

# Logitech, Inc.

**A-00024**

Report No. LABT0371

Report Prepared By



[www.nwemc.com](http://www.nwemc.com)  
1-888-EMI-CERT

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**EMC Test Report**



22975 NW Evergreen Parkway  
Suite 400  
Hillsboro, Oregon 97124

**Certificate of Test**  
**Last Date of Test: May 14, 2010**  
**Logitech, Inc.**  
**Model: A-00024**

Emissions			
Test Description	Specification	Test Method	Pass/Fail
Spurious Radiated Emissions	FCC 15.247:2010	ANSI C63.10:2009	Pass
Radiated Emissions from Digital Portion	FCC 15.247:2010	ANSI C63.10:2009	Pass
Occupied Bandwidth	FCC 15.247:2010	ANSI C63.10:2009	Pass
Output Power	FCC 15.247:2010	ANSI C63.10:2009	Pass
Band Edge Compliance	FCC 15.247:2010	ANSI C63.10:2009	Pass
Spurious Conducted Emissions	FCC 15.247:2010	ANSI C63.10:2009	Pass
Power Spectral Density	FCC 15.247:2010	ANSI C63.10:2009	Pass
AC Powerline Conducted Emissions	FCC 15.209:2010	ANSI C63.10:2009	Pass

**Modifications made to the product**  
**See the Modifications section of this report**

**Test Facility**

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.  
22975 NW Evergreen Parkway, Suite 400  
Hillsboro, OR 97124

Phone: (503) 844-4066 Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada (Site filing #2834D-2).

**Approved By:**

Don Facteau, IS Manager



NVLAP Lab Code: 200630-0

*This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.*

*Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.*

Revision Number	Description	Date	Page Number
00	None		

**Barometric Pressure**

The recorded barometric pressure has been normalized to sea level.



# Accreditations and Authorizations

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## FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.



## NVLAP

Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



NVLAP LAB CODE 200629-0  
NVLAP LAB CODE 200630-0  
NVLAP LAB CODE 200676-0  
NVLAP LAB CODE 200761-0  
NVLAP LAB CODE 200881-0

## Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)



## CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.



## NEMKO

Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



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## Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



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## VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634).



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## BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017). License No.SL2-IN-E-1017.



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## GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



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## KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157)



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## VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.



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## SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



# Northwest EMC Locations



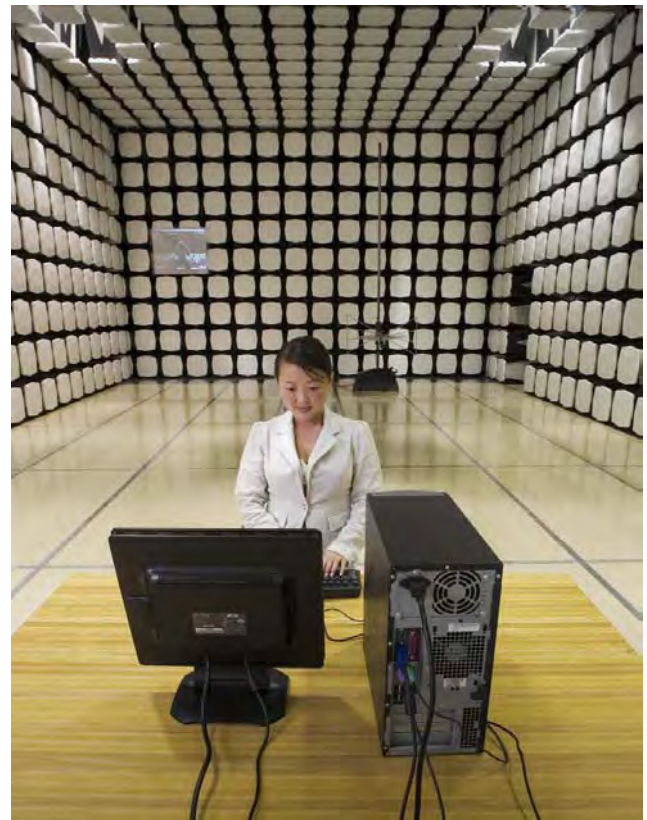
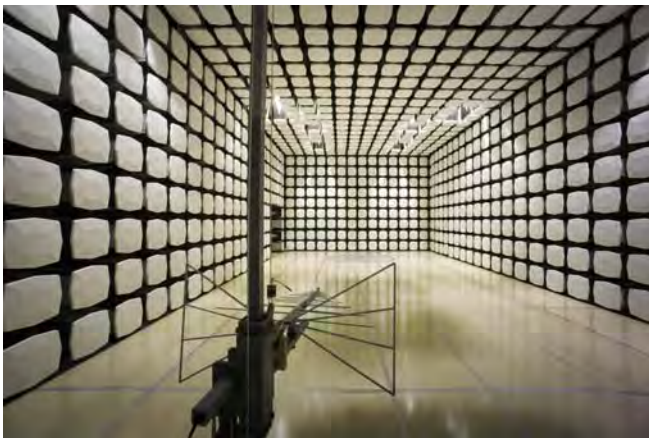
Oregon  
Labs EV01-EV12  
22975 NW Evergreen Pkwy  
Suite 400  
Hillsboro, OR 97124  
(503) 844-4066

California  
Labs OC01-OC13  
41 Tesla  
Irvine, CA 92618  
(949) 861-8918

Minnesota  
Labs MN01-MN08  
9349 W Broadway Ave.  
Brooklyn Park,  
MN 55445  
(763) 425-2281

Washington  
Labs SU01-SU07  
14128 339<sup>th</sup> Ave. SE  
Sultan, WA 98294  
(360) 793-8675

New York  
Labs WA01-WA04  
4939 Jordan Rd.  
Elbridge, NY 13060  
(315) 685-0796





**Party Requesting the Test**

<b>Company Name:</b>	Logitech, Inc.
<b>Address:</b>	1499 SE Tech Center Place Suite 350
<b>City, State, Zip:</b>	Vancouver, WA 98683
<b>Test Requested By:</b>	Aaron Cohen
<b>Model:</b>	A-00024
<b>First Date of Test:</b>	May 10, 2010
<b>Last Date of Test:</b>	May 14, 2010
<b>Receipt Date of Samples:</b>	May 10, 2010
<b>Equipment Design Stage:</b>	Preproduction
<b>Equipment Condition:</b>	No Damage

**Information Provided by the Party Requesting the Test****Functional Description of the EUT (Equipment Under Test):**

2.4 GHz ISM radio

**Testing Objective:**

Seeking approval by a TCB under FCC 15.247

**CONFIGURATION 2 LABT0371**

Software/Firmware Running during test	
Description	Version
AM2debug	v1.46.002

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
USB Dongle - direct connect	Logitech	A-00024	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Control PC	Dell	Inspiron 6000	Unknown

**CONFIGURATION 4 LABT0371**

Software/Firmware Running during test	
Description	Version
Windows Media Player	10.0.0
Windows XP	2002
NW EMC Exerciser	1.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
USB Dongle	Logitech	A-00024	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Keyboard	IBM	KB-9910	0033545
Host PC	Dell	Dimension 1100	CNOYD544
Monitor	HP	HPW1907	3CQ61433DT
USB Puck	Logitech	A-00024	None
Mouse	Microsoft	IntelliMouse 1.1A	4549526-00000
Parallel Printer	Epson	LX300	1YLY287403

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC mains	No	1.8m	No	Host PC	AC Mains
Keyboard	Yes	1.6m	No	Host PC	Keyboard
Mouse	Yes	1.5m	No	Host PC	Mouse
Parallel	Yes	1.5m	No	Host PC	Parallel Printer
USB	Yes	0.7m	No	Host PC	USB Puck
USB	Yes	1.5m	No	USB Puck	Headphones
AC mains	No	1.7m	No	Monitor	AC Mains
Video	Yes	1.5m	Yes	Monitor	Host PC

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.



**CONFIGURATION 5 LABT0371****Software/Firmware Running during test**

Description	Version
AM2debug	v1.46.002

**EUT**

Description	Manufacturer	Model/Part Number	Serial Number
USB Dongle	Logitech	A-00024	None

**Remote Equipment Outside of Test Setup Boundary**

Description	Manufacturer	Model/Part Number	Serial Number
Host Laptop	Dell	Inspiron E1505	G4MBX91
USB Puck	Logitech	A-00024	None

**Cables**

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	0.7m	No	Host PC	USB Puck
USB	Yes	1.5m	No	USB Puck	Headphones

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

<b>Equipment modifications</b>					
Item	Date	Test	Modification	Note	Disposition of EUT
1	5/10/2010	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	5/10/2010	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	5/10/2010	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	5/10/2010	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	5/10/2010	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	5/12/2010	AC Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
7	5/14/2010	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4407B	AAU	12/12/2008	24
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0

#### MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

#### TEST DESCRIPTION

The occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate with the typical modulation.

