	1 Year
Quasi-Peak Adapter	Hewlett Packard	85650	2521A00584	July 31, 2012	1 Year
Radiated EMI Software	Sector Design	N/A	Ver.1.4.6	N/A	N/A
Conducted EMI Software	Hewlett Packard	85869PC	Ver. A.02.03	N/A	N/A
Preamplifier	Com Power	PA-102	1482	March 2, 2013	1 Year
RF Attenuator	Mini-Circuits	CAT-10	Asset #1000	December 8, 2012	1 Year
LISN	Com Power	LI-200	12012	September 21, 2012	1 Year
LISN	Com Power	LI-200	12214	September 21, 2012	1 Year
LISN	Com Power	LI-200	1767	September 21, 2012	1 Year
LISN	Com Power	LI-200	1768	September 21, 2012	1 Year
Biconical Antenna	Com Power	AB-100	01557	June 16, 2012	1 Year
Log Periodic Antenna	Com Power	AL-100	16001	June 3, 2012	1 Year
Horn Antenna	Com Power	AHA-118	711054	N/A	N/A
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Dell, Inc.	DHS	DNSV641	N/A	N/A
Printer	Hewlett Packard	C8124A	CN39B2234T	N/A	N/A
Plotter	Hewlett Packard	7470A	2308A96499	N/A	N/A


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5.2 EMI Test Equipment (Continued)

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
EMI Receiver	Rohde & Schwarz	ESU40	100127	December 22, 2012	1 Year
EMI Test Software	Rohde & Schwarz	EMC32	V8.40.0	N/A	N/A
Passive Loop Antenna (9 KHz – 30 MHz)	ETS-Lindgren	6512	00128210	October 28, 2011	2 Year
BiConiLog Antenna (30 MHz – 1 GHz)	ETS-Lindgren	3142D	00102183	June 21, 2012	1 Year
Horn Antenna (1 GHz – 18 GHz)	ETS-Lindgren	3117	00109294	June 16, 2012	1 Year
Preamplifier (1 GHz – 18 GHz)	Rohde & Schwarz	TS-PR18	100056	October 31, 2012	1 Year
Horn Antenna (18 GHz – 26.5 GHz)	ETS-Lindgren	3160-09	102646	June 20, 2012	1 Year
Preamplifier (18 GHz – 26.5 GHz)	Rohde & Schwarz	TS-PR26	100034	June 20, 2012	1 Year
Horn Antenna (26.5 GHz – 40 GHz)	ETS-Lindgren	3160-10	109153	June 21, 2012	1 Year
Preamplifier (26.5 GHz – 40 GHz)	Rohde & Schwarz	TS-PR40	100030	June 20, 2012	1 Year
Antenna Mast	ETS-Lindgren	2175	00095727	N/A	N/A
Turntable	ETS-Lindgren	2187-3.0	00118231	N/A	N/A
Computer	Acer	Aspire 8930	85100050123	N/A	N/A
Multi-Function Controller	ETS-Lindgren	2090	00102270	N/A	N/A

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6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to the table below and section 7 of this report for the details of which sites were used for testing. All sites are located at 1547 Plymouth Street, Mountain View, California 94043.

Site Used For Test	Site Description
	Open Field Test Site "A"
X	Mains Conducted Emissions Test Site "A"
	Telecom Conducted Emissions Test Site "A"
X	3 Meter Semi-Anechoic Chamber Site "E"
	Mains Conducted Emissions Test Site "E"
	Telecom Conducted Emissions Test Site "E"

6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

6.3 Facility Environmental Characteristics

All tests were performed in a climate controlled building. The temperature was 22° C, humidity 45%, and barometric pressure 102.6 kPa.


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7. TEST PROCEDURES

7.1 Radiated Emissions Test – Semi-Anechoic Chamber

7.1.1 Limit (FCC PART 15 Section 15.209(a)(1))

Frequency of Emission (MHz)	Field Strength		Measurement Distance (Meters)
	$\mu\text{V/m}$	$\text{dB}\mu\text{V/m}$	
0.009-0.49	2400/F(kHz)		300
0.49-1.705	24000/F(kHz)		30
1.705-30	30		30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

7.1.2 Test Procedure

The Rohde & Schwarz ESU40 EMI receiver was used as a measuring meter while under software control by the Rohde & Schwarz EMC32 software. To increase the sensitivity of the instrument, the built in preamplifier was used from 9 KHz to 1 GHz and an external preamplifier was used from 1 GHz to 26.5 GHz. The EMI receiver was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the EMI receiver records the highest measured reading over all the sweeps. The built in quasi-peak or average detector was used only for those readings which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was 100 kHz from 9 kHz to 1 GHz and 1 MHz from 1 GHz to 26.5 GHz.

The Loop Antenna, Broadband BiConiLog and horn antennas were used as transducers during the measurement. The Loop antenna was used from 9 KHz to 30 MHz, the BiConiLog antenna was used from 30 MHz to 1000 MHz and horn antennas were used from 1GHz – 26.5 GHz. The frequency spans were wide (9 kHz to 150 kHz, 150 kHz to 30 MHz, 30 MHz to 88 MHz, 88 MHz to 216 MHz, 216 to 300 MHz, 300 MHz to 1 GHz, 1 GHz to 18 GHz and 18 GHz to 26.5 GHz) during preliminary investigations. The final data was taken with a frequency span of 1 MHz. Furthermore, the frequency span was reduced during the preliminary investigations as deemed necessary.

The 5 meter semi-anechoic chamber of Electro Magnetic Test, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 2009. 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)

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configuration of the EUT. The EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The presence of non EUT signals was verified by turning the EUT off. In case a non EUT signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the other signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance from 9 kHz to 26.5 GHz. to obtain final test data.

Calculation Of Radiated Emission Test Data:

Amplitude - Gain + Antenna Factor + Cable Loss = Corrected Amplitude

Corrected Amplitude - Limit = Margin


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7.2 Conducted Emissions Test – Mains Ports

7.2.1 Limit (FCC PART 15 Section 15.207(a))

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

*Note: Decreases with the logarithm of the frequency

7.2.2 Test Procedure

The HP 8566B spectrum analyzer was used as a measuring meter along with the HP 85650A quasi-peak adapter. The data was collected with the spectrum analyzer in the peak detect mode with the "Max Hold" feature activated. The quasi-peak detector was used only where indicated in the data sheets. A 10 dB attenuation pad was used for the protection of the spectrum analyzer input stage, and the spectrum analyzer offset was adjusted accordingly to read the actual data measured. The LISN output was read by the HP 8566B spectrum analyzer. The output of the second LISN was terminated by a 50 ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4: 2009. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable and peripheral placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the spectrum analyzer span adjusted to 1 MHz.

The final data was collected under program control by the HP 85869PC software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave.

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7.3 Occupied Bandwidth

7.3.1 Limit (FCC PART 15 Section 15.247(a)(1))

Frequency hopping systems shall have hopping channel frequencies separated by a minimum of 25 KHz or 20db bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW

7.3.2 Test Procedure

Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator, set the Spectrum Analyzer as below:

RBW: $\geq 1\%$ of the 20 dB bandwidth

VBW: $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

Span: 2-3 times of 20dB Bandwidth

- (1) When the trace is completed, find the trace peak value and place the spectrum analyzer marker on this peak.
- (2) Now measure the 20db bandwidth using Xdb down or find the peak, use delta marker to measure 20db down on one side from the peak and do the same for the other side. Use whichever method can encompass the full 20db bandwidth.

7.3.3 Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.

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7.4 Carrier Frequency Separation

7.4.1 Limit (FCC Part 15 Section 15.247(a)(1))

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 KHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW

Limit
25 khz or 2/3 of 20 dB bandwidth whichever is greater, if output power is no greater than 125 Mw

7.4.2 Test Procedure

Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator, set the Spectrum Analyzer as below:

RBW $\geq$ 1% of the span

VBW $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

Span: Enough to See Adjacent Channels

- (1) When the trace is completed use the marker delta function to find the seperatinon between the two peaks of adjacent channels.

7.4.3 Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.

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7.5 Hopping Channel

7.5.1 Limit (FCC PART 15 Section 15.247(a)(1)(iii))

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Limit
Hopping Channels $\geq$ 15 Channels

7.5.2 Test Procedure

(1) Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator, set the Spectrum Analyzer as below:

RBW $\geq$ 1% of the span

VBW: $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

Span: Enough see all the channels (plot may be broken into sections)

- (1) Set frequency span to encompass all the channels, if the number of channels on the plot are unclear, the plot can be broken up into multiple segments
- (2) Set EUT to frequency hopping
- (3) Let the trace complete for all channels

7.5.3 Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.

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7.6 Dwell Time**7.6.1 Limit (FCC PART 15 Section 15.247(a)(1)(iii))**

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Limit
Average occupancy time $\leq$ 0.4 seconds within period of 0.4 Seconds multiplied 79

7.6.2 Test Procedure

(1) Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator, set the Spectrum Analyzer as below:

RBW: 1 MHz

VBW: $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

- (1) Change center frequency to frequency being measured
- (2) Change frequency span to zero.
- (3) Measure time duration of one pulse
- (4) Repeat test if value varies with different modes of operation

7.6.3 Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.

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7.7 Maximum Peak Output Power

7.7.1 Limit (FCC PART 15 Section 15.247(b)(1))

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Limit
Maximum Peak Output Power (Frequency Hopping) $\leq$ 1 Watt or 30 dBm

7.7.2 Test Procedure

Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator and set the Spectrum Analyzer as below:

RBW: $\geq$ 20 dB bandwidth

VBW: $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

Span: About 5 times the 20dB Bandwidth

(1) Find Peak, take measurement

For systems with larger bandwidth, channel power may be used.

7.7.3 Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.


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7.8 Bandedge
7.8.1 Limit (FCC PART 15 Section 15.247(d))

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Limit
20db Below Fundamental For Frequency Hopping

7.8.2 Test Procedure

(1) Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator, set the Spectrum Analyzer as below:

RBW: $\geq 1\%$ of the span

VBW: $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

Span: Enough to Capture Fundamental and Emissions Outside of the Authorized Band

- (1) Set marker to peak
- (2) Set display line to 20db below the marker
- (3) Place marker at appropriate band edge.
- (4) Place markers at highest emissions beyond the band edges.



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7.8.3

Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.


ELECTRO MAGNETIC TEST, INC.

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7.9 Conducted Spurious Emissions

7.9.1 Limit (FCC PART 15 Section 15.247(d))

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Limit
20db Below Fundamental For Frequency Hopping

7.9.2 Test Procedure

Connect the antenna port of the EUT to the spectrum analyzer via an Attenuator, set the Spectrum Analyzer as below:

RBW: 100 KHz

VBW: $\geq$ RBW

Detector: Peak

Trace Mode: Max Hold

Span: From Lowest Frequency of EUT up to the 10th harmonic of the highest, plot may be broken up.

- (1) Mark fundamental
- (2) Set marker to peak
- (3) Set display line to appropriate limit
- (4) Place markers at 3 highest readings.



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7.9.3

Test Result

The EUT meets the requirements. Please see the datasheets in Appendix A for the measurement results.

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7.10 Antenna Requirement

7.10.1 Requirement (FCC PART 15 SECTION 15.203,15.247(b)(4))

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.10.2 Test Result

The antenna is integrated on the main PCB with no consideration for replacement on the HDMI Dongle.



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8. CONCLUSIONS / COMPLIANCE STATEMENT

Based upon the results contained in this report, Electro Magnetic Test, Inc. has determined that the HDMI Dongle, Model: REV. E4 meets all of the specification limits defined in FCC Title 47, Part 15, Subpart C.



ELECTRO MAGNETIC TEST, INC.

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APPENDIX A

RADIATED AND CONDUCTION DATA SHEETS

**ELECTRO MAGNETIC TEST, INC.**1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Radiated Emissions

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/22/13
Test Engineer:	George Hsu	Measurement:	9 KHz to 30 MHz

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators were attenuated more than 20 dB below the permissible value


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EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	30 MHz to 1 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dB μ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
30.09	35.9	133	V	292	16.7	4.1	40
42.39	42.6	131	V	257	10.4	-2.6	40
295.05	42.3	100	H	180	15.5	3.7	46
367.98	42.9	133	V	0	17.3	3.1	46
519.75	42.5	100	V	167	20.8	3.5	46
735.84	46	124	V	180	24.7	0	46

Quasipeak Measurements:

Frequency (MHz)	Quasipeak (dB μ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
30.09	30.4	133	V	292	16.7	9.6	40
42.39	36.1	131	V	257	10.4	3.9	40
295.05	38.1	100	H	180	15.5	7.9	46
367.98	35.5	133	V	0	17.3	10.5	46
519.75	38.7	100	V	167	20.8	7.3	46
735.84	38.8	124	V	180	24.7	7.2	46


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EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	1 GHz to 18 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
6981.735	49.9	100.0	H	160.9	10.5	24.1	74
6982.371	54.8	161.4	H	161.1	10.5	19.2	74
7427.584	47.7	100.0	V	149.1	11.9	26.3	74
9556.410	48.3	100.0	H	267.7	14.9	25.7	74
9511.611	48.3	100.0	V	200.5	14.8	25.7	74
12317.000	52.4	100.0	H	174.2	20.2	21.6	74
14237.000	54.2	100.0	H	39.8	21.6	19.8	74
11264.000	51.1	100.0	V	163.8	18.2	22.9	74
15365.000	55.3	100.0	V	169.2	23.2	18.7	74

Average Measurements:

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
6981.735	43.5	100.0	H	160.9	10.5	10.49	54
6982.371	45.4	161.4	H	161.1	10.5	8.62	54
7427.584	34.4	100.0	V	149.1	11.9	19.62	54
9556.410	35	100.0	H	267.7	14.9	19.03	54
9511.611	34.9	100.0	V	200.5	14.8	19.15	54
12317.000	39.7	100.0	H	174.2	20.2	14.34	54
14237.000	40.6	100.0	H	39.8	21.6	13.37	54
11264.000	37.6	100.0	V	163.8	18.2	16.44	54
15365.000	41.8	100.0	V	169.2	23.2	12.18	54

Bluetooth Channel 0, 2402 MHz, 1 Mbps


ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	1 GHz to 18 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7434.986667	48.3	110	V	123	12.3	25.7	74
8543.066667	47.9	100	V	1	13.6	26.1	74
9946.026667	48.5	100	V	100	16.2	25.5	74
12062.37333	53.6	100	V	89	20.6	20.4	74
12837.06667	52.9	195	V	292	21.3	21.1	74
15763.57333	57.8	100	V	67	26.3	16.2	74
16537.25333	57.6	158	H	143	25.6	16.4	74

Average Measurements:

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7434.986667	34.7	110	V	123	12.3	19.3	54
8543.066667	34.6	100	V	1	13.6	19.4	54
9946.026667	35.5	100	V	100	16.2	18.5	54
12062.37333	39.9	100	V	89	20.6	14.1	54
12837.06667	40	195	V	292	21.3	14	54
15763.57333	44.7	100	V	67	26.3	9.3	54
16537.25333	44.1	158	H	143	25.6	9.9	54

Bluetooth Channel 0, 2402 MHz, 3 Mbps


ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	1 GHz to 18 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1370.192	37.2	100	H	142.6	-3.4	36.8	74
7415.733333	48.4	394	V	316	12.3	25.6	74
7424.853333	48.4	223	H	331	12.3	25.6	74
11913.41333	53.2	167	V	307	20.5	20.8	74
11941.78667	53.9	320	H	67	20.5	20.1	74
16090.37333	57.7	286	H	78	25.8	16.3	74
16099.49333	57.6	146	V	253	25.8	16.4	74

Average Measurements

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1370.192	24.9	100	H	142.6	-3.4	12.22	54
7415.733333	35.1	394	V	316	12.3	18.9	54
7424.853333	35	223	H	331	12.3	19	54
11913.41333	40.3	167	V	307	20.5	13.7	54
11941.78667	40.2	320	H	67	20.5	13.8	54
16090.37333	44.2	286	H	78	25.8	9.8	54
16099.49333	44.5	146	V	253	25.8	9.5	54

Bluetooth Channel 19, 2440 MHz, 1 Mbps


ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	1 GHz to 18 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7406.106667	48.3	385	H	90	12.3	25.7	74
7407.12	48.3	400	V	330	12.3	25.7	74
12981.97333	54.5	389	V	117	21.5	19.5	74
12986.53333	53.3	141	H	102	21.5	20.7	74
15743.81333	57.9	149	H	230	26.2	16.1	74
15801.06667	57.8	200	V	336	25.9	16.2	74

Average Measurements:

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7406.106667	35.2	385	H	90	12.3	18.8	54
7407.12	35.1	400	V	330	12.3	18.9	54
12981.97333	40.4	389	V	117	21.5	13.6	54
12986.53333	40.3	141	H	102	21.5	13.7	54
15743.81333	44.5	149	H	230	26.2	9.5	54
15801.06667	44.6	200	V	336	25.9	9.4	54