## EMC

## OCCUPIED BANDWIDTH

EUT:	A-00024	Work Order:	LABT0371
Serial Number:	None	Date:	05/10/10
Customer:	Logitech, Inc.	Temperature:	23°C
Attendees:	None	Humidity:	39%
Project:	None	Barometric Pres.:	29.91 in
Tested by:	Rod Peloquin	Power:	USB
		Job Site:	EV06

<b>TEST SPECIFICATIONS</b>		Test Method
FCC 15.247:2010		ANSI C63.10:2009

<b>COMMENTS</b>
None

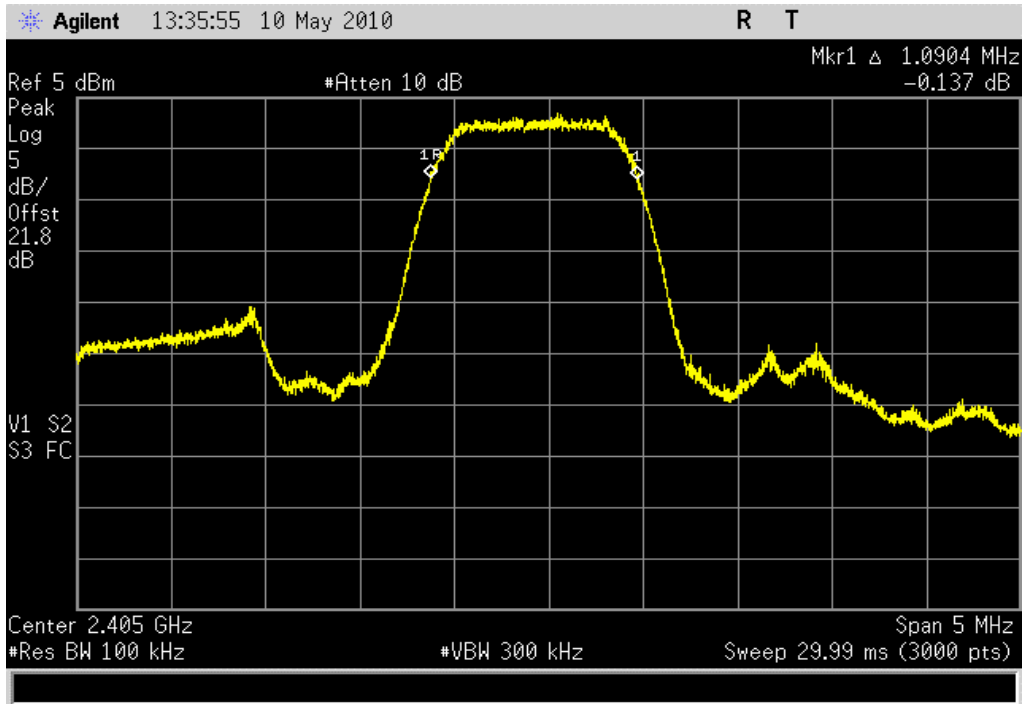
<b>DEVIATIONS FROM TEST STANDARD</b>
No Deviations

<b>Configuration #</b>	2	<i>Rodry Le Pelley</i> Signature
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	Value	Limit	Results
Low Channel	1.090 MHz	> 500 kHz	Pass
Mid Channel	1.090 MHz	> 500 kHz	Pass
High Channel	1.085 MHz	> 500 kHz	Pass

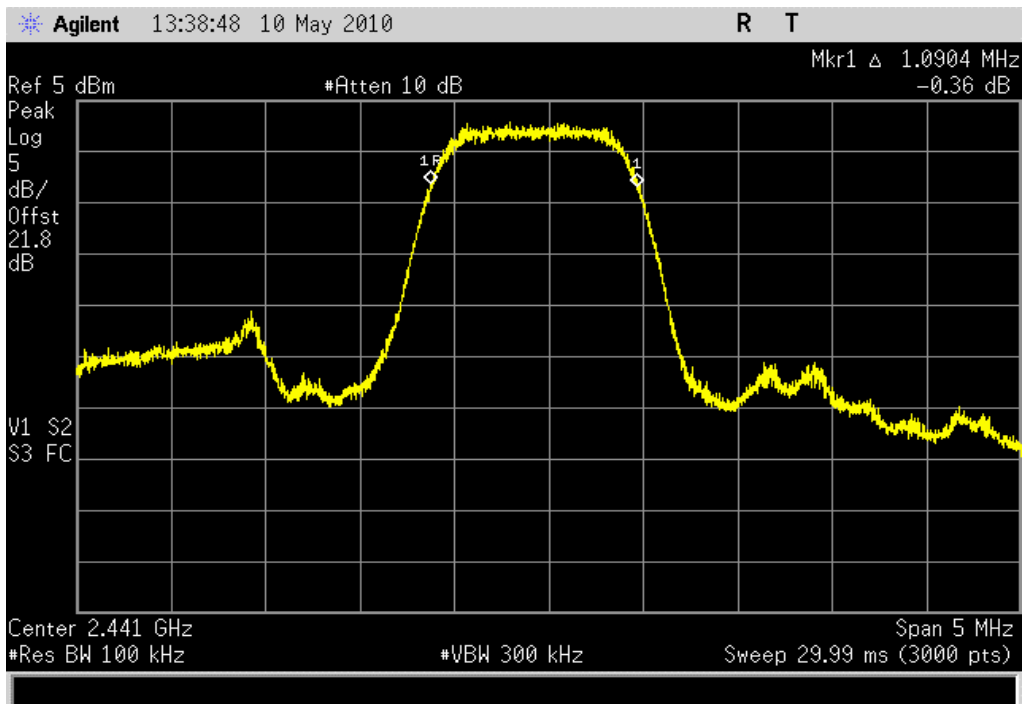
**Low Channel**

<b>Result:</b> Pass	<b>Value:</b> 1.090 MHz	<b>Limit:</b> > 500 kHz
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**Mid Channel**

<b>Result:</b> Pass	<b>Value:</b> 1.090 MHz	<b>Limit:</b> > 500 kHz
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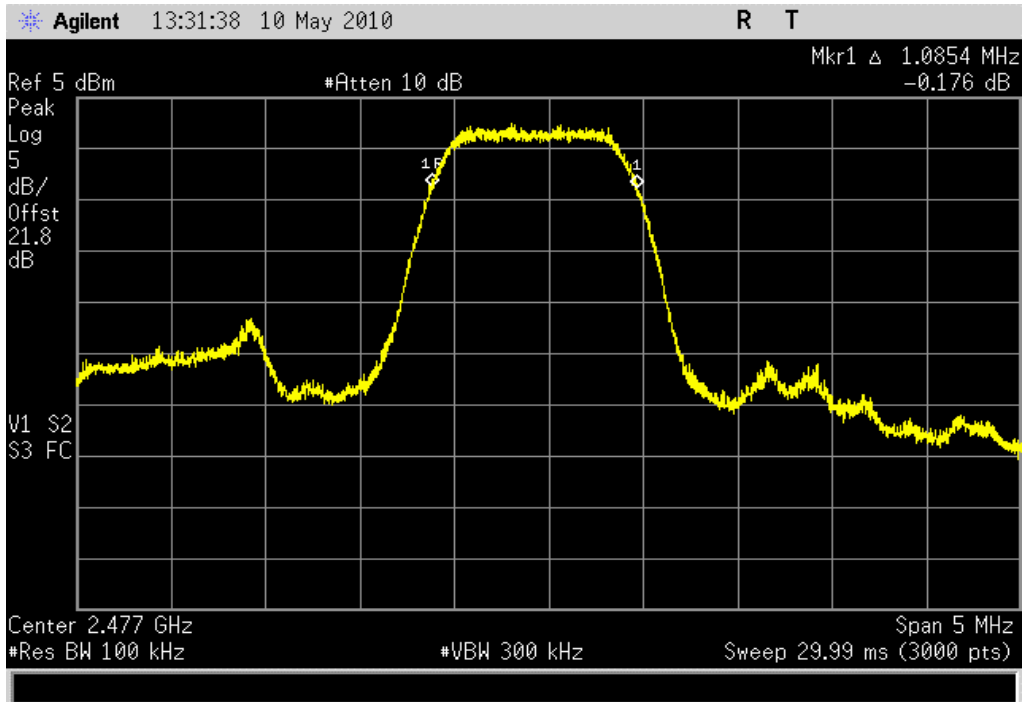


## High Channel

**Result:** Pass

**Value:** 1.085 MHz

**Limit:** > 500 kHz



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4407B	AAU	12/12/2008	24
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator, 6 dB, 'SMA'	N/A	93459 3330A-6	AUF	4/1/2010	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Signal Generator	Agilent	E8257D	TGX	12/10/2008	24

#### MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

#### TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

**De Facto EIRP Limit:** Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.



## EMC

## OUTPUT POWER

EUT:	A-00024	Work Order:	LABT0371
Serial Number:	None	Date:	05/10/10
Customer:	Logitech, Inc.	Temperature:	23°C
Attendees:	None	Humidity:	39%
Project:	None	Barometric Pres.:	29.91 in
Tested by:	Rod Peloquin	Power:	USB
		Job Site:	EV06

<b>TEST SPECIFICATIONS</b>		Test Method
FCC 15.247:2010		ANSI C63.10:2009

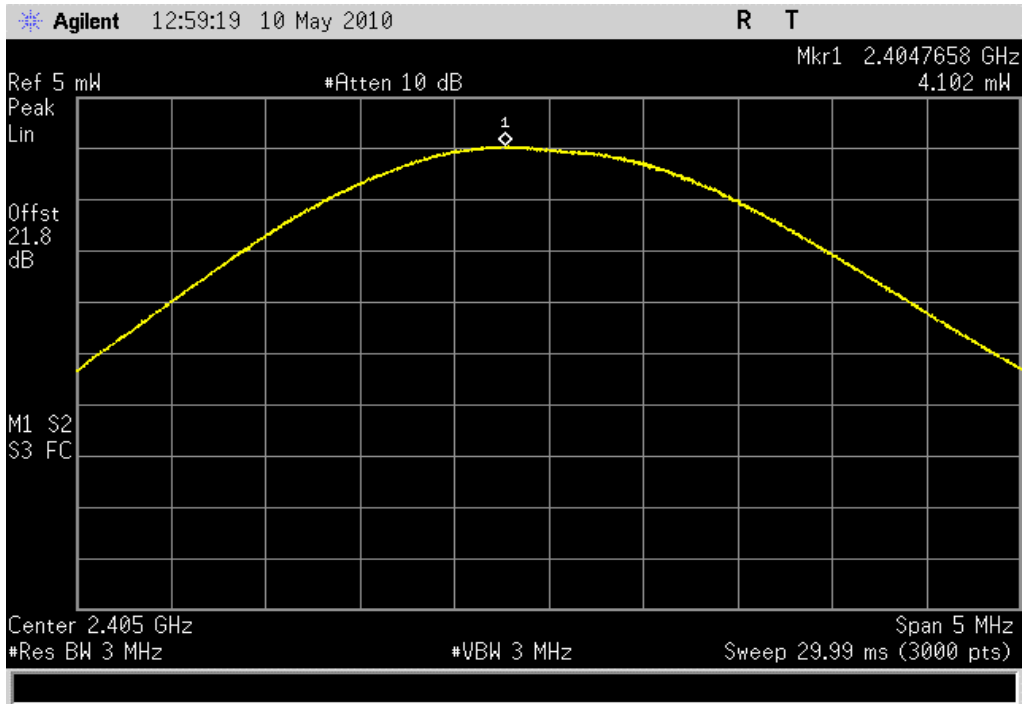
<b>COMMENTS</b>
None

<b>DEVIATIONS FROM TEST STANDARD</b>
No Deviations

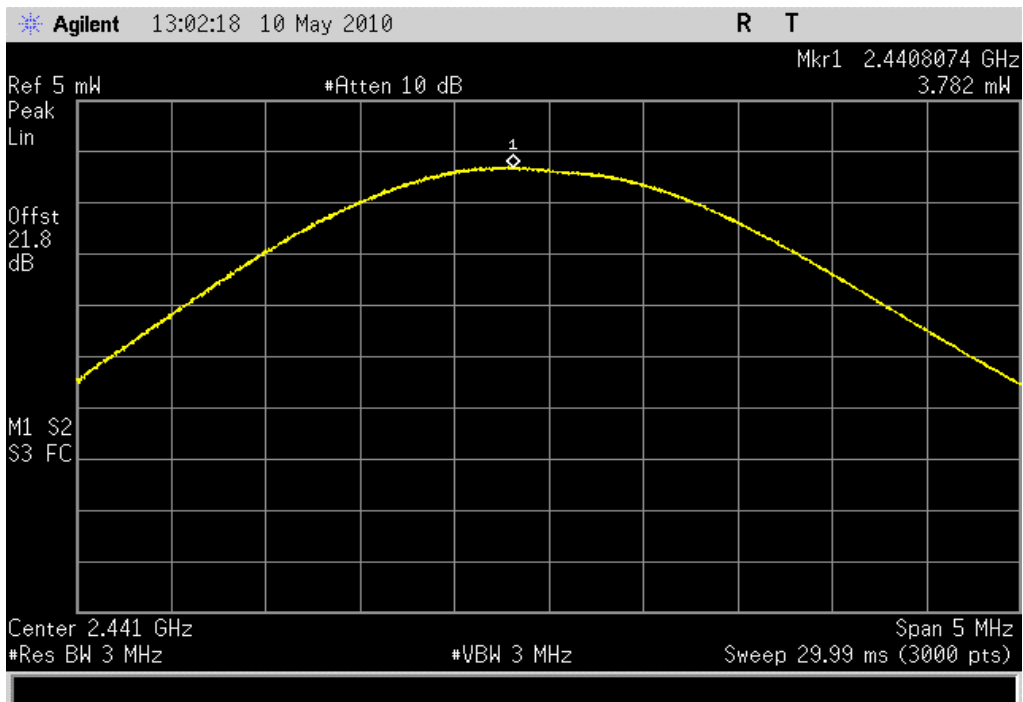
<b>Configuration #</b>	2	<i>Rod Peloquin</i> Signature
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	Value	Limit	Results
Low Channel	4.1 mW	1 W	Pass
Mid Channel	3.8 mW	1 W	Pass
High Channel	3.3 mW	1 W	Pass

Low Channel  
**Result:** Pass      **Value:** 4.1 mW      **Limit:** 1 W



Mid Channel  
**Result:** Pass      **Value:** 3.8 mW      **Limit:** 1 W

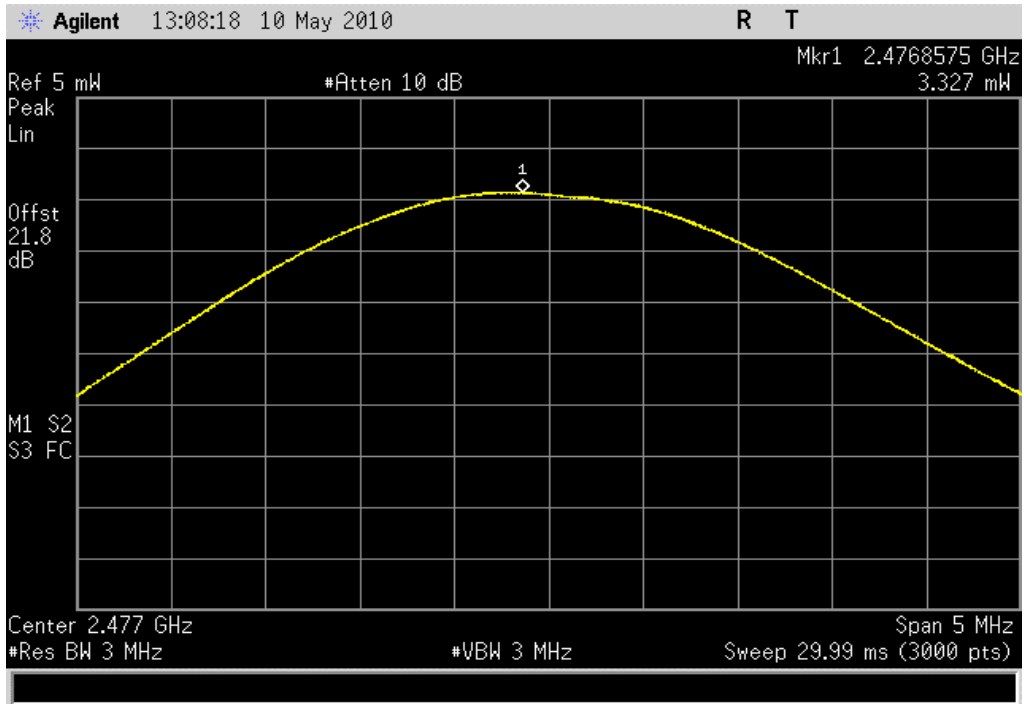


High Channel

**Result:** Pass

**Value:** 3.3 mW

**Limit:** 1 W



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4407B	AAU	12/12/2008	24
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0

#### MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.


#### TEST DESCRIPTION

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its lowest, middle, and maximum data rate available.

The spectrum was scanned across each band edge from at least 10 MHz below the band edge to 10 MHz above the band edge.