Bluetooth Channel 19, 2440 MHz, 3 Mbps


ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	1 GHz to 18 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7188.24	47.3	300	H	43	12	26.7	74
7196.853333	48.6	400	V	119	12.1	25.4	74
9797.573333	48.9	221	V	325	15.8	25.1	74
9809.733333	49	200	H	283	15.8	25	74
13938.56	54.6	371	H	85	22.1	19.4	74
13959.84	54.7	211	V	299	22.3	19.3	74
15738.24	57.7	200	V	141	26.1	16.3	74
15762.05333	58.7	200	H	154	26.3	15.3	74

Average Measurements:

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7188.24	34	300	H	43	12	20	54
7196.853333	34.1	400	V	119	12.1	19.9	54
9797.573333	35.4	221	V	325	15.8	18.6	54
9809.733333	35.3	200	H	283	15.8	18.7	54
13938.56	41.3	371	H	85	22.1	12.7	54
13959.84	41.2	211	V	299	22.3	12.8	54
15738.24	44.4	200	V	141	26.1	9.6	54
15762.05333	44.8	200	H	154	26.3	9.2	54

Bluetooth Channel 39, 2480 MHz, 1 Mbps


ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	1 GHz to 18 GHz

Peak Measurements:

Frequency (MHz)	MaxPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7419.28	48.6	324	H	193	12.3	25.4	74
7437.013333	47.6	353	V	0	12.3	26.4	74
9767.68	48.3	119	H	204	15.7	25.7	74
9797.066667	48.6	300	V	246	15.8	25.4	74
13561.09333	53.8	363	V	88	21.8	20.2	74
13571.22667	53.5	282	H	170	21.8	20.5	74
15752.42667	57.9	271	V	5	26.3	16.1	74
15786.88	58.5	400	H	0	26.1	15.5	74

Average Measurements:

Frequency (MHz)	Average (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
7419.28	35.1	324	H	193	12.3	18.9	54
7437.013333	34.8	353	V	0	12.3	19.2	54
9767.68	35.4	119	H	204	15.7	18.6	54
9797.066667	35.4	300	V	246	15.8	18.6	54
13561.09333	40.3	363	V	88	21.8	13.7	54
13571.22667	40.3	282	H	170	21.8	13.7	54
15752.42667	44.6	271	V	5	26.3	9.4	54
15786.88	44.7	400	H	0	26.1	9.3	54

Bluetooth Channel 39, 2480 MHz, 3 Mbps

**ELECTRO MAGNETIC TEST, INC.**1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

EUT:	HDMI Dongle	Model Name:	REV. E4
Test Mode:	Bluetooth	Test Date:	1/16/13
Test Engineer:	George Hsu	Measurement:	18 GHz to 26.5 GHz

The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators were attenuated more than 20 dB below the permissible value



ELECTRO MAGNETIC TEST, INC.

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Conducted Emissions

hp

ELECTRO MAGNETIC TEST, INC.

26 Feb 2013 18:21:09

EMISSION LEVEL

dBuV

PEAK

AVERAGE

100

80

60

40

20

CISPR 22 CLASS B CONDUCTED
ALWAYS INNOVATING
HDMI DONGLE
M/N: REV E4
BLACK LEAD 128U

CLASS B QP

CLASS B AVG

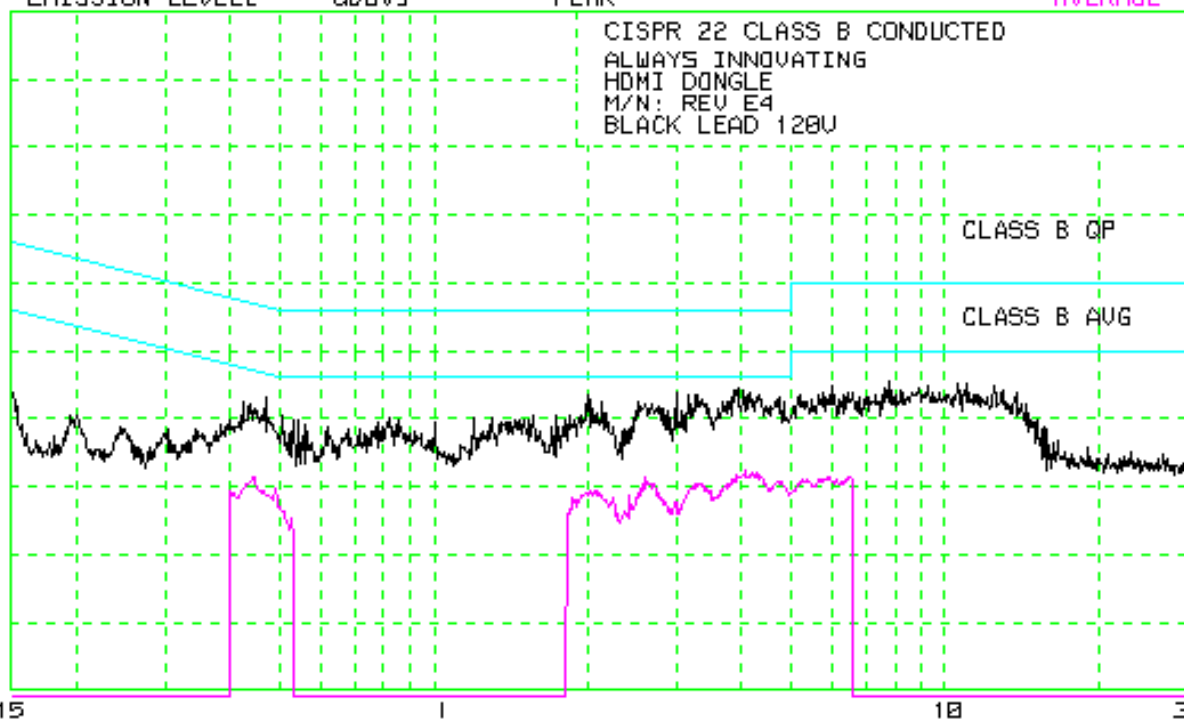
.15

1

10

30

FREQUENCY [MHz]



1. CONDUCTED WITH PRESELECTOR

1.2 CISPR 22 CLASS B CONDUCTED

=====

58 highest Peaks above -50 dB of Limit Line #2

peak criteria = .1 dB

PEAK#	FREQ (MHz)	(dBUV)	DELTA
1	3.93	44.4	-1.6
2	3.868	44	-2.0
3	4.036	44	-2.0
4	2.985	43.9	-2.1
5	4.166	43.9	-2.1
6	3.248	43.6	-2.4
7	4.122	43.6	-2.4
8	2.007	43.4	-2.6
9	3.13	43.3	-2.7
10	3.283	43.3	-2.7
11	4.346	43.3	-2.7
12	3.807	43.1	-2.9
13	4.277	43.1	-2.9
14	4.755	43.1	-2.9
15	4.705	42.9	-3.1
16	2.028	42.8	-3.2
17	3.353	42.7	-3.3
18	.4706	43.1	-3.4
19	2.52	42.6	-3.4
20	4.21	42.6	-3.4
21	4.831	42.6	-3.4
22	2.138	42.4	-3.6
23	3.688	42.4	-3.6
24	3.747	42.3	-3.7
25	3.163	42.2	-3.8
26	1.986	42.1	-3.9
27	2.601	42.1	-3.9
28	2.656	42	-4.0
29	4.462	41.9	-4.1
30	2.742	41.8	-4.2
31	4.558	41.7	-4.3
32	4.51	41.6	-4.4
33	2.56	41.5	-4.5
34	2.801	41.5	-4.5
35	7.779	45.5	-4.5
36	3.461	41.4	-4.6
37	.4233	42.6	-4.7
38	2.05	41.3	-4.7
39	3.214	41.3	-4.7
40	3.611	41.3	-4.7
41	.4393	42.2	-4.8
42	2.861	41.2	-4.8
43	10.57	45.1	-4.9
44	2.48	41	-5.0
45	3.065	41	-5.0
46	10.97	45	-5.0
47	2.184	40.9	-5.1
48	6.002	44.9	-5.1
49	12.46	44.8	-5.2
50	2.082	40.7	-5.3
51	9.215	44.7	-5.3
52	.4346	41.8	-5.3
53	.4463	41.5	-5.4
54	1.944	40.6	-5.4
55	.5068	40.5	-5.5
56	1.565	40.5	-5.5
57	3.097	40.5	-5.5
58	1.844	40.4	-5.6

1. CONDUCTED WITH PRESELECTOR

1.2 CISPR 22 CLASS B CONDUCTED

=====

Avg Peaks above -50 dB of Limit Line #2

peak criteria = .1 dB

PEAK#	FREQ (MHz)	(dBUV)	DELTA
1	4.057	32.3	-13.7
2	4.21	32	-14.0
3	4.277	32	-14.0
4	3.909	31.6	-14.4
5	2.601	31.3	-14.7
6	4.369	31.2	-14.8
7	4.68	30.8	-15.2
8	4.806	30.7	-15.3
9	.4463	31.5	-15.4
10	.4416	31.5	-15.5
11	3.266	30.5	-15.5
12	3.318	30.5	-15.5
13	4.462	30.5	-15.5
14	2.56	30.4	-15.6
15	2.642	30.4	-15.6
16	2.699	30.3	-15.7
17	3.231	30.3	-15.7
18	3.747	30.2	-15.8
19	3.425	29.7	-16.3
20	.4909	29.6	-16.5
21	2.028	29.4	-16.6
22	3.649	29.4	-16.6
23	2.071	29.3	-16.7
24	3.461	29.3	-16.7
25	2.506	29.1	-16.9
26	2.742	29.1	-16.9
27	1.975	29	-17.0
28	.4607	29.5	-17.1
29	2.116	28.9	-17.1
30	3.592	28.8	-17.2
31	.4681	29.2	-17.3
32	2.415	28.6	-17.4
33	1.873	28.5	-17.5
34	2.231	28.5	-17.5
35	3.517	28.4	-17.6
36	2.172	28.1	-17.9
37	1.903	28	-18.0
38	2.953	27.6	-18.4
39	2.846	27.5	-18.5
40	.4015	29.2	-18.6
41	2.441	27.3	-18.7
42	5.97	31.3	-18.7
43	6.498	31.3	-18.7
44	.4057	29	-18.7
45	5.753	31.1	-18.9
46	5.258	31	-19.0
47	6.131	31	-19.0
48	6.362	31	-19.0
49	5.633	30.9	-19.1
50	3.016	26.7	-19.3
51	2.907	26.6	-19.4
52	6.229	30.6	-19.4
53	5.148	30.5	-19.5
54	2.352	26.4	-19.6
55	2.278	26.1	-19.9
56	2.327	25.7	-20.3
57	5.04	29.5	-20.5
58	.5287	25.2	-20.8

hp

ELECTRO MAGNETIC TEST, INC.

26 Feb 2013 18:19:22

EMISSION LEVEL

dBuV

PEAK

CISPR 22 CLASS B CONDUCTED
ALWAYS INNOVATING
HDMI DONGLE
M/N: REV E4
WHITE LEAD 128U

100

80

60

40

20

CLASS B QP

CLASS B AVG

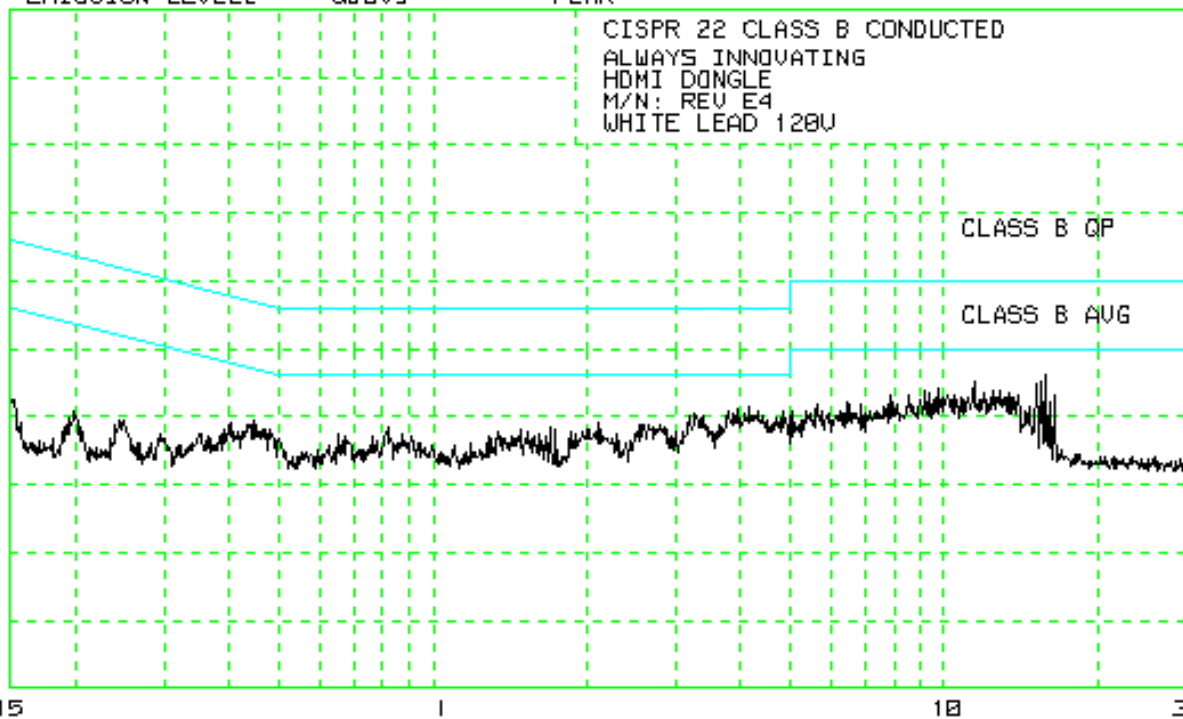
.15

1

10

30

FREQUENCY [MHz]



1. CONDUCTED WITH PRESELECTOR

1.2 CISPR 22 CLASS B CONDUCTED

=====

58 highest Peaks above -50 dB of Limit Line #2

peak criteria = .1 dB

PEAK#	FREQ (MHz)	(dBUV)	DELTA
1	15.73	46	-4.0
2	4.166	41.4	-4.6
3	3.93	41.2	-4.8
4	11.45	45	-5.0
5	15.4	45	-5.0
6	3.767	40.9	-5.1
7	4.857	40.8	-5.2
8	4.323	40.7	-5.3
9	15.08	44.7	-5.3
10	4.078	40.6	-5.4
11	3.248	40.5	-5.5
12	3.868	40.5	-5.5
13	3.163	40.2	-5.8
14	4.21	40.2	-5.8
15	3.389	40.1	-5.9
16	4.255	40.1	-5.9
17	4.392	40.1	-5.9
18	9.768	44	-6.0
19	3.993	39.8	-6.2
20	4.122	39.8	-6.2
21	4.68	39.8	-6.2
22	3.353	39.7	-6.3
23	4.78	39.7	-6.3
24	9.167	43.7	-6.3
25	12.46	43.7	-6.3
26	12.86	43.7	-6.3
27	9.313	43.5	-6.5
28	13.42	43.5	-6.5
29	4.51	39.4	-6.6
30	4.909	39.4	-6.6
31	11.94	43.4	-6.6
32	10.41	43.2	-6.8
33	13.93	43.2	-6.8
34	2.105	39.1	-6.9
35	4.462	39.1	-6.9
36	7.862	43.1	-6.9
37	8.557	43	-7.0
38	10.14	43	-7.0
39	16.41	43	-7.0
40	2.587	38.9	-7.1
41	2.786	38.9	-7.1
42	3.425	38.9	-7.1
43	3.649	38.9	-7.1
44	10.74	42.9	-7.1
45	11.15	42.9	-7.1
46	12.66	42.9	-7.1
47	13.28	42.9	-7.1
48	2.642	38.8	-7.2
49	13.56	42.8	-7.2
50	2.533	38.7	-7.3
51	4.582	38.7	-7.3
52	9.614	42.7	-7.3
53	9.924	42.7	-7.3
54	12.33	42.7	-7.3
55	13.14	42.7	-7.3
56	9.513	42.6	-7.4
57	10.57	42.6	-7.4
58	12.07	42.6	-7.4


ELECTRO MAGNETIC TEST, INC.