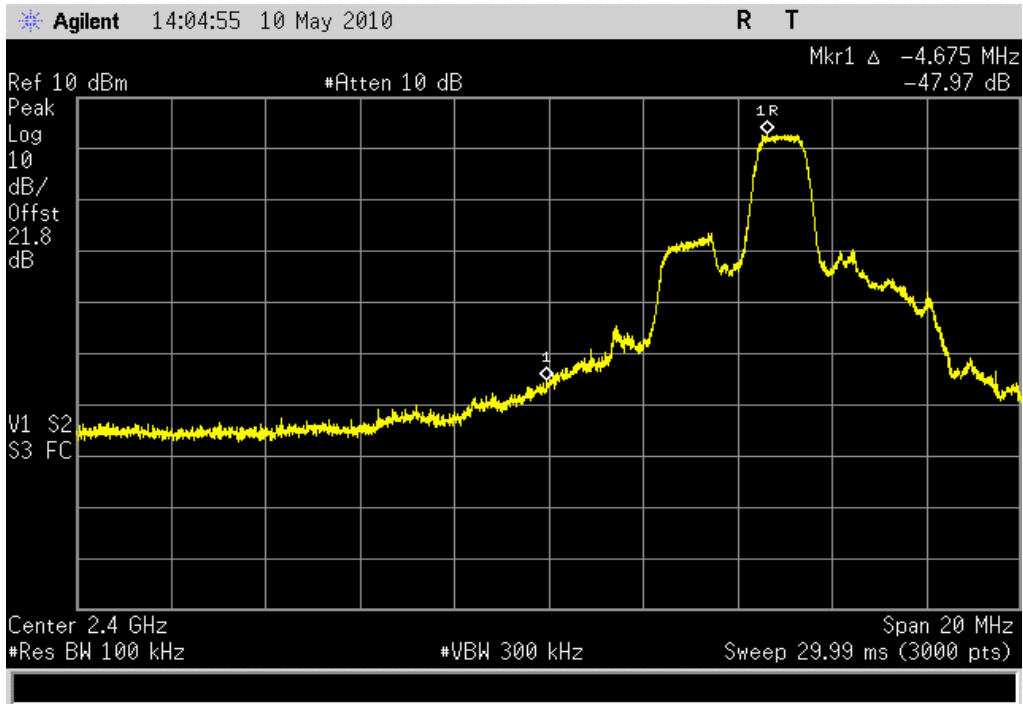
## EMC

## BAND EDGE COMPLIANCE

EUT: A-00024		Work Order: LABT0371	
Serial Number: None		Date: 05/10/10	
Customer: Logitech, Inc.		Temperature: 23°C	
Attendees: None		Humidity: 39%	
Project: None		Barometric Pres.: 29.91 in	
Tested by: Rod Peloquin		Power: USB	Job Site: EV06
<b>TEST SPECIFICATIONS</b>		Test Method	
FCC 15.247:2010		ANSI C63.10:2009	
<b>COMMENTS</b>			
None			
<b>DEVIATIONS FROM TEST STANDARD</b>			
No Deviations			
Configuration #	2	Signature 	
		<b>Value</b>	<b>Limit</b>
Low Channel		-47.97 dBc	≤ -20 dBc
High Channel		-51.36 dBc	≤ -20 dBc
			<b>Results</b>
			Pass
			Pass

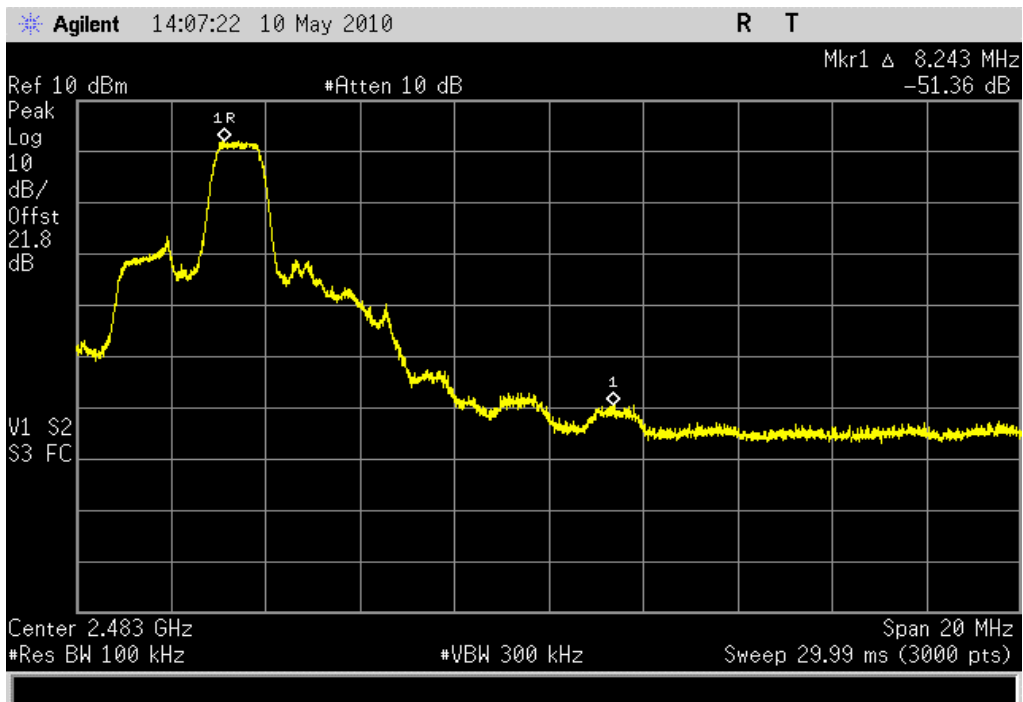
Low Channel

<b>Result:</b> Pass	<b>Value:</b> -47.97 dBc	<b>Limit:</b> ≤ -20 dBc
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High Channel

<b>Result:</b> Pass	<b>Value:</b> -51.36 dBc	<b>Limit:</b> ≤ -20 dBc
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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4407B	AAU	12/12/2008	24
26 GHz DC Block, SMA	Pasternack	PE8210	AME	10/19/2009	13
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0

#### MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

#### TEST DESCRIPTION

The spurious RF conducted emissions were measured with the EUT set to low, medium, and high transmit frequencies. The measurements were made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate using direct sequence modulation. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.



EUT: A-00024	Work Order: LABT0371
Serial Number: None	Date: 05/10/10
Customer: Logitech, Inc.	Temperature: 23°C
Attendees: None	Humidity: 39%
Project: None	Barometric Pres.: 29.91 in
Tested by: Rod Peloquin	Power: USB
	Job Site: EV06