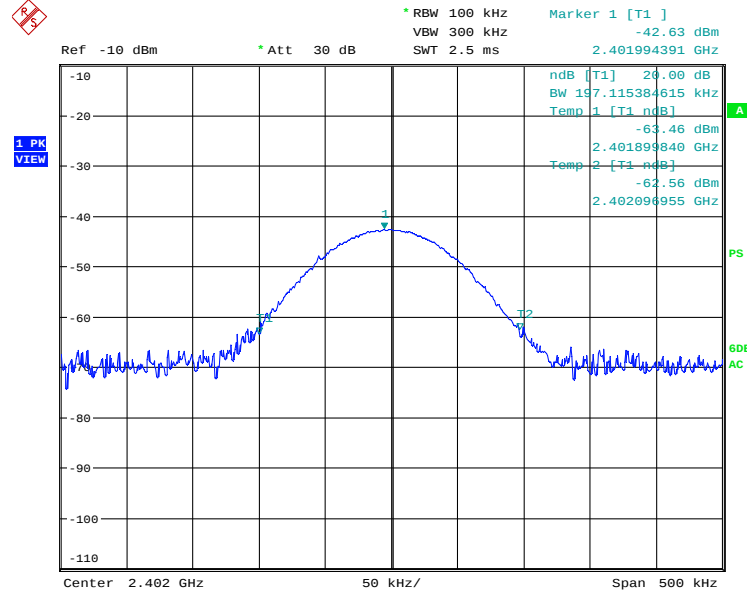
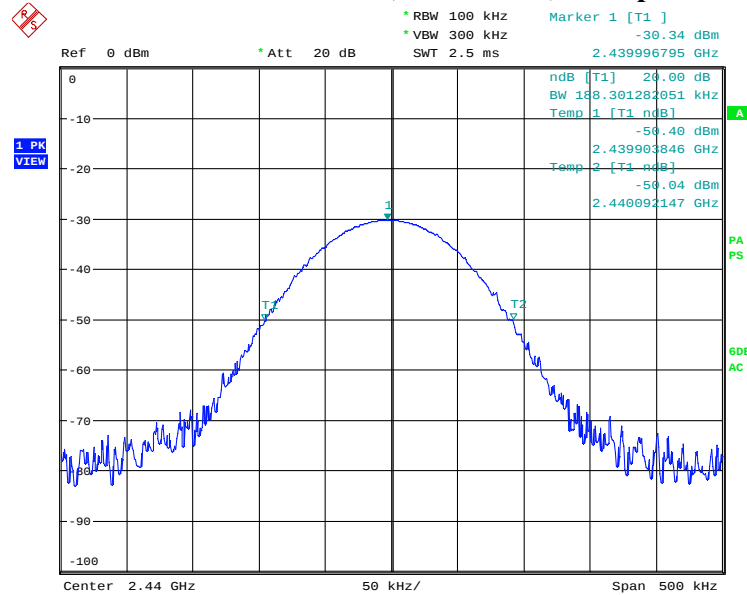
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

20dB Bandwidth Test Data

Company:	Always Innovating, Inc.		Test Date	2/13/13	
EUT Name	HDMI Dongle		Test Engineer	George Hsu	
Model:	REV. E4				
Operating Mode	TX Mode				
Mode	Test CH	Frequency (MHz)	20 dB Bandwidth (KHz)	Limit (KHz)	Conclusion
Bluetooth 1 Mbps	Low	2402	197.115	N/A	N/A
	Middle	2440	188.301	N/A	N/A
	High	2480	188.301	N/A	N/A
Bluetooth 3 Mbps	Low	2402	184.294	N/A	N/A
	Middle	2440	191.506	N/A	N/A
	High	2480	185.096	N/A	N/A
Test Equipment: Please refer to section 5.2					

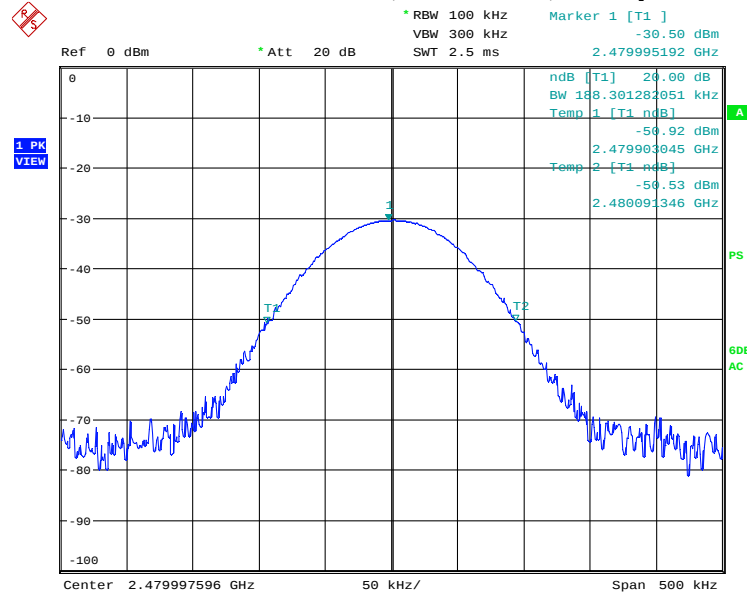
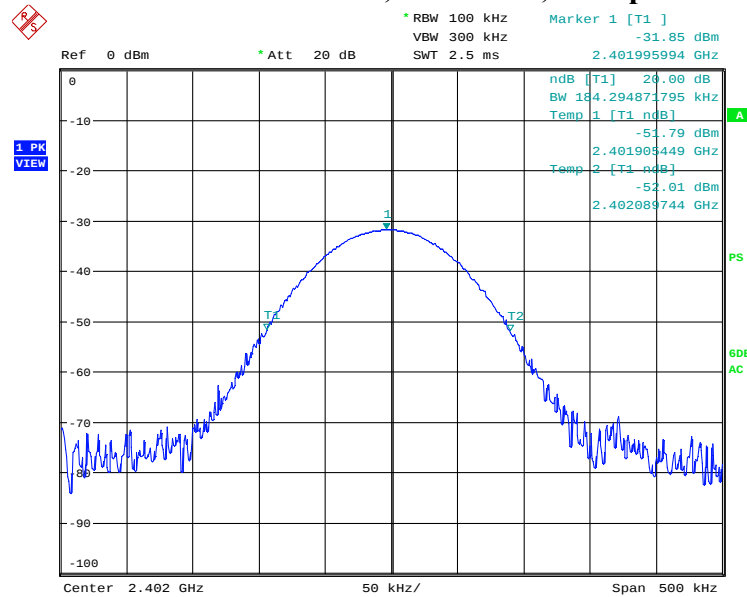
**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth Channel 0, 2402 MHz, 1 Mbps**Bluetooth Channel 19, 2440 MHz, 1 Mbps**

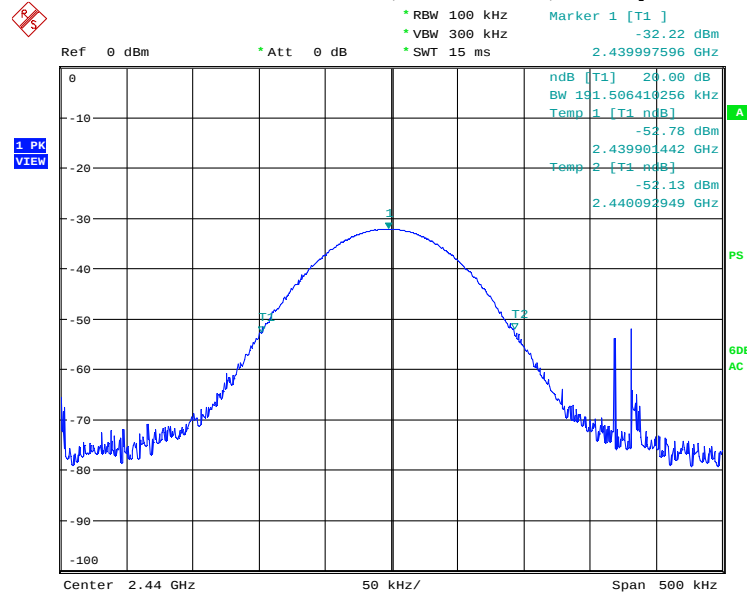
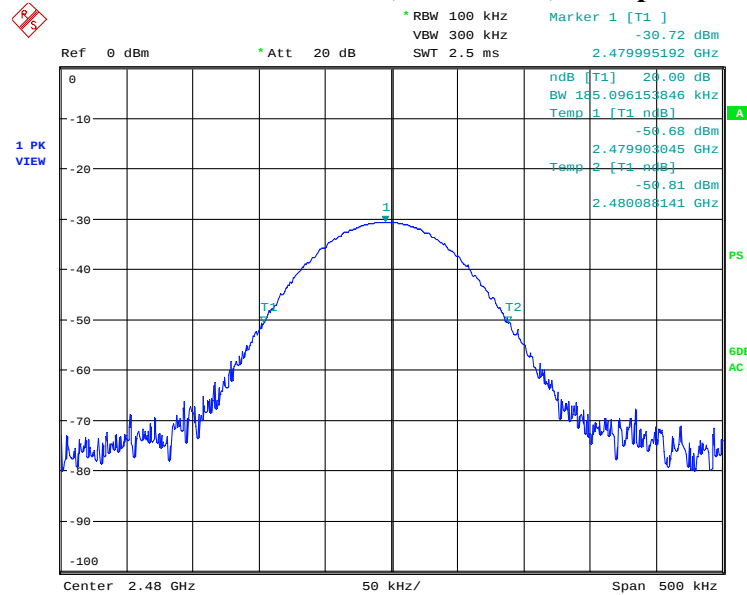
**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth Channel 39, 2480 MHz, 1 Mbps**Bluetooth Channel 0, 2402 MHz, 3 Mbps**

**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth Channel 19, 2440 MHz, 3 Mbps**Bluetooth Channel 39, 2480 MHz, 3 Mbps**


ELECTRO MAGNETIC TEST, INC.

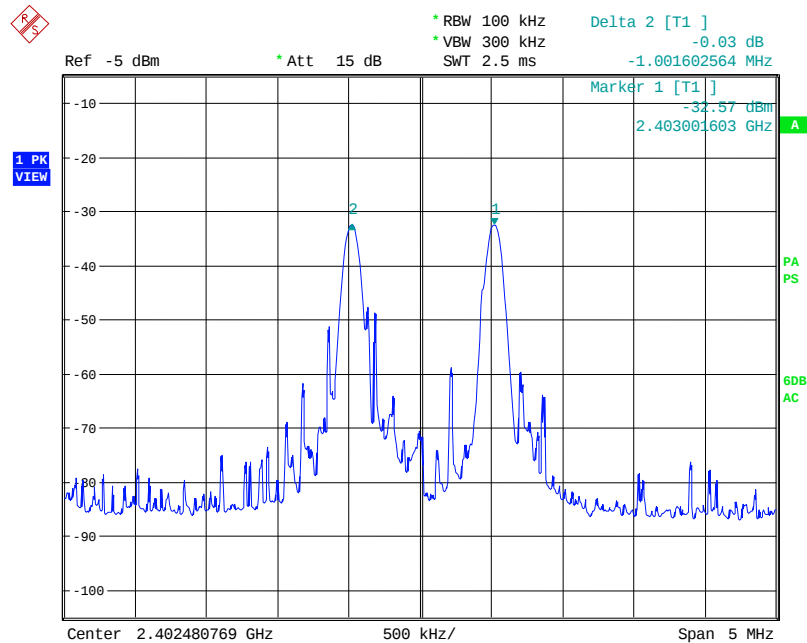
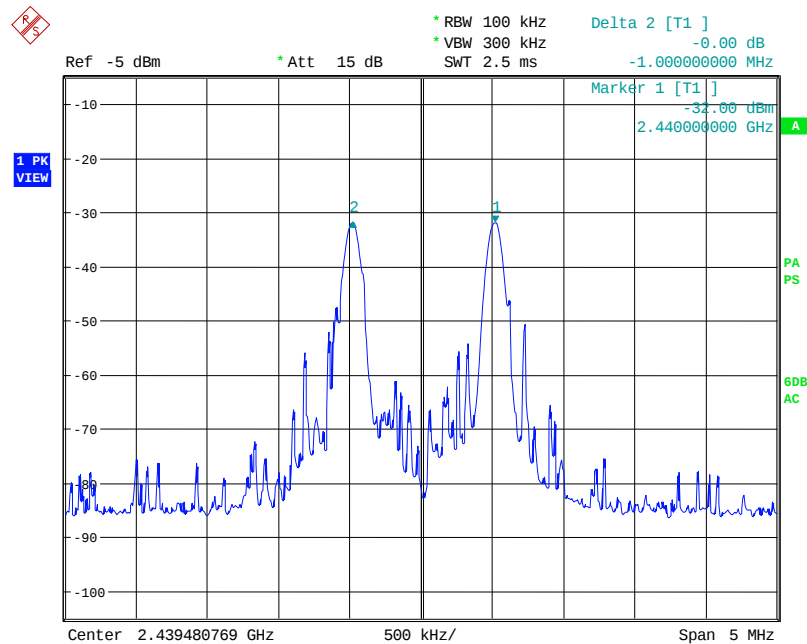
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Carrier Frequency Separation Test Data

Company:	Always Innovating, Inc.		Test Date	2/27/13	
EUT Name	HDMI Dongle		Test Engineer	George Hsu	
Model:	REV. E4		Test Result	PASS	
Operating Mode	TX Mode				
Mode	Test CH	Frequency (MHz)	Frequency Separation (KHz)	Limit (KHz)	Conclusion
Bluetooth 1 Mbps	Low	2402	1001.602	≥ 131.410	Pass
	Middle	2440	1000.000	≥ 125.534	Pass
	High	2480	1001.602	≥ 125.534	Pass
Bluetooth 3 Mbps	Low	2402	1001.602	≥ 122.863	Pass
	Middle	2440	998.397	≥ 127.671	Pass
	High	2480	1001.602	≥ 123.397	Pass
Test Equipment: Please refer to section 5.2					

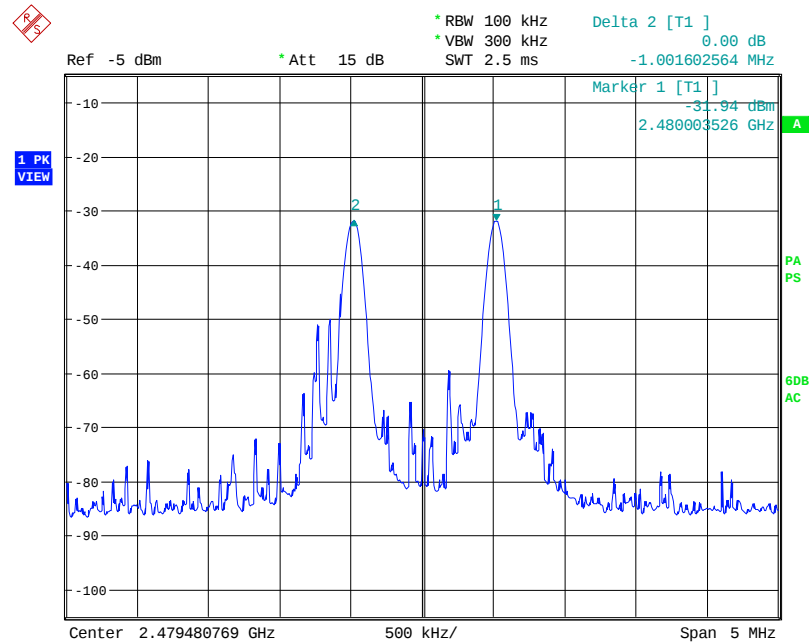
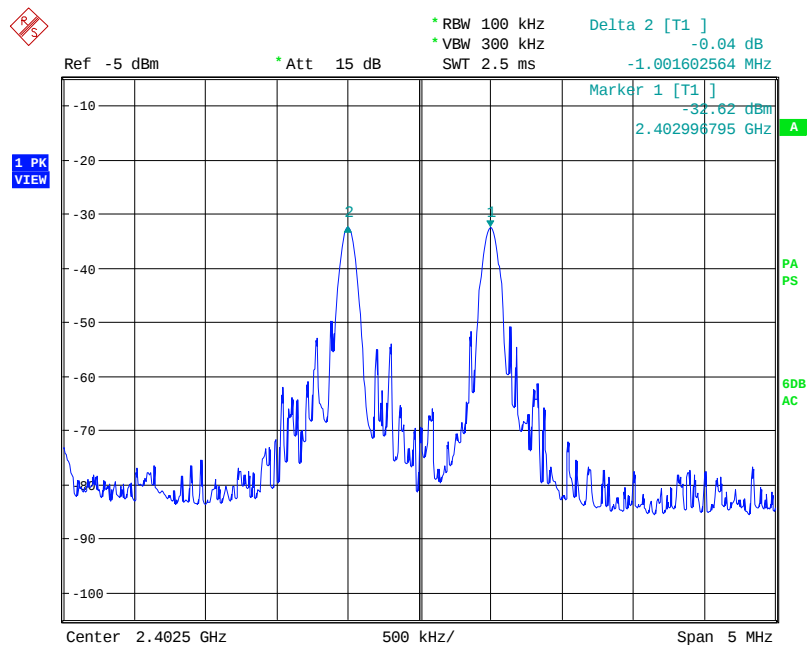
**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

2402 MHz, 1Mbps**2440 MHz, 1 Mbps**

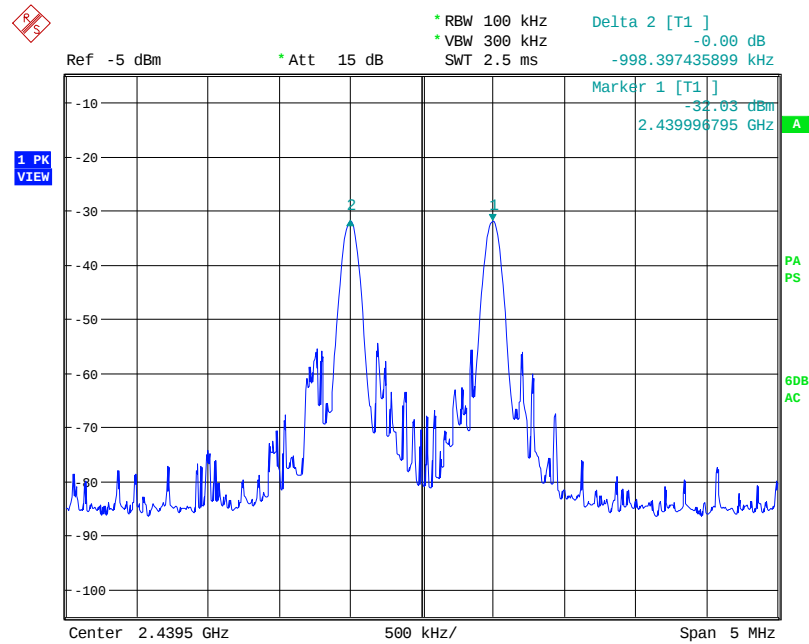
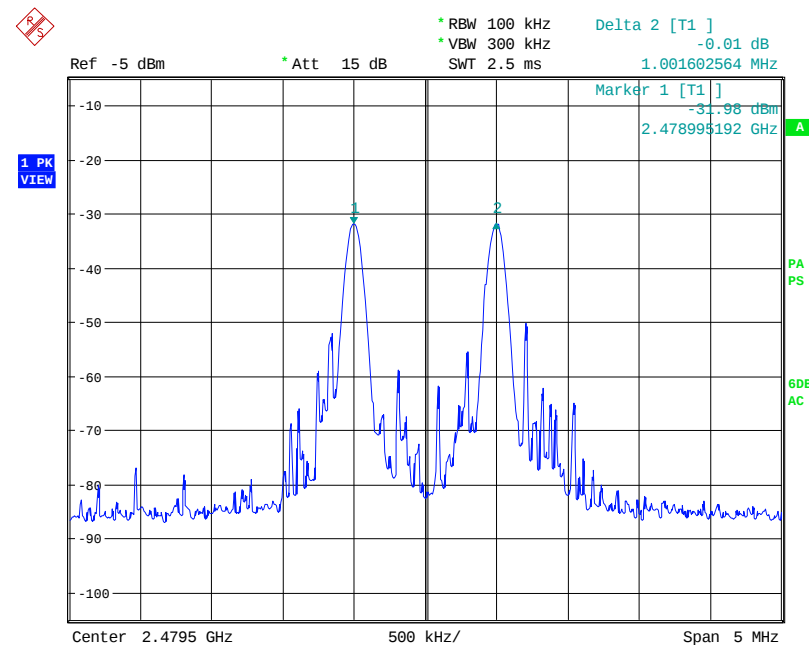
**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

2480 MHz, 1 Mbps**2402 MHz, 3 Mbps**

**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

2440 MHz, 3 Mbps**2480 MHz, 3 Mbps**



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Hopping Channel

Company:	Always Innovating, Inc.	Test Date	2/27/13
EUT Name	HDMI Dongle	Test Engineer	George Hsu
Model:	REV. E4	Test Result	PASS
Operating Mode	TX Mode		

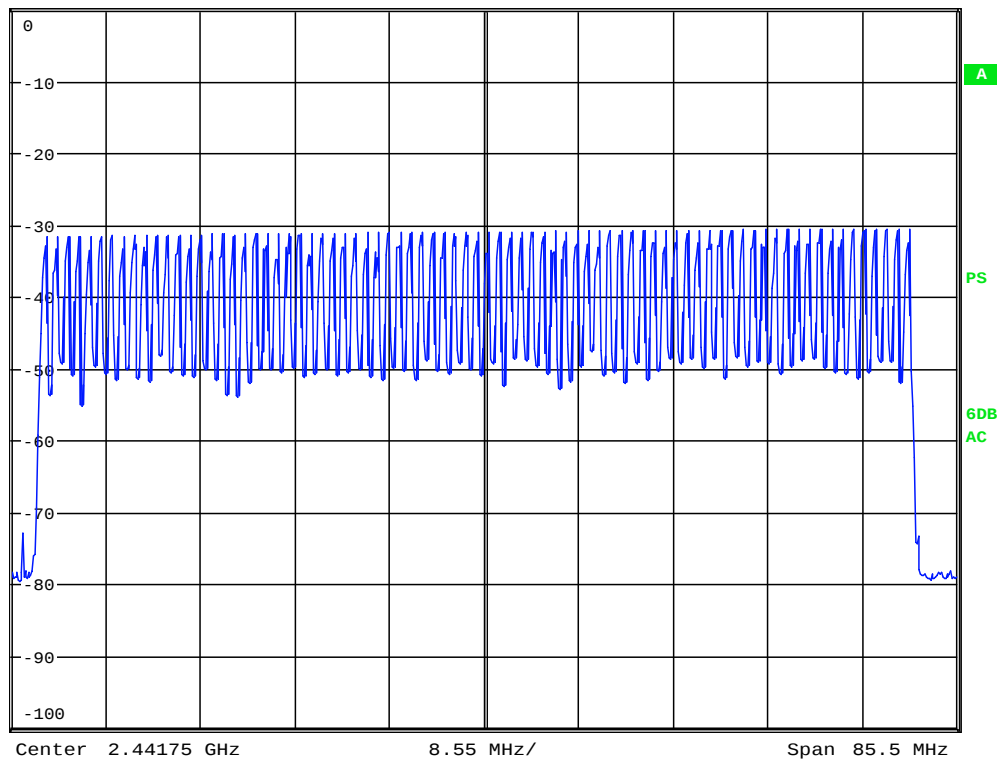


* RBW 100 kHz
VBW 300 kHz
SWT 25 ms

Ref 0 dBm

* Att 10 dB

1 PK
VIEW



Limit	Test Result	Test Result
≥ 15 Channels	79 Channels	PASS


ELECTRO MAGNETIC TEST, INC.

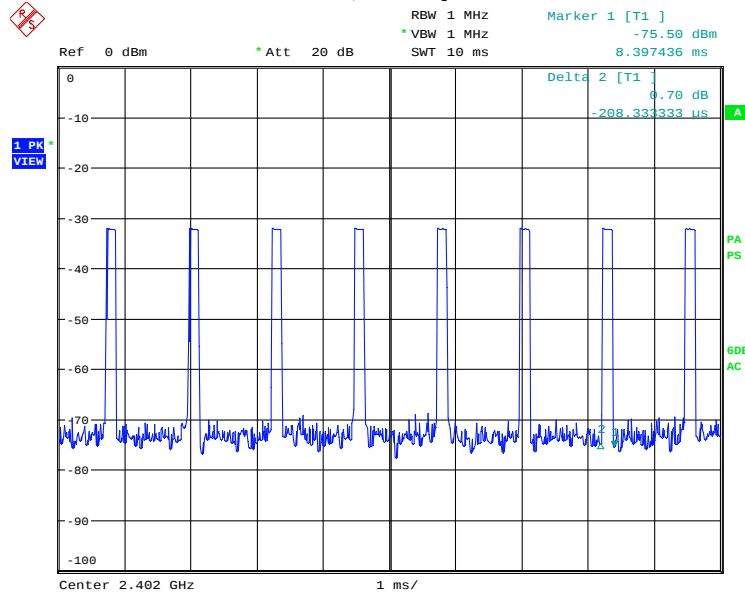
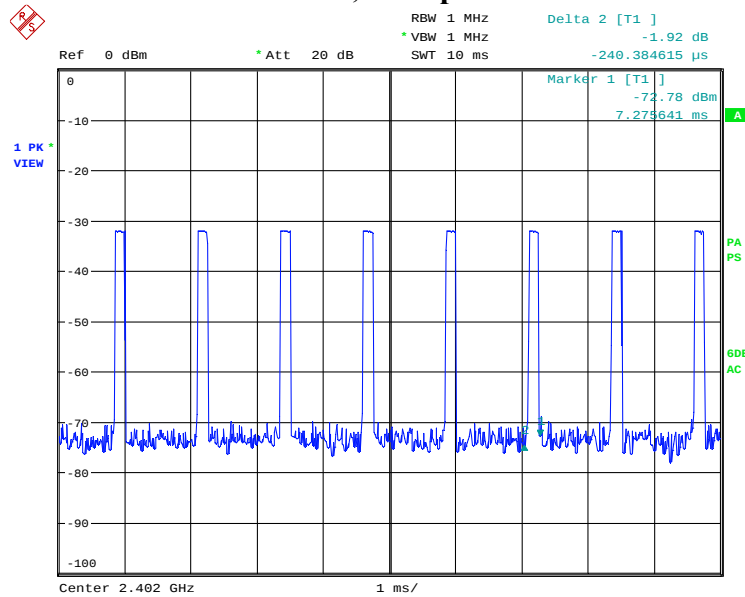
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Dwell Time Test Data

Company:	Always Innovating, Inc.		Test Date	2/27/13	
EUT Name	HDMI Dongle		Test Engineer	George Hsu	
Model:	REV. E4		Test Result	PASS	
Operating Mode	TX Mode, 2402 MHz				
Mode	DH Mode	Pulse Duration(ms)	Dwell Time (s)	Limit (s)	Conclusion
Bluetooth 1 Mbps	DH1	0.208	0.06656	0.4000	Pass
	DH3	0.240	0.07680	0.4000	Pass
	DH5	0.448	0.14336	0.4000	Pass
Bluetooth 3 Mbps	DH1	0.496	0.07936	0.4000	Pass
	DH3	0.512	0.08192	0.4000	Pass
	DH5	2.322	0.23220	0.4000	Pass
Test Equipment: Please refer to section 5.2					

**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

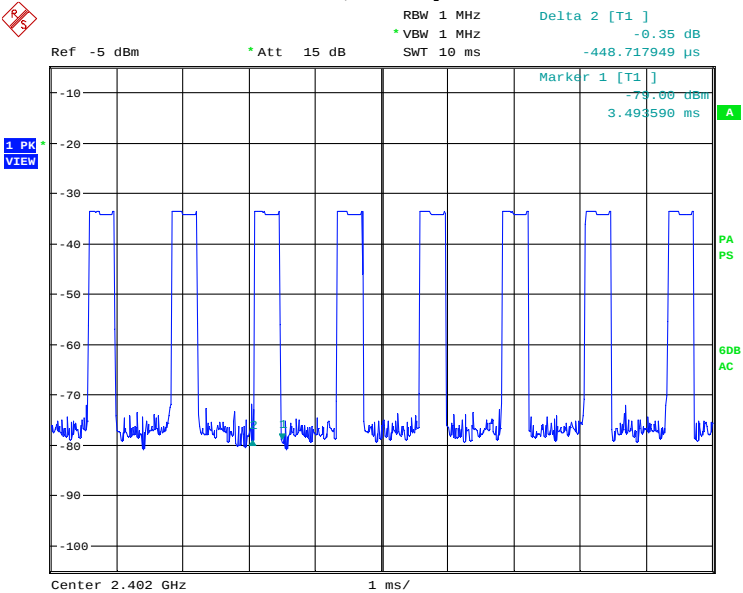
DH1, 1 Mbps**DH3, 1 Mbps**



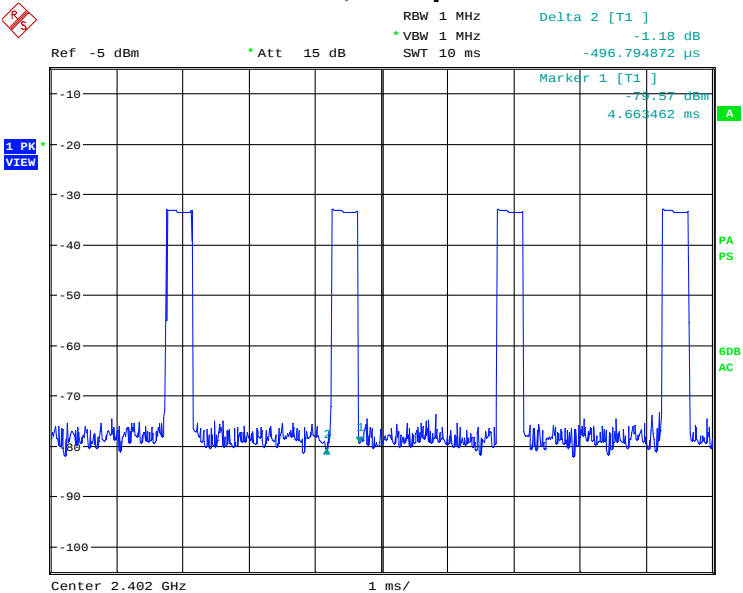
ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

DH5, 1 Mbps

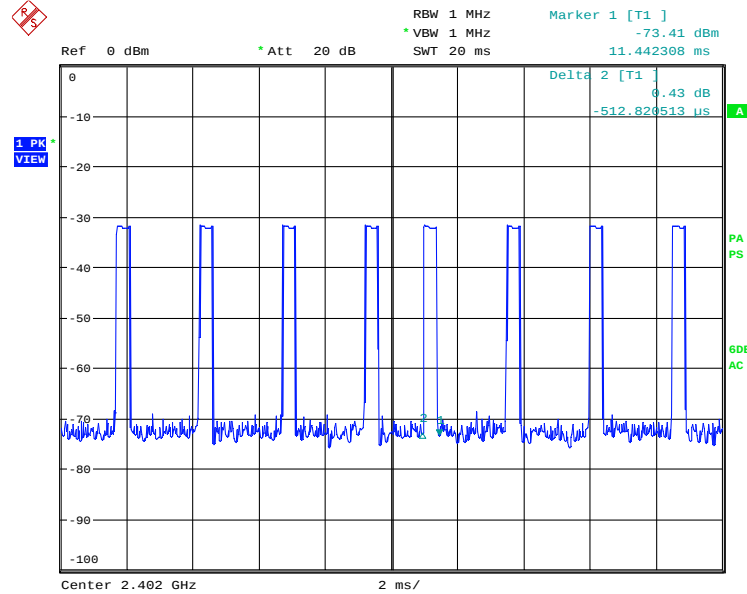
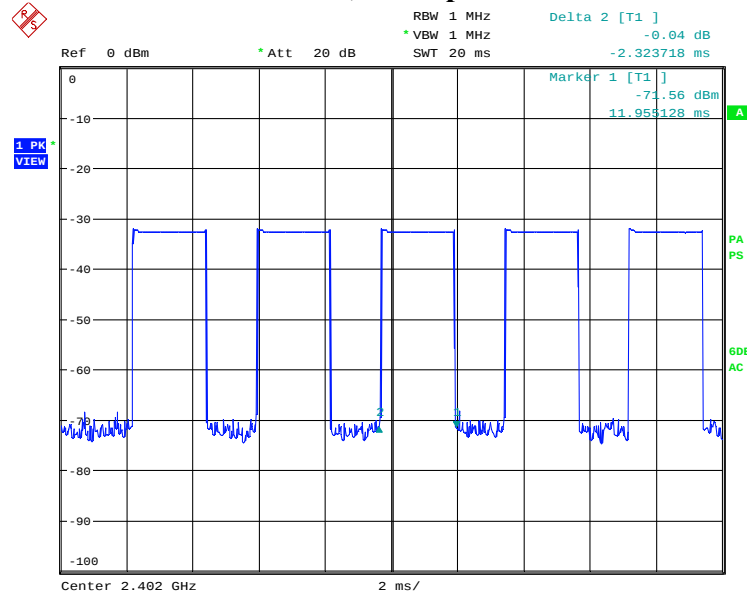


DH1, 3 Mbps



**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

DH3, 3 Mbps**DH5, 3 Mbps**


ELECTRO MAGNETIC TEST, INC.