<b>TEST SPECIFICATIONS</b>	Test Method
FCC 15.247:2010	ANSI C63.10:2009

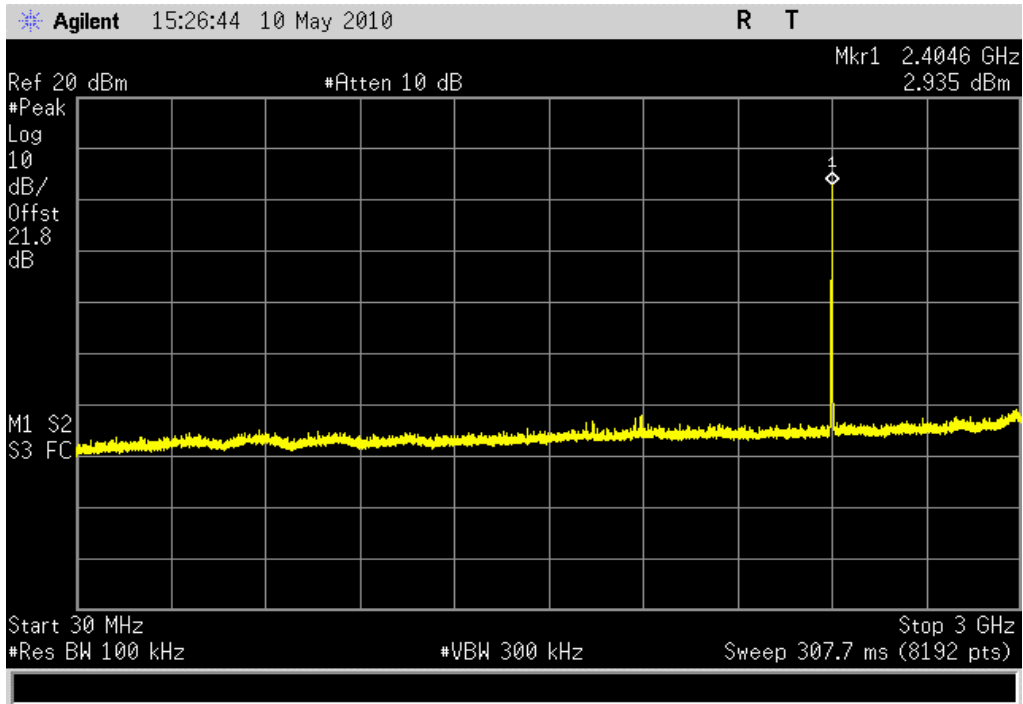
<b>COMMENTS</b>
None

<b>DEVIATIONS FROM TEST STANDARD</b>
No Deviations

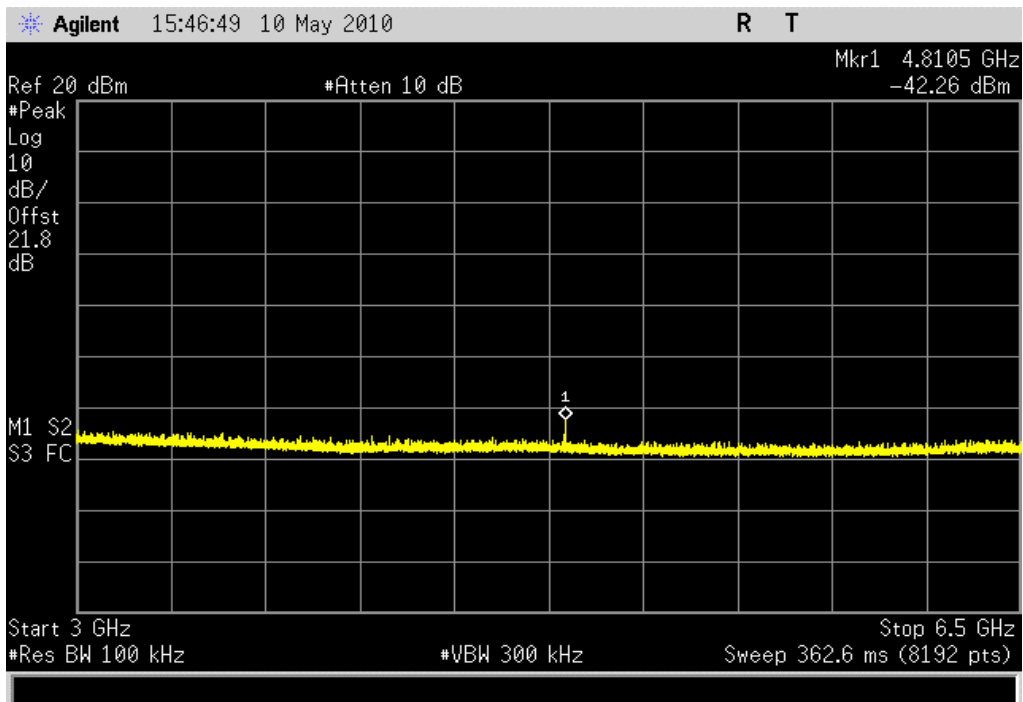
<b>Configuration #</b>	2	<i>Rod Peloquin</i> Signature
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		Value	Limit	Results
<b>Low Channel</b>				
	0 - 3 GHz	< -40 dBc	≤ -20 dBc	Pass
	3 - 6.5 GHz	-45.2 dBc	≤ -20 dBc	Pass
	6.5 - 12.8 GHz	-46.1 dBc	≤ -20 dBc	Pass
	12.8 - 25 GHz	< -40 dBc	≤ -20 dBc	Pass
<b>Mid Channel</b>				
	0 - 3 GHz	< -40 dBc	≤ -20 dBc	Pass
	3 - 6.5 GHz	-45.2 dBc	≤ -20 dBc	Pass
	6.5 - 12.8 GHz	-45.8 dBc	≤ -20 dBc	Pass
	12.8 - 25 GHz	< -40 dBc	≤ -20 dBc	Pass
<b>High Channel</b>				
	0 - 3 GHz	< -40 dBc	≤ -20 dBc	Pass
	3 - 6.5 GHz	< -40 dBc	≤ -20 dBc	Pass
	6.5 - 12.8 GHz	-46.2 dBc	≤ -20 dBc	Pass
	12.8 - 25 GHz	< -40 dBc	≤ -20 dBc	Pass

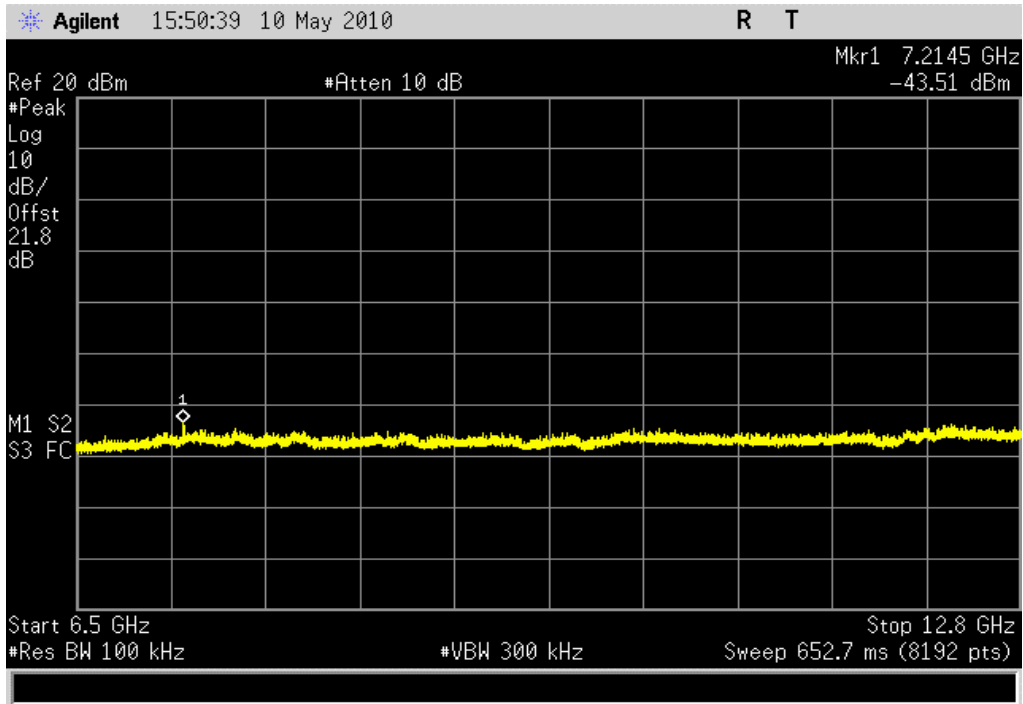
Low Channel, 0 - 3 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc



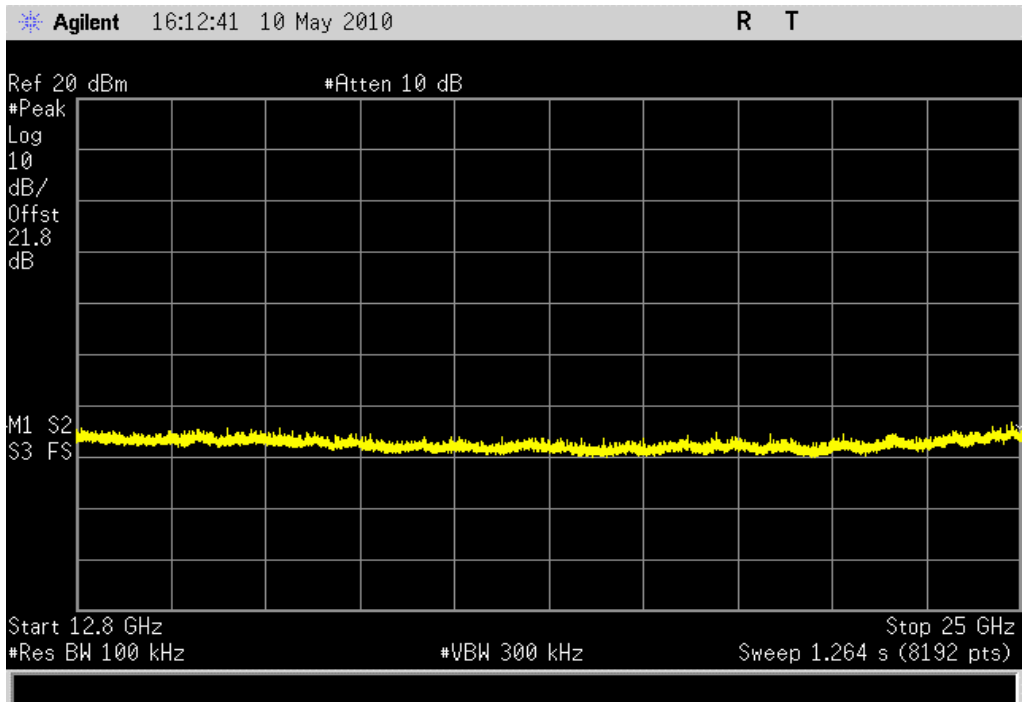
Low Channel, 3 - 6.5 GHz  
**Result:** Pass      **Value:** -45.2 dBc      **Limit:** ≤ -20 dBc



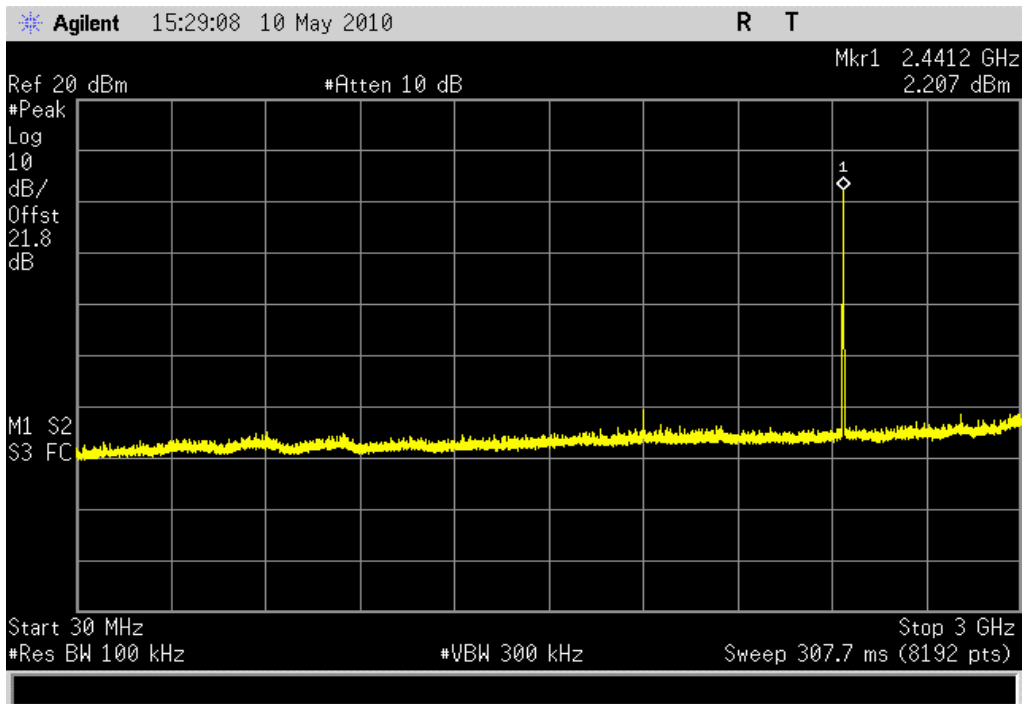
Low Channel, 6.5 - 12.8 GHz  
**Result:** Pass      **Value:** -46.1 dBc      **Limit:** ≤ -20 dBc



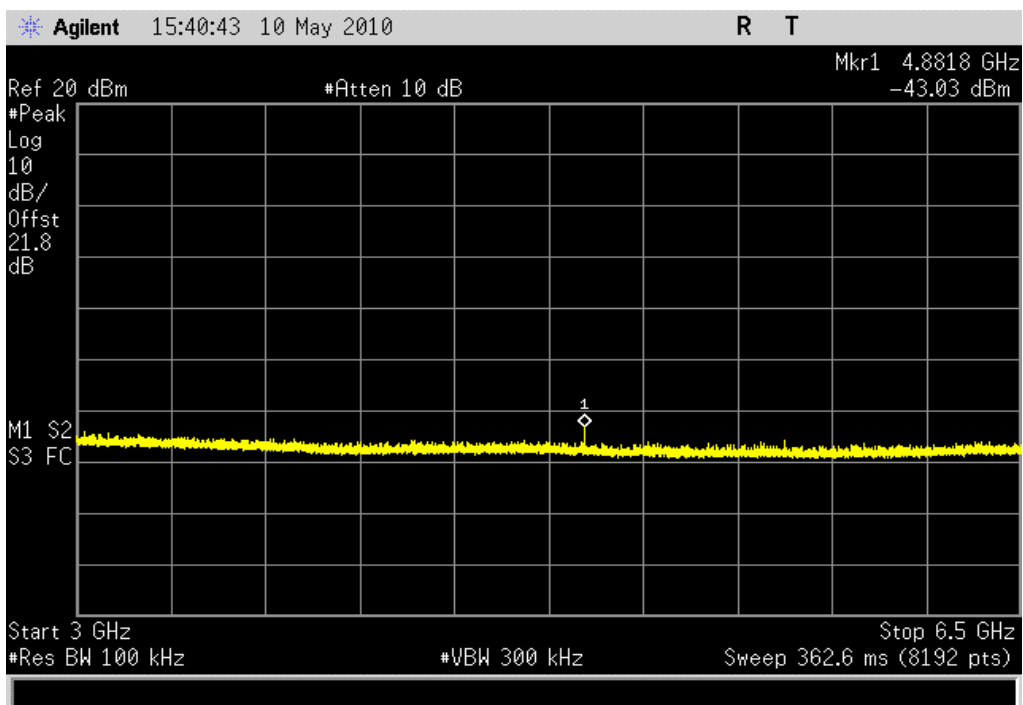
Low Channel, 12.8 - 25 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc



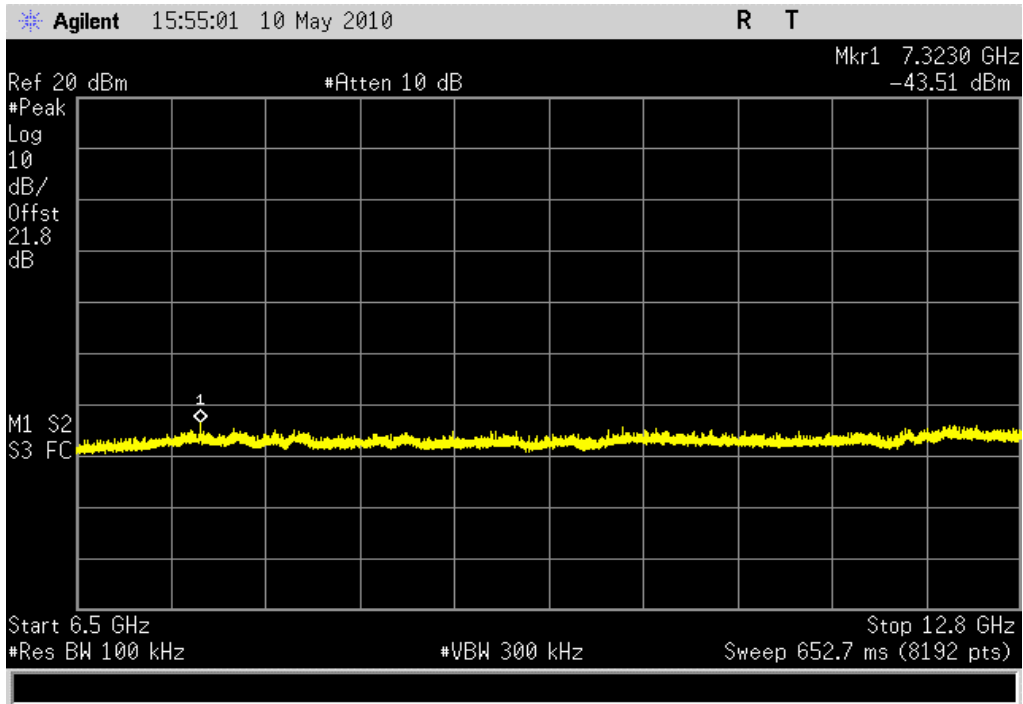
Mid Channel, 0 - 3 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc



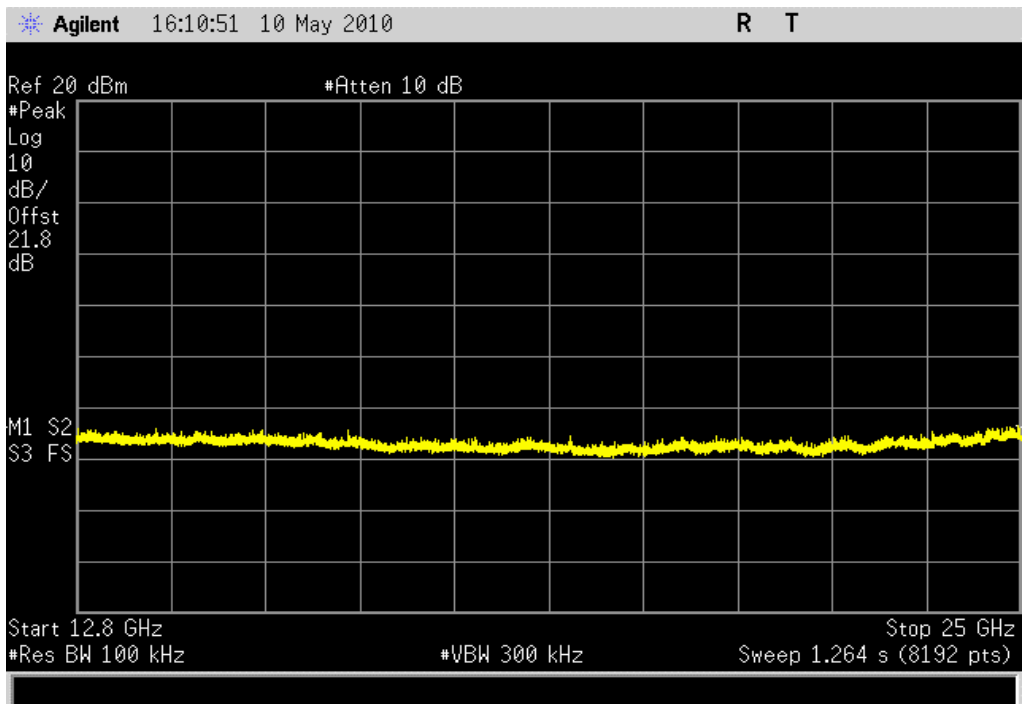
Mid Channel, 3 - 6.5 GHz  
**Result:** Pass      **Value:** -45.2 dBc      **Limit:** ≤ -20 dBc



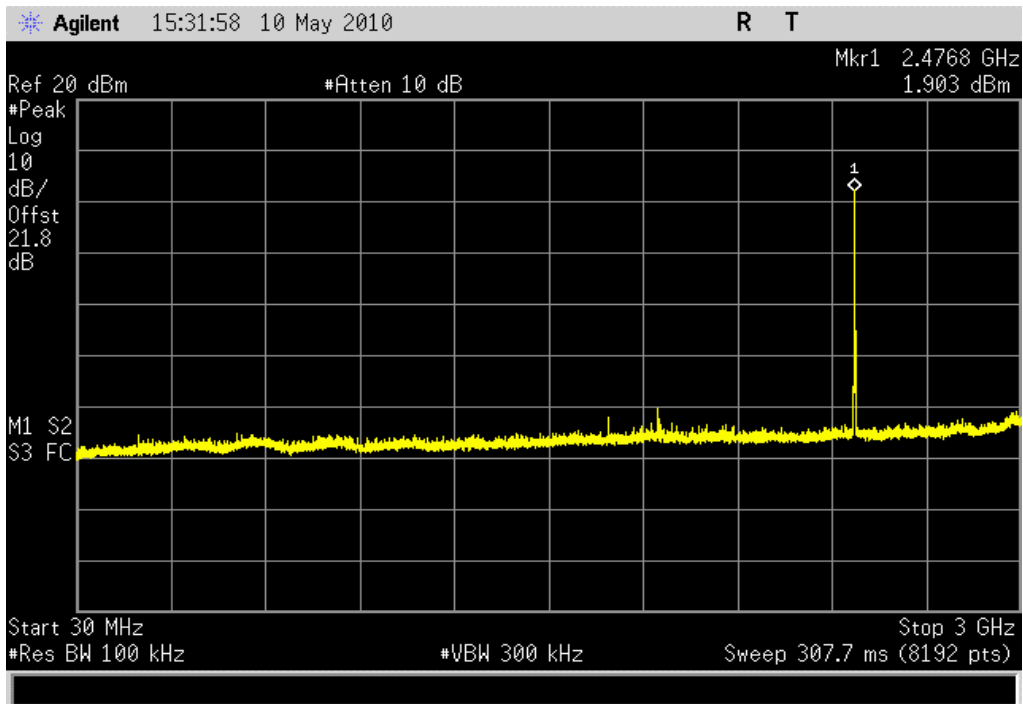
Mid Channel, 6.5 - 12.8 GHz  
**Result:** Pass      **Value:** -45.8 dBc      **Limit:** ≤ -20 dBc