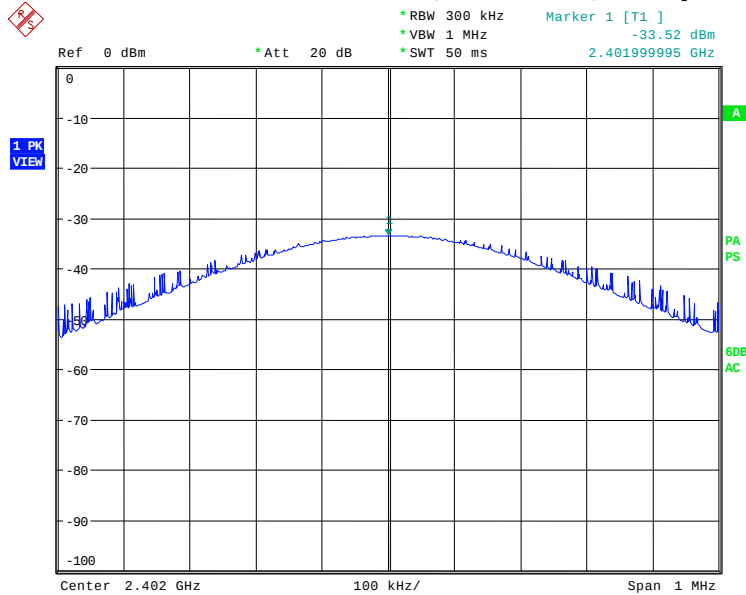
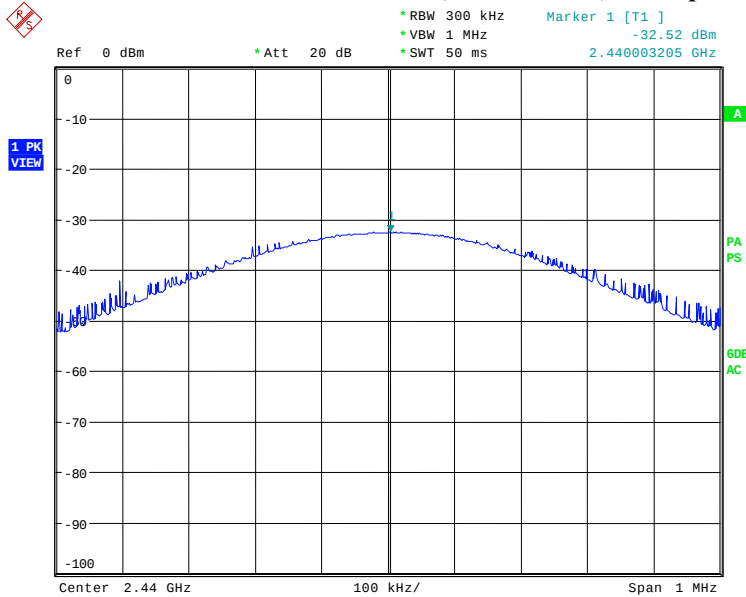
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Maximum Peak Output Power (FHSS)

Company:	Always Innovating, Inc.		Test Date	2/27/13	
EUT Name	HDMI Dongle		Test Engineer	George Hsu	
Model:	REV. E4		Test Result	PASS	
Operating Mode	TX Mode				
Mode	Test CH	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Conclusion
Bluetooth 1 Mbps	Low	2402	-33.52	≤ 30	PASS
	Middle	2440	-32.52	≤ 30	PASS
	High	2480	-32.70	≤ 30	PASS
Bluetooth 3 Mbps	Low	2402	-33.33	≤ 30	PASS
	Middle	2440	-32.55	≤ 30	PASS
	High	2480	-32.72	≤ 30	PASS
Test Equipment: Please refer to section 5.2					

**ELECTRO MAGNETIC TEST, INC.**

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

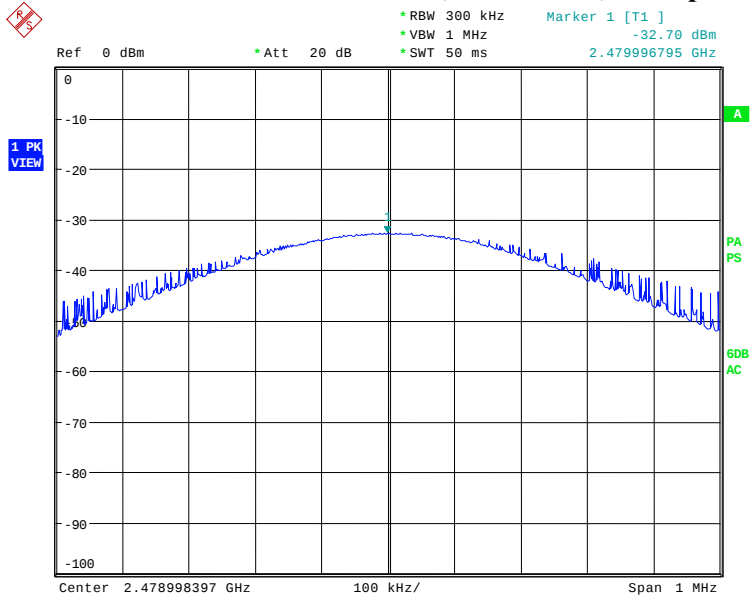
Bluetooth Channel 0, 2402 MHz, 1 Mbps**Bluetooth Channel 19, 2440 MHz, 1 Mbps**



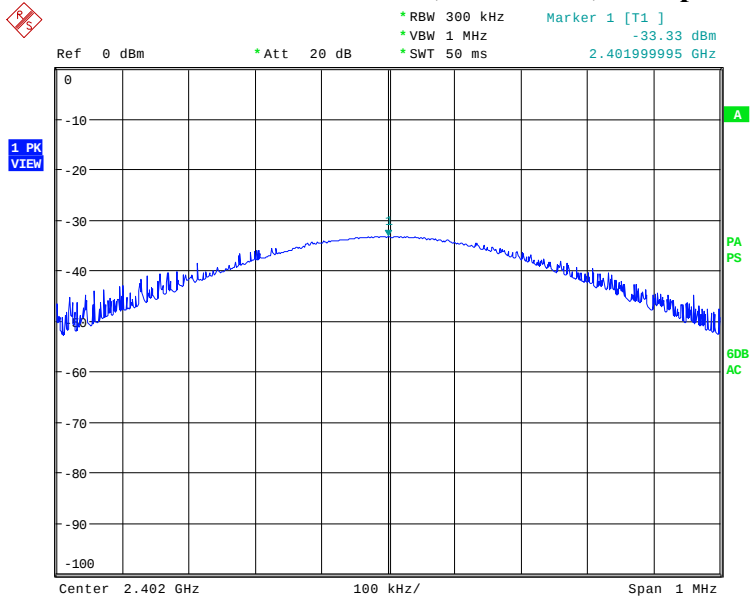
ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth Channel 39, 2480 MHz, 1 Mbps



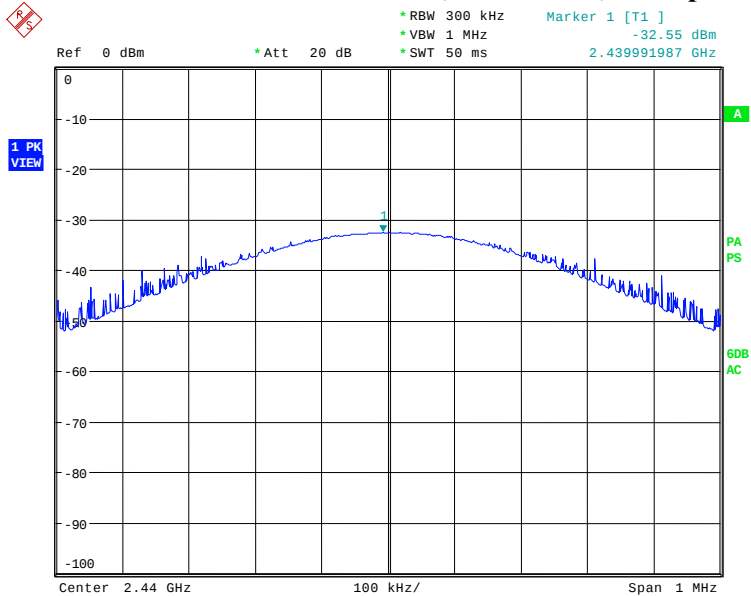
Bluetooth Channel 0, 2402 MHz, 3 Mbps



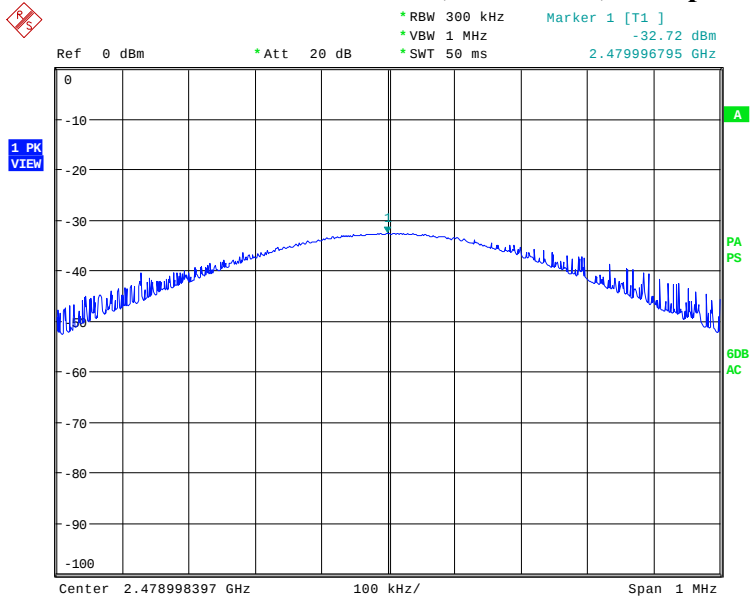


ELECTRO MAGNETIC TEST, INC.
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth Channel 19, 2440 MHz, 3 Mbps



Bluetooth Channel 39, 2480 MHz, 3 Mbps



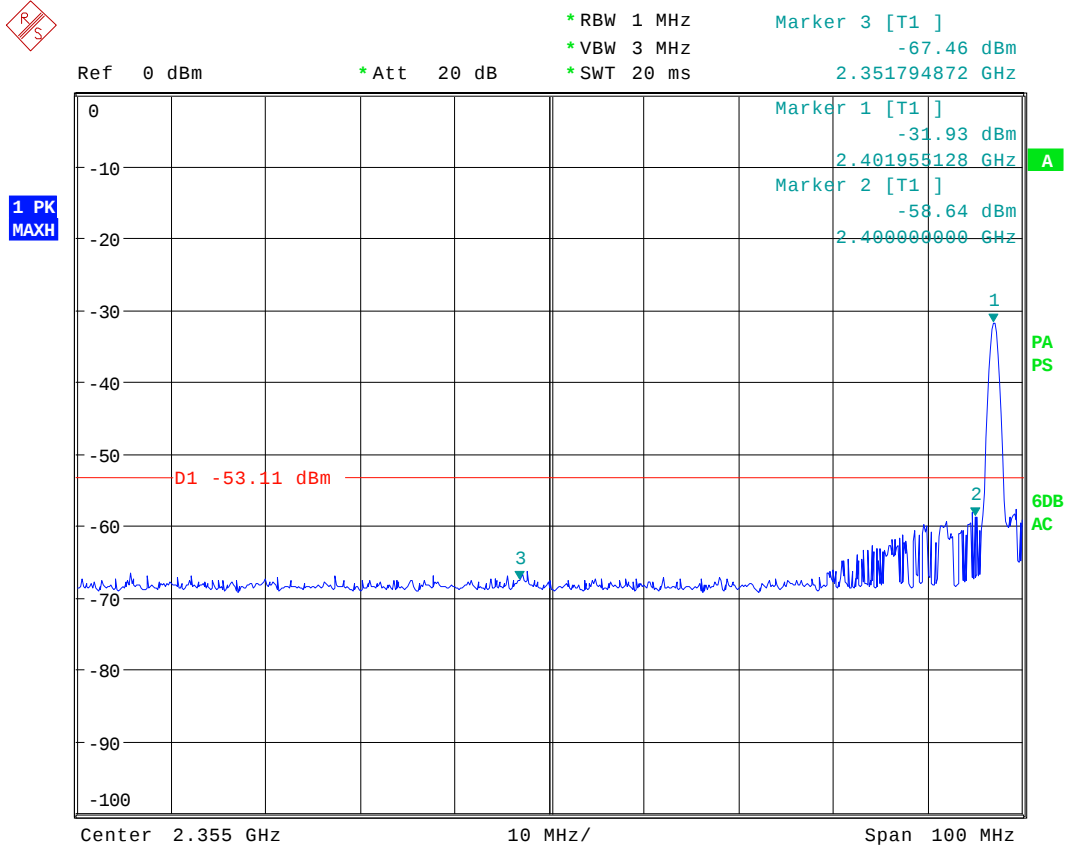


ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bandedge Test Data

Below 2.4Ghz Bluetooth, 1 Mbps



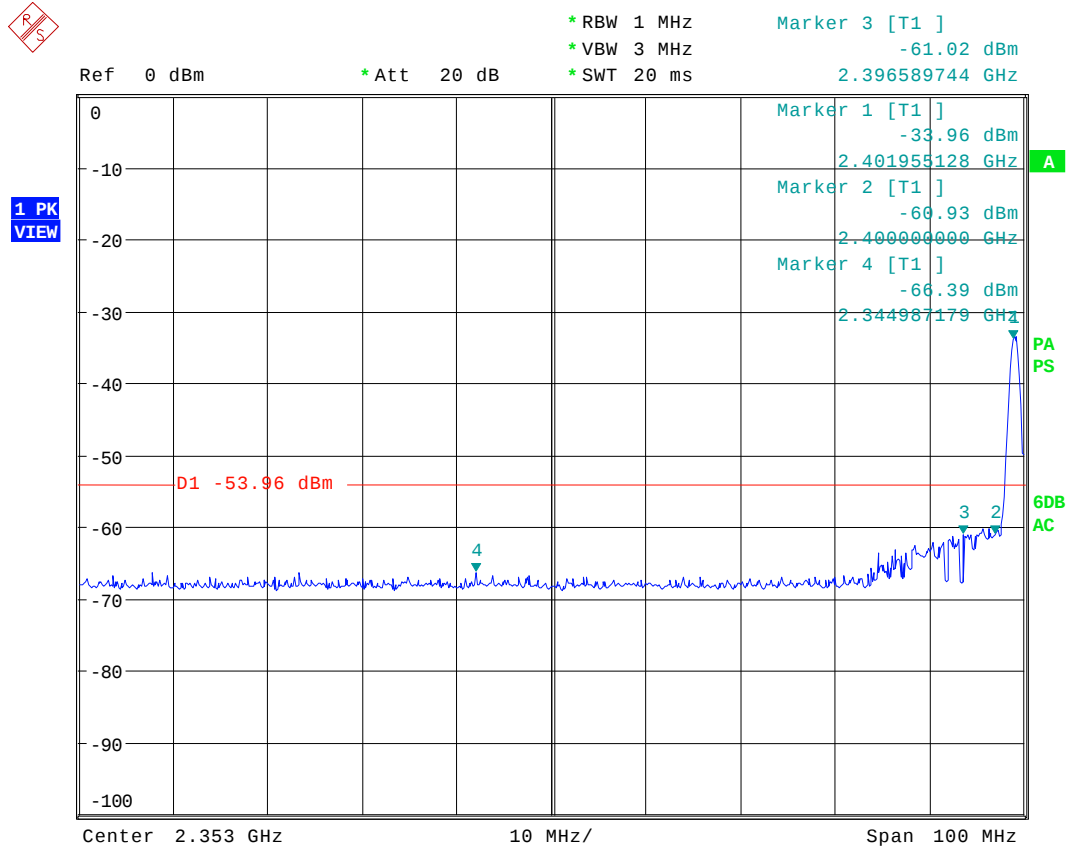
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2401.955	-31.93	N/A
2400.000	-58.64	-51.93
2351.794	-67.46	-51.93



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Below 2.4Ghz Bluetooth, 3 Mbps



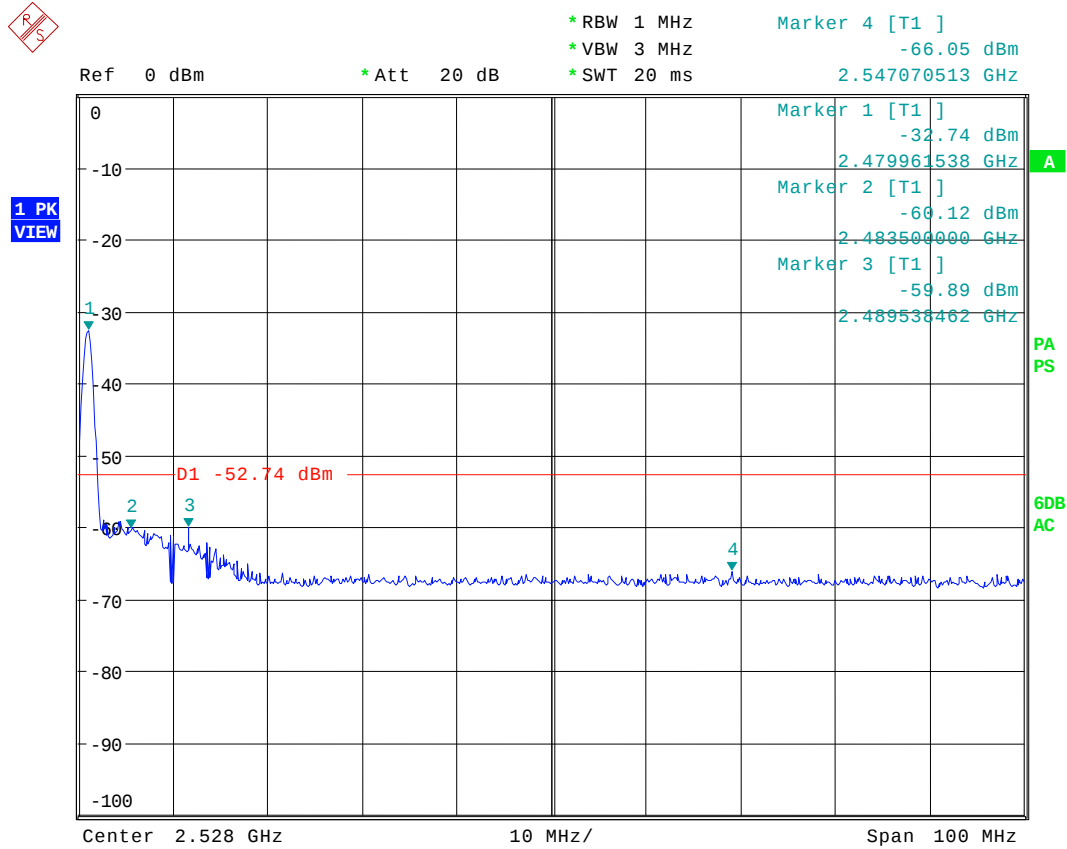
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2401.955	-33.96	N/A
2400.000	-60.93	-53.96
2396.589	-61.02	-53.96
2344.907	-66.39	-53.96



ELECTRO MAGNETIC TEST, INC.

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Above 2.4835 Ghz Bluetooth, 1 Mbps



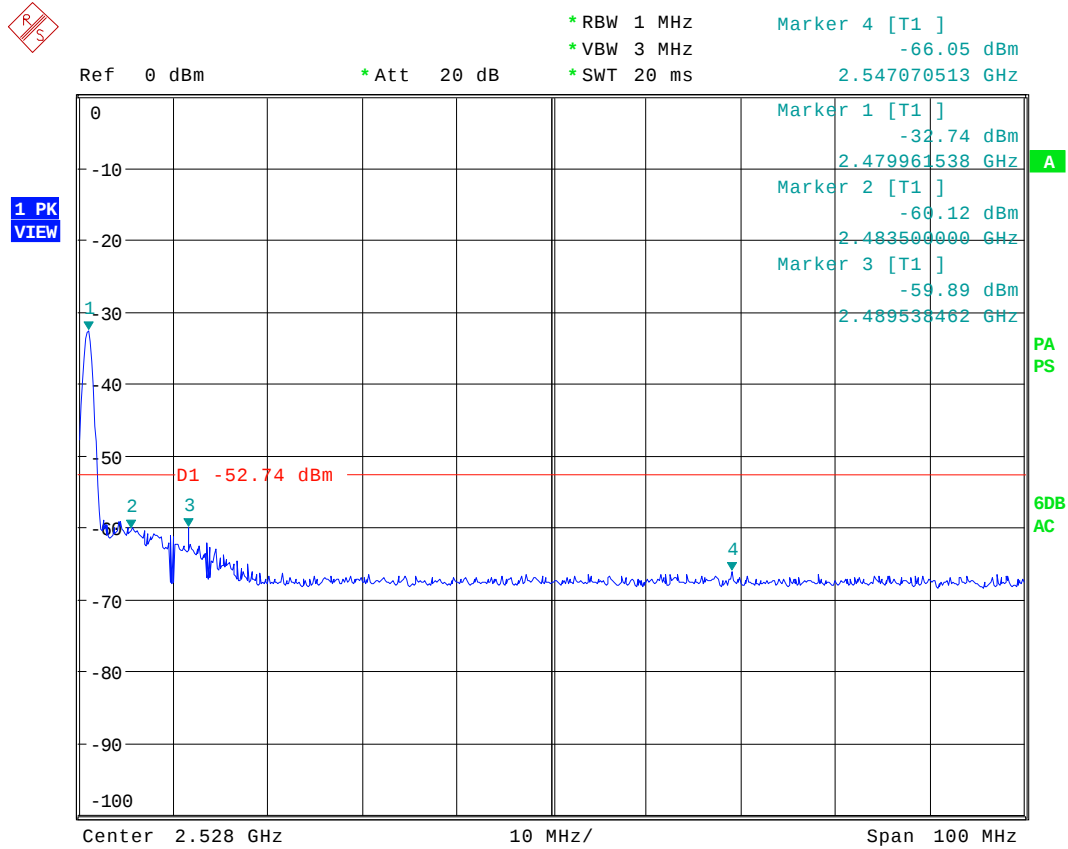
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2479.961	-32.74	N/A
2483.5	-60.12	-52.74
2409.538	-59.89	-52.74
2547.070	-66.05	-52.74



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Above 2.4835 Ghz Bluetooth, 1 Mbps



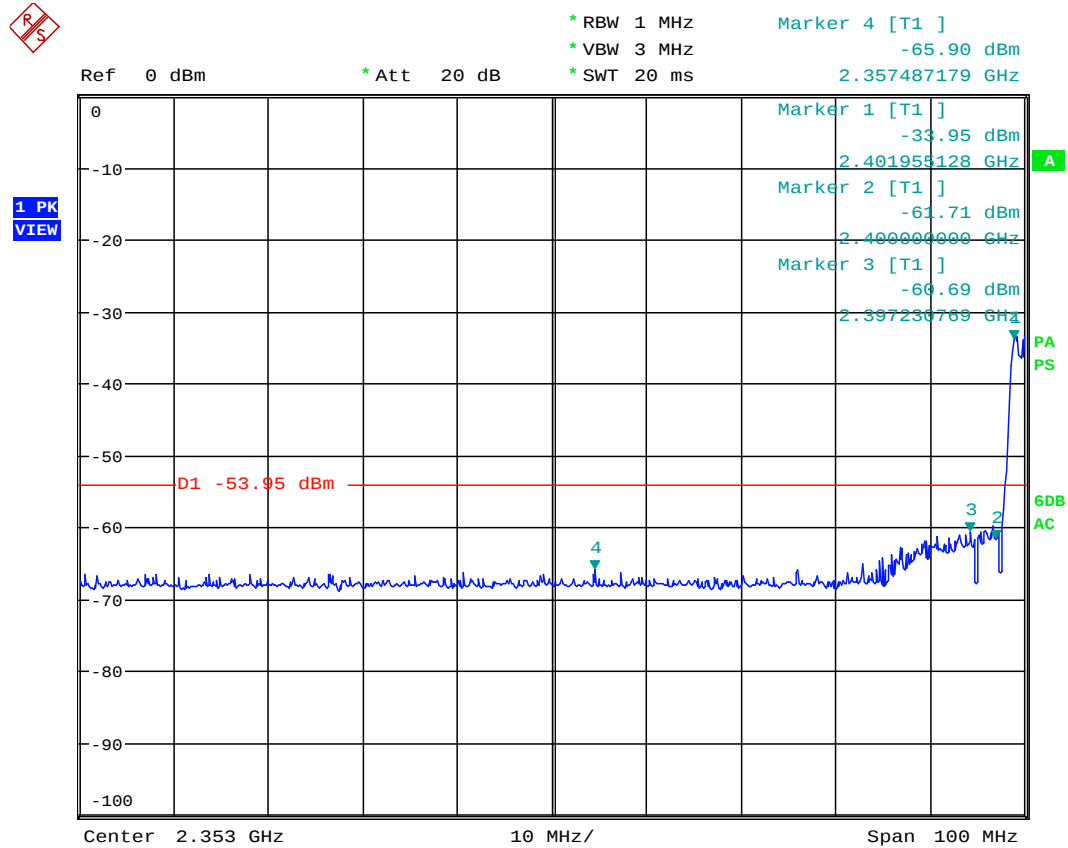
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2479.961	-32.74	N/A
2483.5	-60.12	-52.74
2409.538	-59.89	-52.74
2547.070	-66.05	-52.74



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Below 2.4 Ghz Bluetooth, 1 Mbps, Hopping



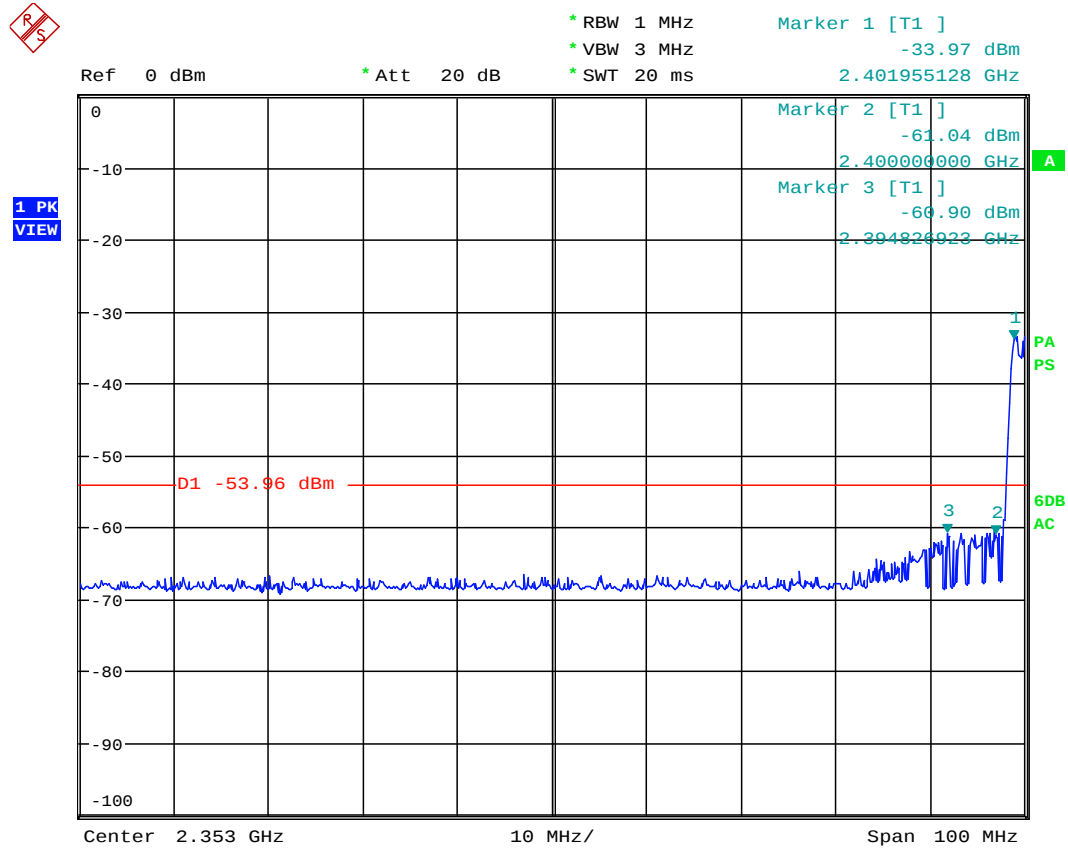
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2401.955	-33.95	N/A
2400.000	-61.71	-53.95
2397.236	-60.69	-53.95
2357.487	-65.90	-53.95



ELECTRO MAGNETIC TEST, INC.

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Below 2.4 Ghz Bluetooth, 3 Mbps, Hopping



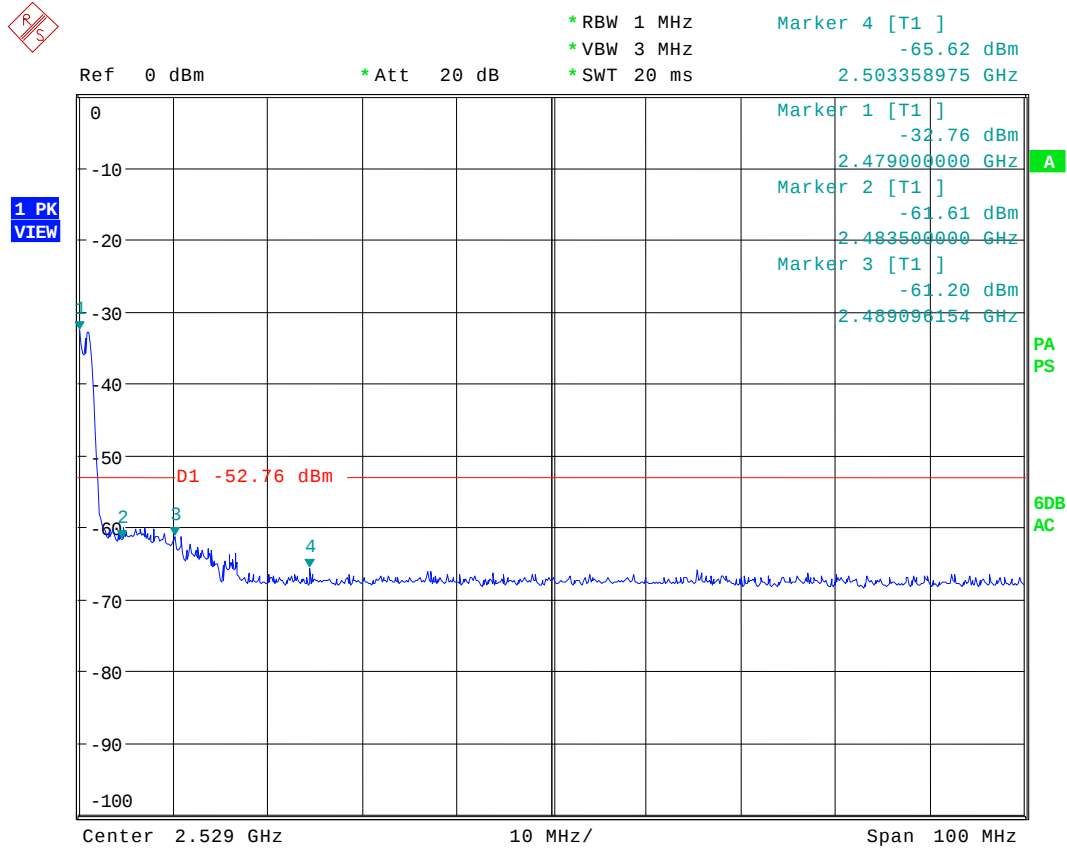
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2401.955	-33.97	N/A
2400.000	-61.04	-53.97
2394.826	-60.90	-53.97



ELECTRO MAGNETIC TEST, INC.

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Above 2.4835 Ghz Bluetooth, 1 Mbps, Hopping



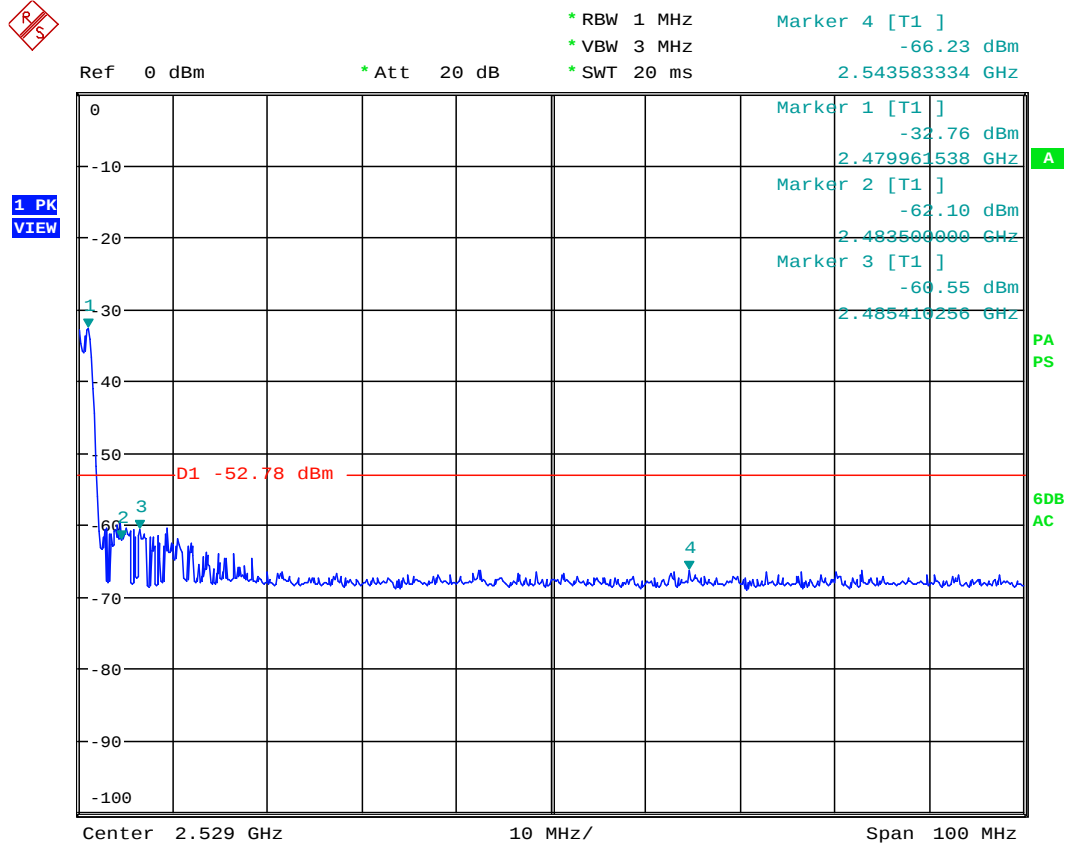
Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2479.00	-32.76	N/A
2483.500	-61.61	-52.76
2489.896	-61.20	-52.76
2503.358	-65.62	-52.76



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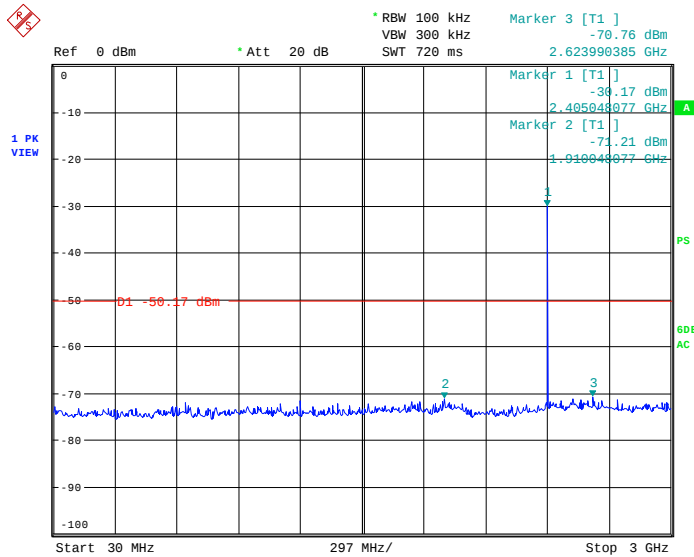
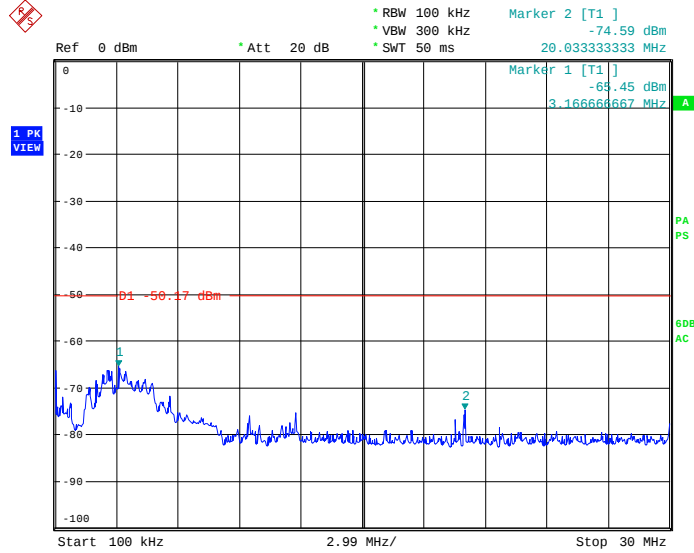
Above 2.4835 Ghz Bluetooth, 3 Mbps, Hopping



Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2479.961	-32.76	N/A
2483.5	-62.10	-52.76
2485.410	-60.55	-52.76
2543.583	-66.23	-52.76

**ELECTRO MAGNETIC TEST, INC.**

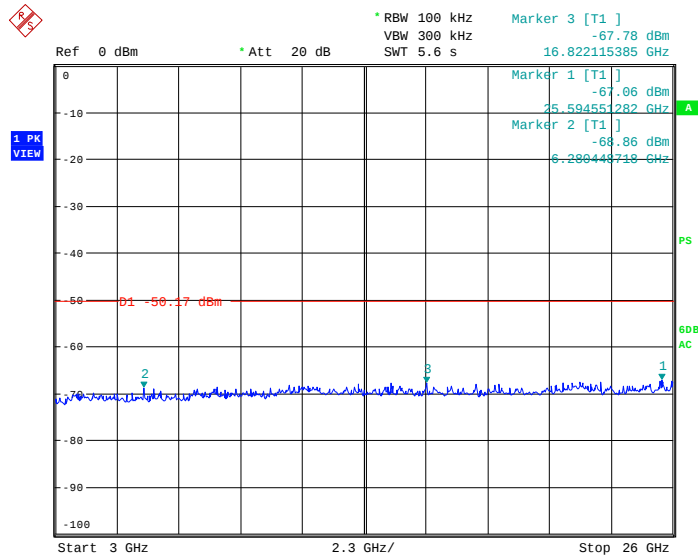
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Conducted Spurious Emissions: Bluetooth, 2402 MHz, 1 Mbps



ELECTRO MAGNETIC TEST, INC.

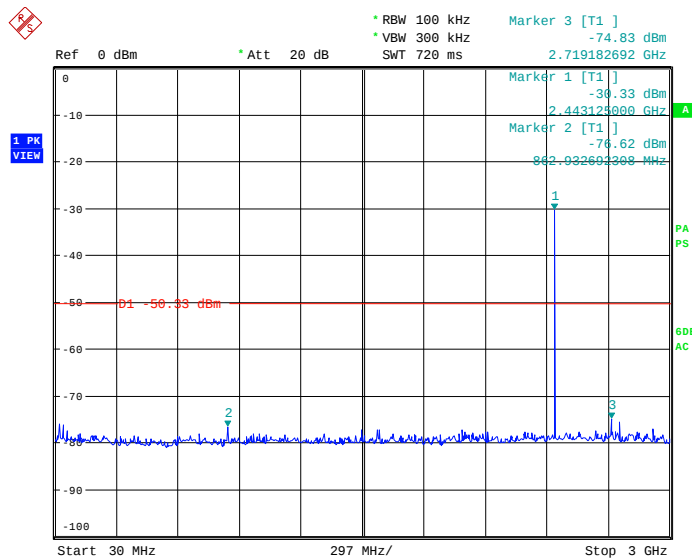
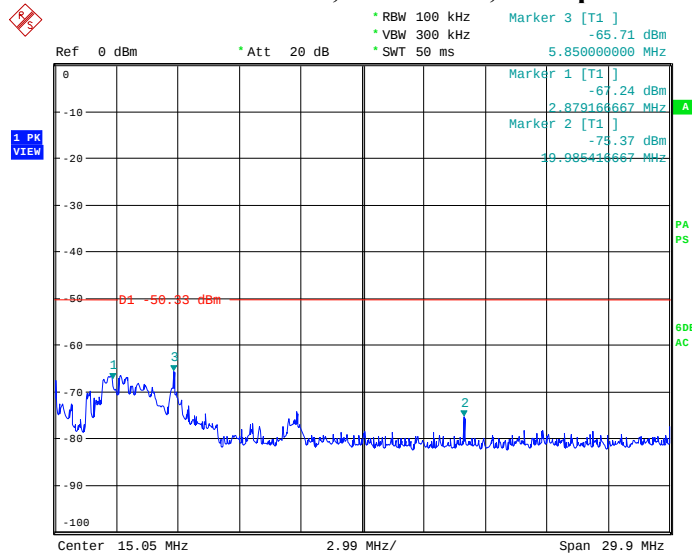
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Frequency (MHz)	Measurement (dBm)	Limit (dBm)
3.167	-69.45	-50.17
20.033	-74.59	-50.17
1910.048	-71.21	-50.17
2405.048	-30.17	Fundamental
2623.99	-70.76	-50.17
6280.449	-68.86	-50.17
16822.115	-67.78	-50.17
25594.551	-67.06	-50.17

**ELECTRO MAGNETIC TEST, INC.**

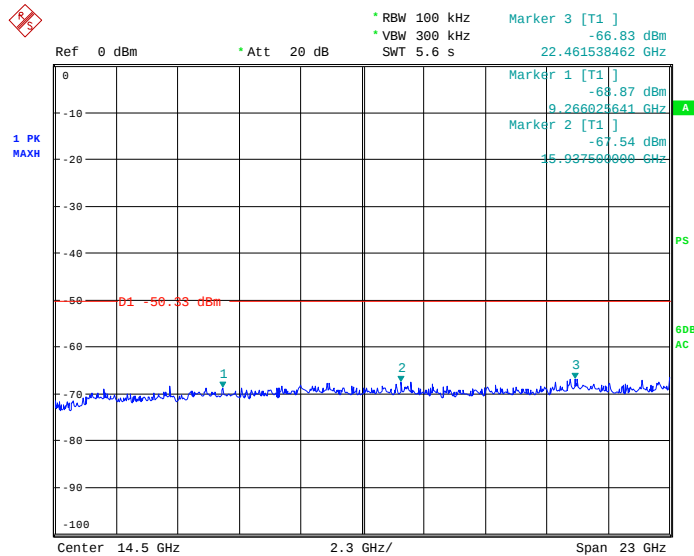
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Bluetooth, 2440 MHz, 1 Mbps



ELECTRO MAGNETIC TEST, INC.

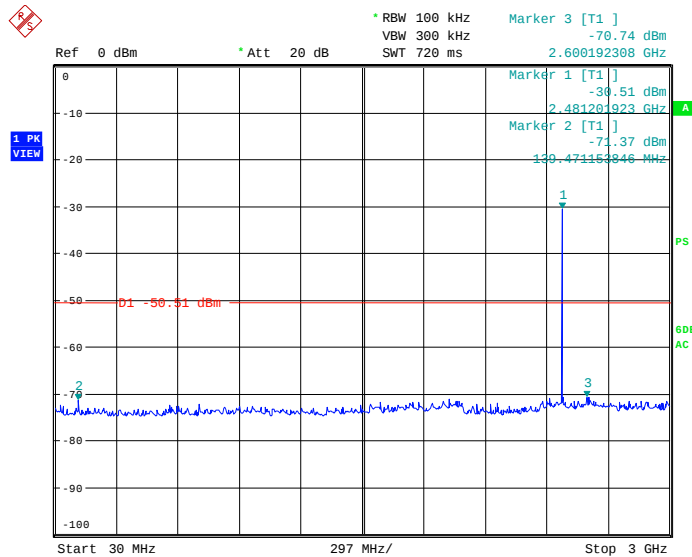
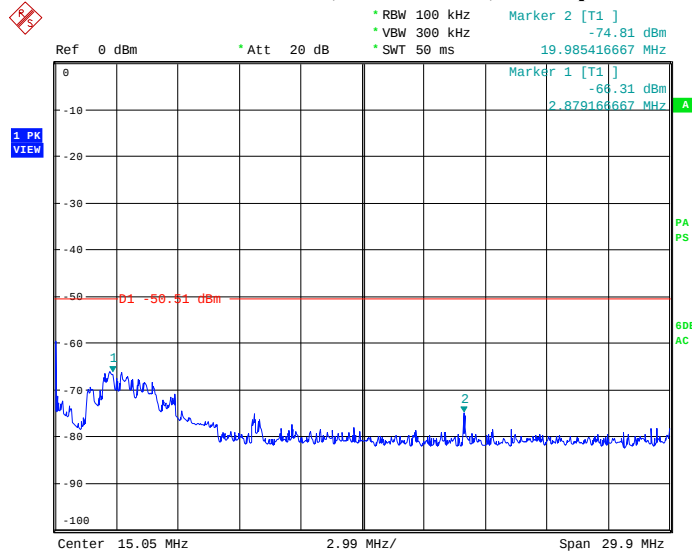
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000



Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2.897	-67.24	-50.33
5.850	-65.71	-50.33
19.985	-79.37	-50.33
862.932	-76.62	-50.33
2443.125	-30.33	Fundamental
2719.182	-74.83	-50.33
9266.025	-68.87	-50.33
15937.5	-67.54	-50.33
22461.538	-66.83	-50.33

**ELECTRO MAGNETIC TEST, INC.**

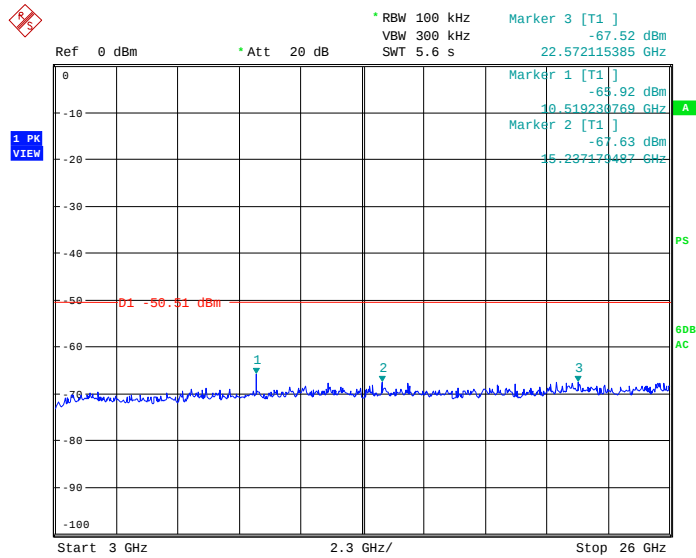
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth, 2480 MHz, 1 Mbps



ELECTRO MAGNETIC TEST, INC.

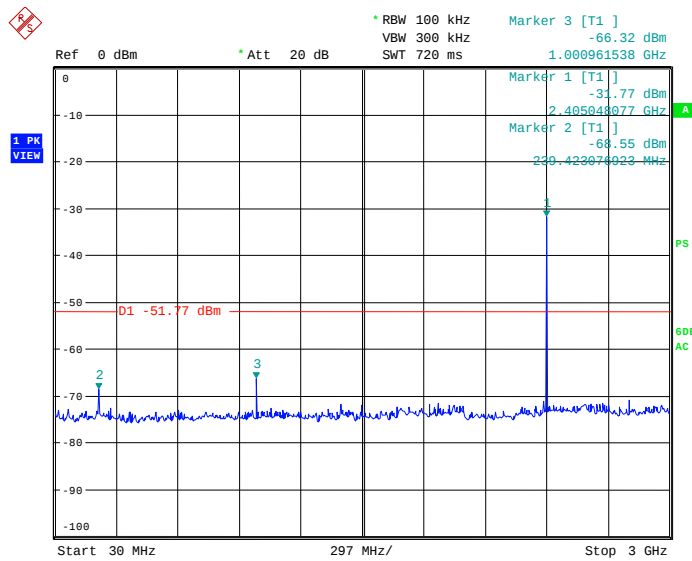
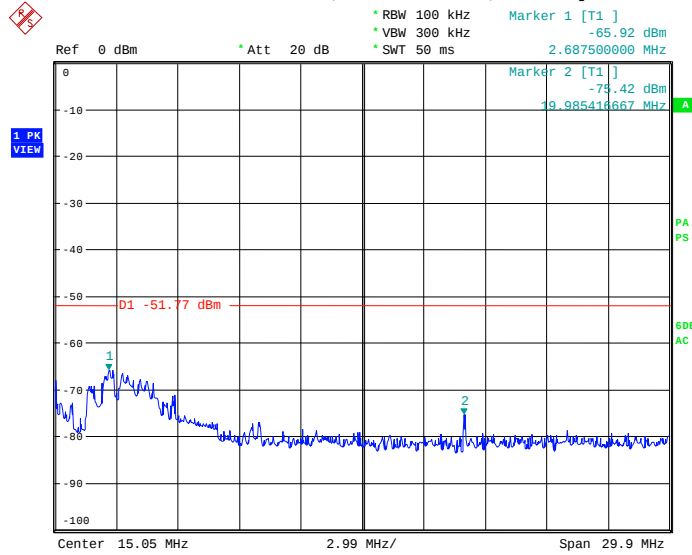
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Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2.879	-66.31	-50.51
19.985	-74.81	-50.51
139.471	-71.37	-50.51
2481.201	-30.51	Fundamental
2600.192	-70.74	-50.51
10519.231	-65.92	-50.51
15237.179	-67.63	-50.51
22572.115	-67.52	-50.51

**ELECTRO MAGNETIC TEST, INC.**

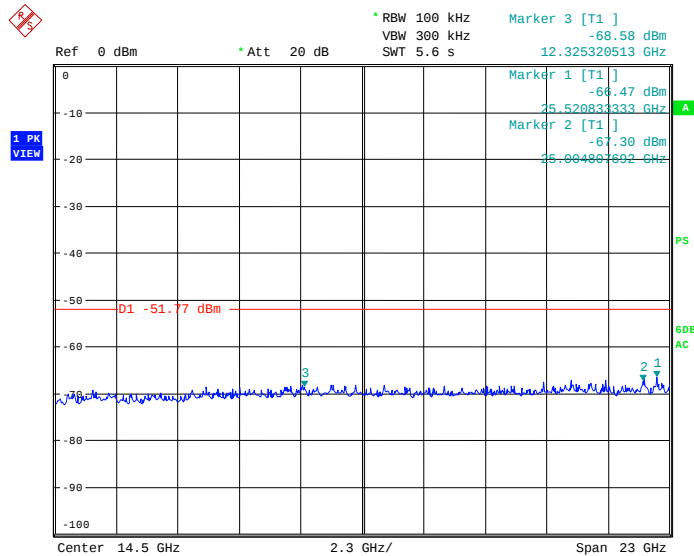
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth, 2402 MHz, 3 Mbps



ELECTRO MAGNETIC TEST, INC.

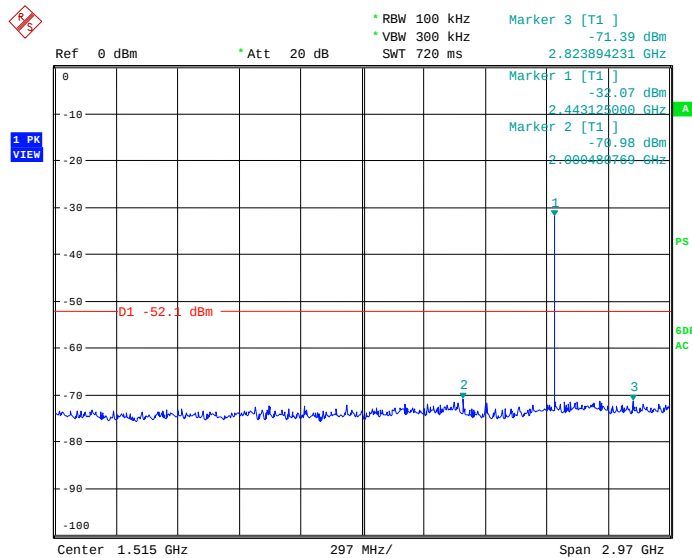
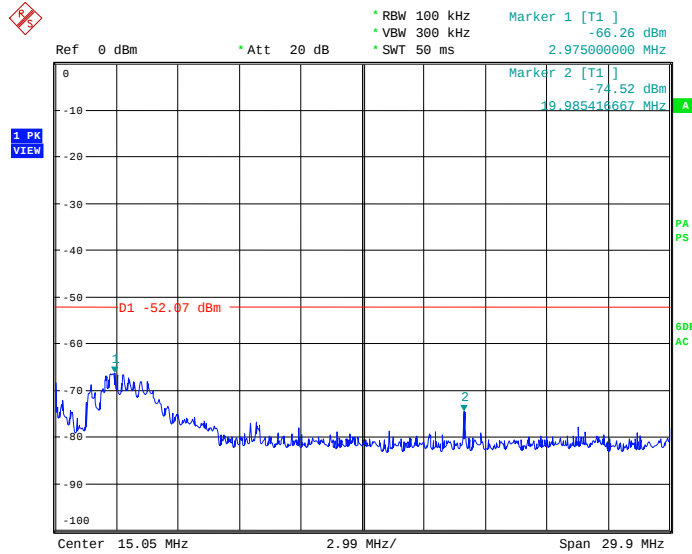
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Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2.687	-65.92	-51.77
19.985	-79.42	-51.77
239.423	-68.55	-51.77
1000.961	-66.32	-51.77
2405.048	-31.77	Fundamental
12325.32	-68.58	-51.77
25004.808	-67.3	-51.77
25520.833	-66.47	-51.77

**ELECTRO MAGNETIC TEST, INC.**

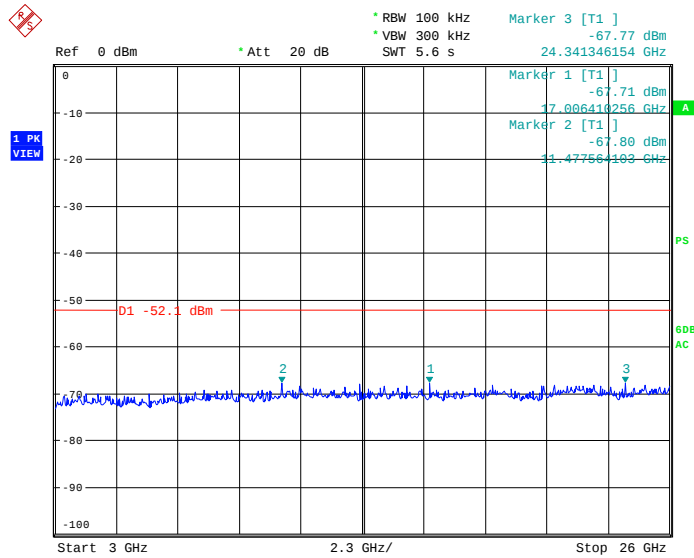
1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

Bluetooth, 2440 MHz, 3 Mbps



ELECTRO MAGNETIC TEST, INC.

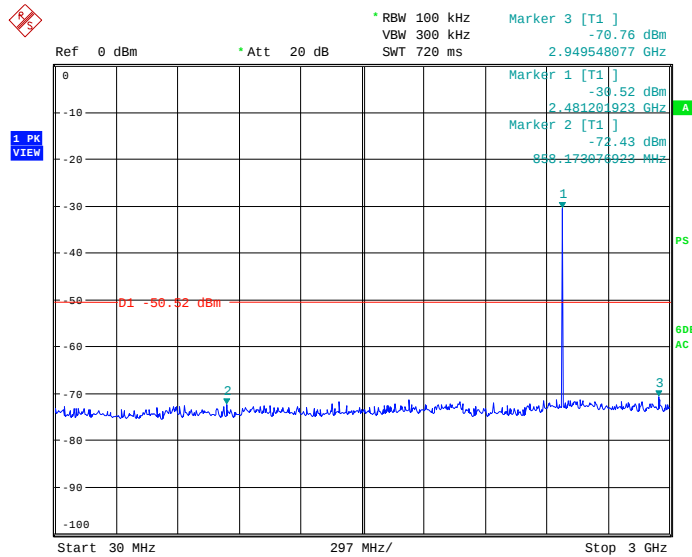
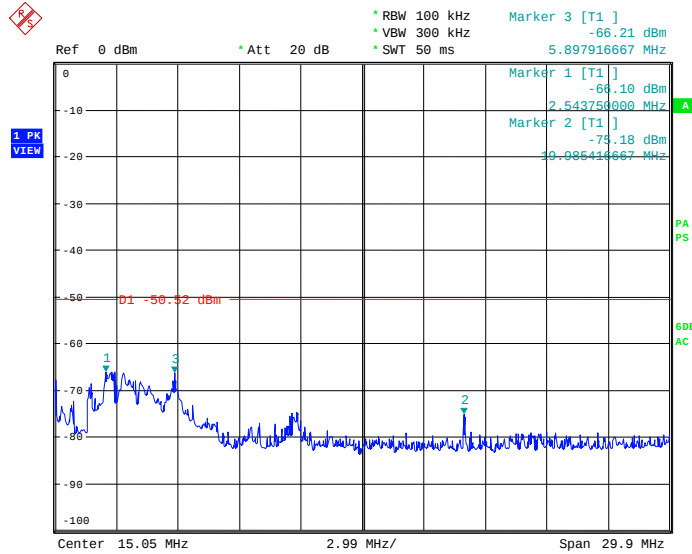
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Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2.975	-66.26	-52.07
19.985	-74.52	-52.07
2000.48	-70.98	-52.07
2443.125	-32.07	Fundamental
2823.894	-71.39	-52.07
11477.564	-67.8	-52.07
17006.41	-67.71	-52.07
24341.346	-67.77	-52.07

**ELECTRO MAGNETIC TEST, INC.**

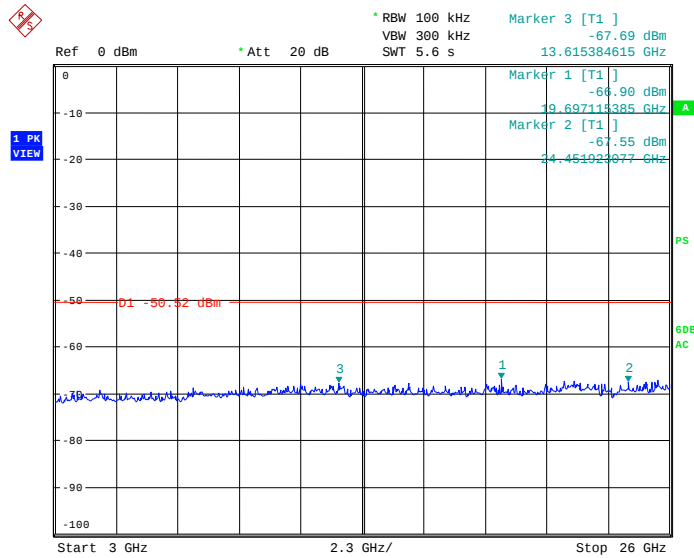
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Bluetooth, 2480 MHz, 3 Mbps



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000



Frequency (MHz)	Measurement (dBm)	Limit (dBm)
2.544	-66.10	-50.52
5.898	-66.21	-50.52
19.985	-79.18	-50.52
858.173	-72.43	-50.52
2481.201	-30.52	Fundamental
2949.548	-70.76	-50.52
13615.384	-67.69	-50.52
19697.115	-66.9	-50.52
24451.923	-67.55	-50.52



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APPENDIX B

PHOTOGRAPHS



ELECTRO MAGNETIC TEST, INC.

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FRONT VIEW

ALWAYS INNOVATING, INC.

HDMI DONGLE

MODEL: REV. E4

FCC PART 15 SUBPART C - RADIATED EMISSIONS

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



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000



REAR VIEW

ALWAYS INNOVATING, INC.

HDMI DONGLE

MODEL: REV. E4

FCC PART 15 SUBPART C - RADIATED EMISSIONS

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



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000



FRONT VIEW

ALWAYS INNOVATING, INC.

HDMI DONGLE

MODEL: REV. E4

FCC PART 15 SUBPART C - CONDUCTED EMISSIONS

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



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000



REAR VIEW

ALWAYS INNOVATING, INC.

HDMI DONGLE

MODEL: REV. E4

FCC PART 15 SUBPART C - CONDUCTED EMISSIONS

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



ELECTRO MAGNETIC TEST, INC.

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APPENDIX C

TEST SETUP DIAGRAMS



ELECTRO MAGNETIC TEST, INC.

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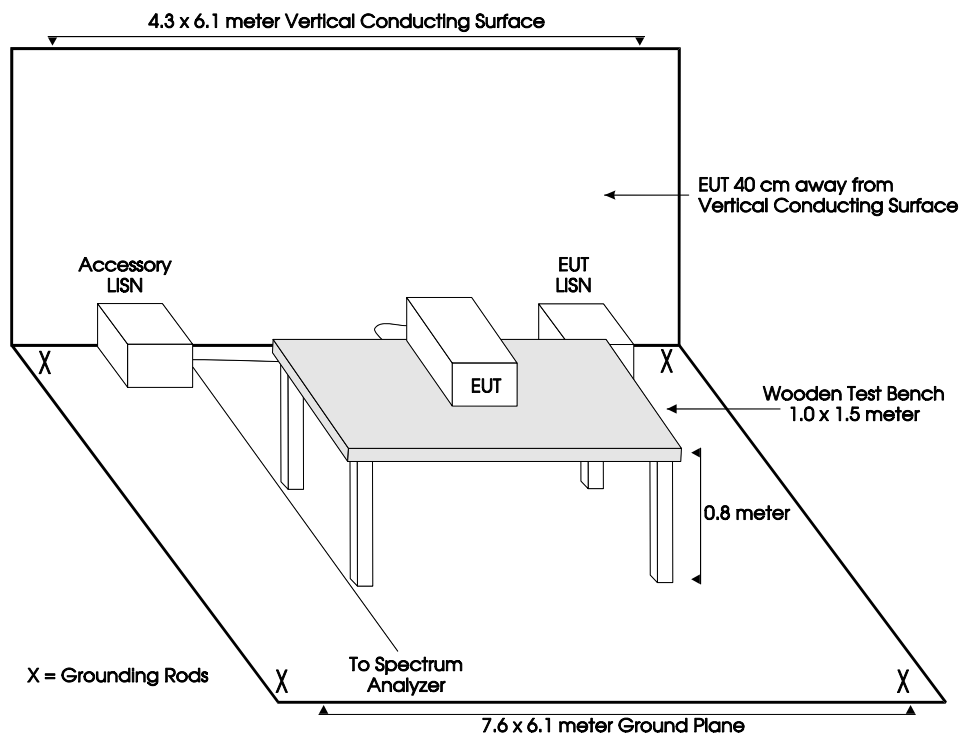


FIGURE 1 – TABLETOP CONDUCTED EMISSIONS TEST SETUP – SITE ‘A’

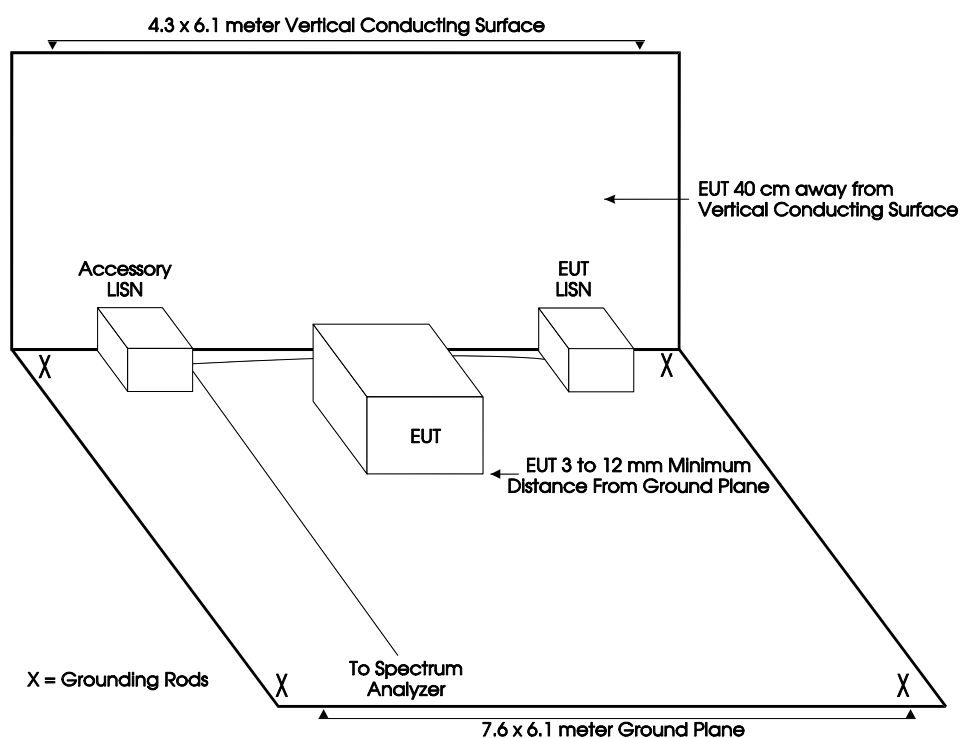
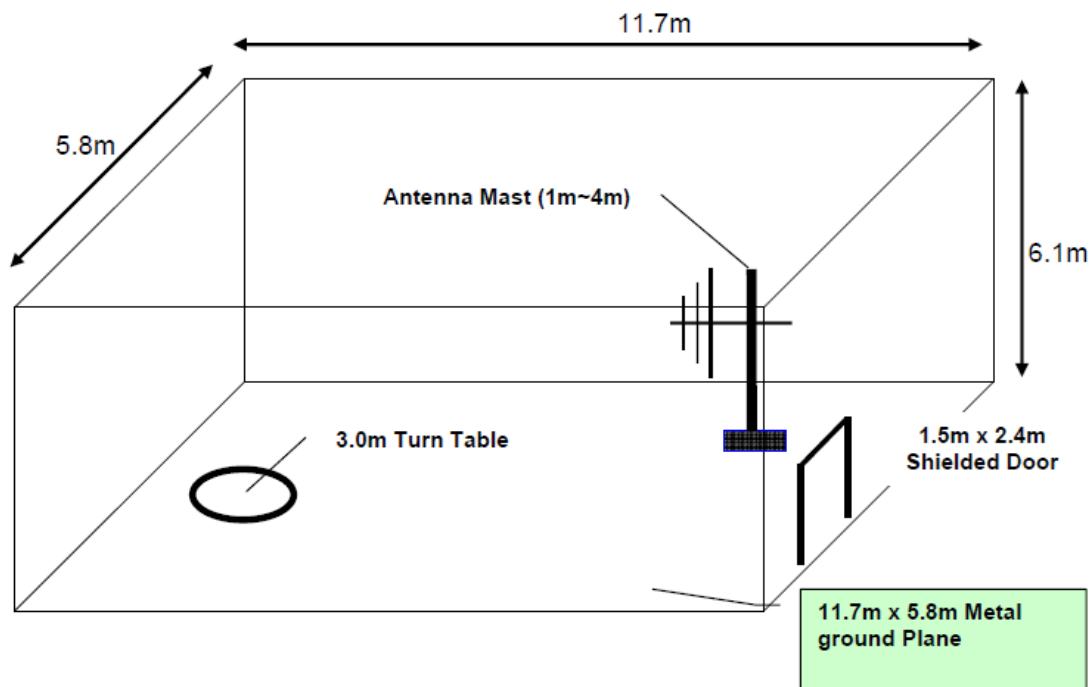


FIGURE 1a – FLOORSTANDING CONDUCTED EMISSIONS TEST SETUP – SITE ‘A’

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**FIGURE 3 - LAYOUT OF 5 METER SEMI-ANECHOIC CHAMBER**



ELECTRO MAGNETIC TEST, INC.

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APPENDIX D

MODIFICATIONS TO THE EUT



ELECTRO MAGNETIC TEST, INC.

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MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC radiated emission specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

Modifications:

- 1) Bluetooth was set at 80% of maximum power.



ELECTRO MAGNETIC TEST, INC.

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APPENDIX E

ADDITIONAL MODELS COVERED UNDER THIS REPORT



ELECTRO MAGNETIC TEST, INC.

1547 Plymouth Street, Mountain View, CA 94043 Tel: (650) 965-4000 Fax: (650) 965-3000

ADDITIONAL MODELS COVERED UNDER THIS REPORT

There are no additional models to be covered under this report.