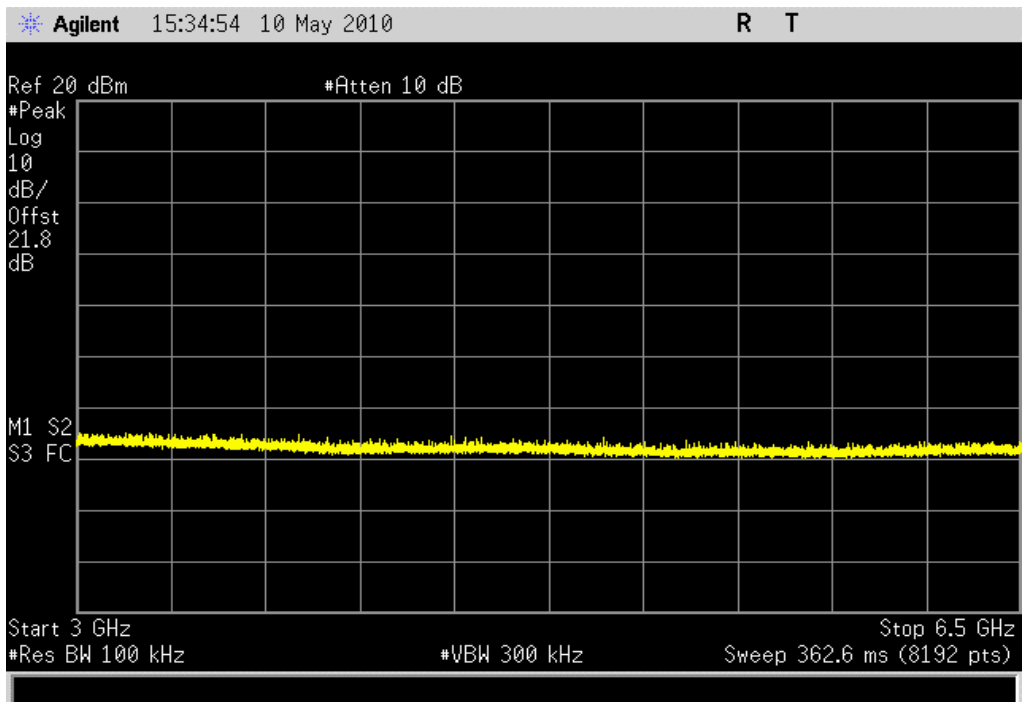
Mid Channel, 12.8 - 25 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc



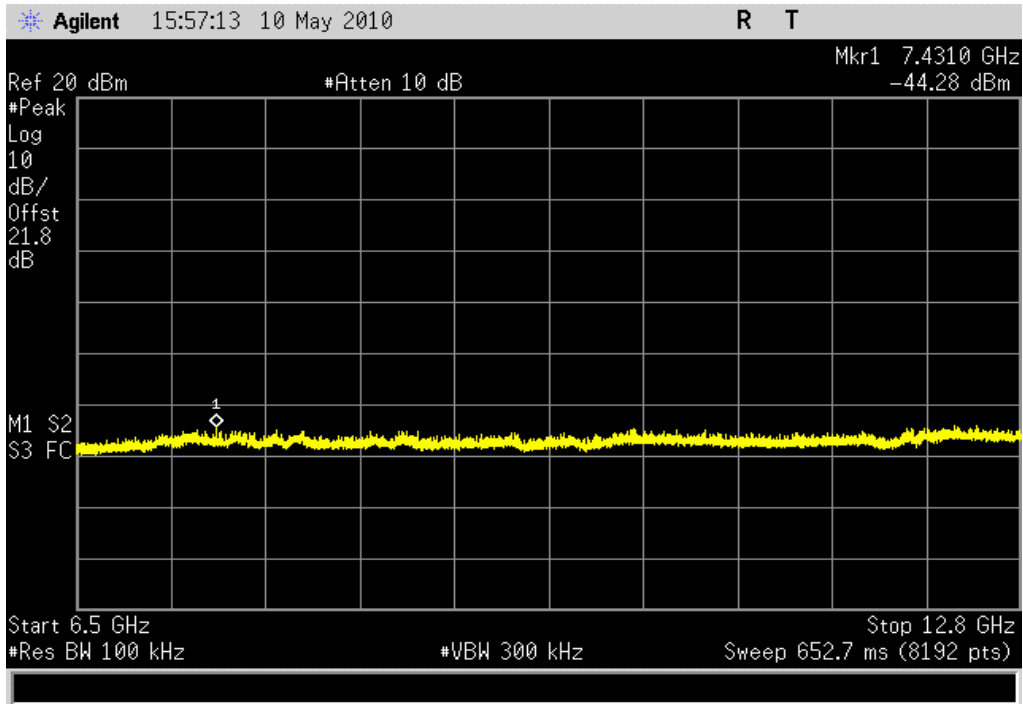
High Channel, 0 - 3 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc



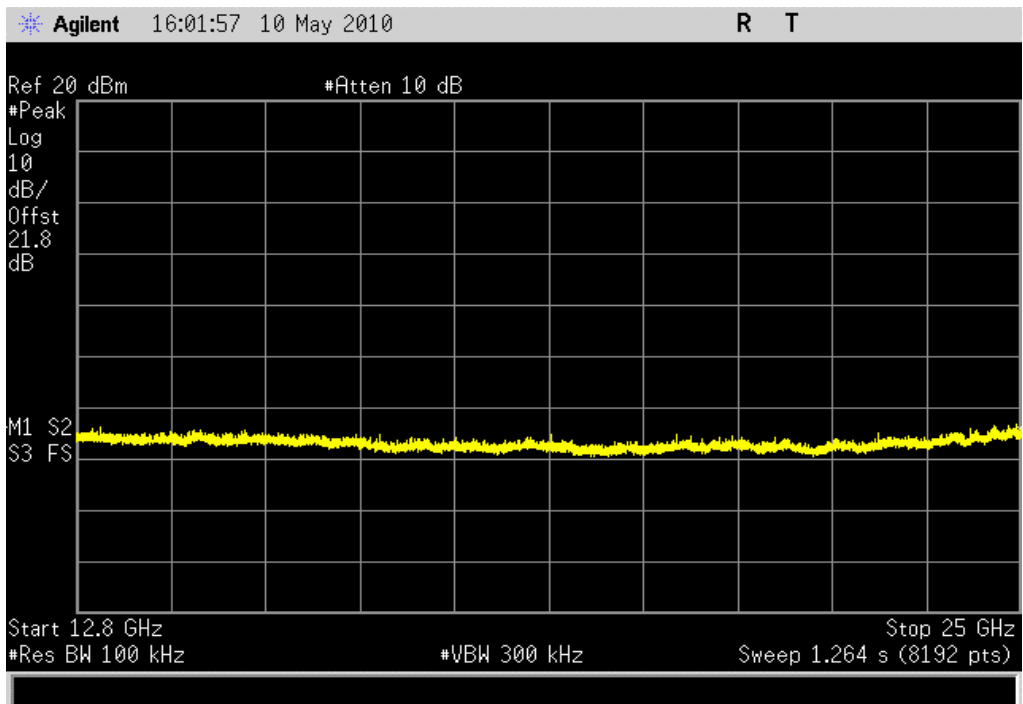
High Channel, 3 - 6.5 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc



High Channel, 6.5 - 12.8 GHz  
**Result:** Pass      **Value:** -46.2 dBc      **Limit:** ≤ -20 dBc



High Channel, 12.8 - 25 GHz  
**Result:** Pass      **Value:** < -40 dBc      **Limit:** ≤ -20 dBc





Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT					
Description	Manufacturer	Model	ID	Last Cal.	Interval
Spectrum Analyzer	Agilent	E4407B	AAU	12/12/2008	24
Attenuator 20 dB, SMA M/F 26GHz	S.M. Electronics	SA26B-20	AUY	7/21/2009	13
EV06 Direct Connect Cable	ESM Cable Corp.	TT	ECA	NCR	0
Attenuator, 6 dB, 'SMA'	N/A	93459 3330A-6	AUF	4/1/2010	13
Power Meter	Gigatronics	8651A	SPM	1/7/2010	13
Power Sensor	Gigatronics	80701A	SPL	1/7/2010	13
Signal Generator	Agilent	E8257D	TGX	12/10/2008	24

### MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

### TEST DESCRIPTION

The peak power spectral density measurements were measured with the EUT set to low, mid, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate for each modulation type available. Per the procedure outlined in FCC KDB 558074, March 23, 2005, the spectrum analyzer was used as follows:

The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be  $1.5 \times 10^6 \div 3 \times 10^3 = 500$  seconds. External attenuation was used and added to the reading. The following FCC procedure was used for modifying the power spectral density measurements:

*"If the spectrum line spacing cannot be resolved on the available spectrum analyzer, the noise density function on most modern conventional spectrum analyzers will directly measure the noise power density normalized to a 1 Hz noise power bandwidth. Add 35 dB for correction to 3 kHz."*

**EMC**

**POWER SPECTRAL DENSITY**

EUT: A-00024	Work Order: LABT0371
Serial Number: None	Date: 05/10/10
Customer: Logitech, Inc.	Temperature: 23°C
Attendees: None	Humidity: 39%
Project: None	Barometric Pres.: 29.91 in
Tested by: Rod Peloquin	Power: USB
	Job Site: EV06

<b>TEST SPECIFICATIONS</b>	
FCC 15.247:2010	Test Method: ANSI C63.10:2009

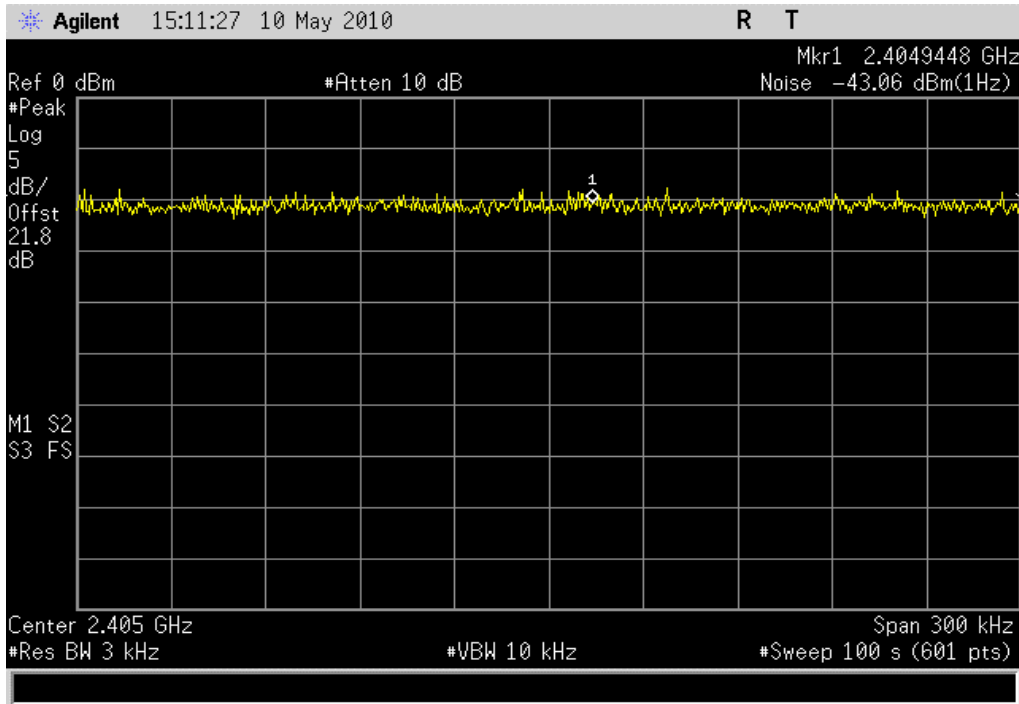
**COMMENTS**  
None

**DEVIATIONS FROM TEST STANDARD**  
No Deviations

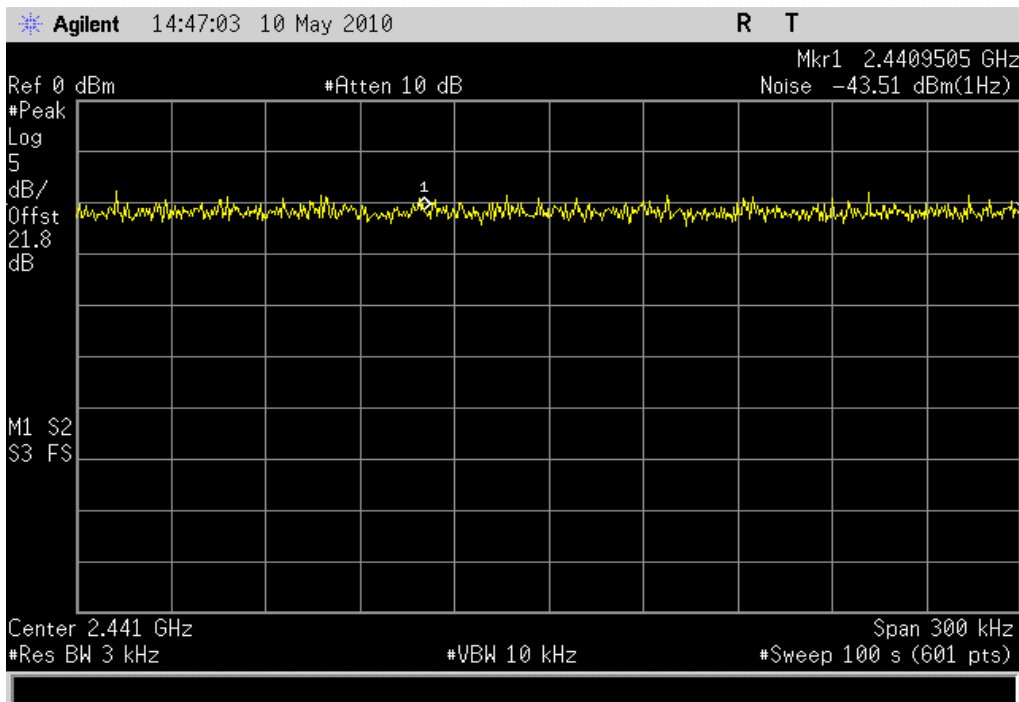
<b>Configuration #</b>	2	<i>Rod Peloquin</i> Signature
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	Value	Limit	Results
Low Channel	-8.3 dBm / 3 kHz	8 dBm / 3 kHz	Pass
Mid Channel	-8.7 dBm / 3 kHz	8 dBm / 3 kHz	Pass
High Channel	-9.1 dBm / 3 kHz	8 dBm / 3 kHz	Pass

Low Channel  
**Result:** Pass      **Value:** -8.3 dBm / 3 kHz      **Limit:** 8 dBm / 3 kHz



Mid Channel  
**Result:** Pass      **Value:** -8.7 dBm / 3 kHz      **Limit:** 8 dBm / 3 kHz

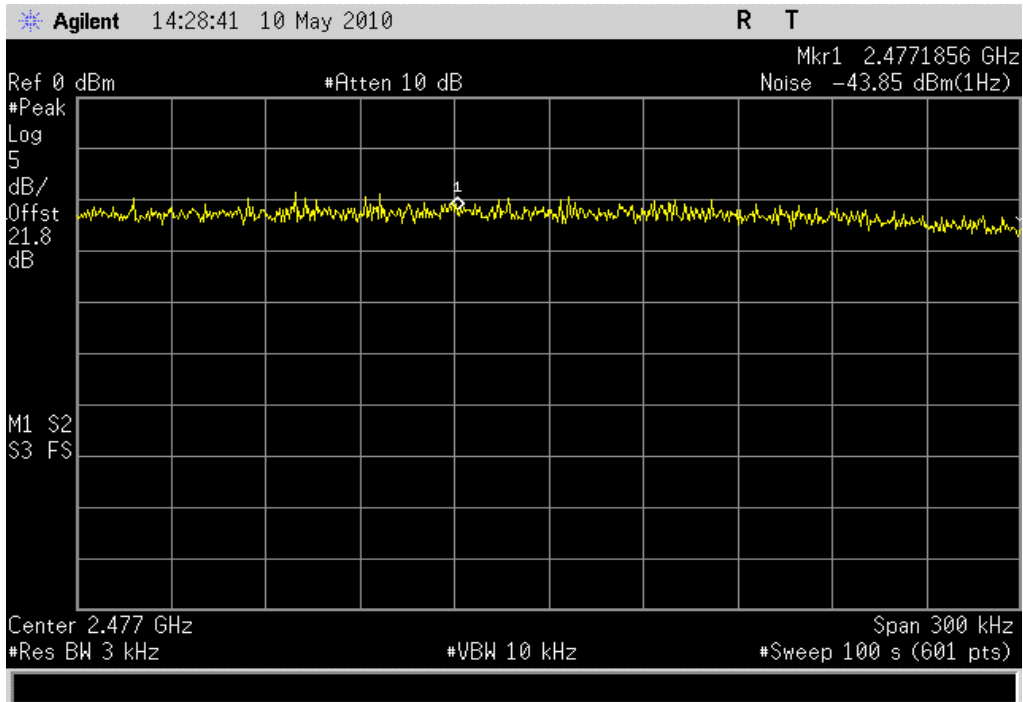


## High Channel

**Result:** Pass

**Value:** -9.1 dBm / 3 kHz

**Limit:** 8 dBm / 3 kHz



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

#### MODES OF OPERATION

Transmitting continuous, Low antenna  
Transmitting continuous, High antenna

#### CHANNELS INVESTIGATED

Low, Mid, and High channels

#### FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26 GHz
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#### SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

#### TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	Pasternack	PE7005-20	AUN	6/25/2009	13
High Pass Filter	Micro-Tronics	50111	HGE	1/13/2010	13
Antenna, Horn	ETS Lindgren	3160-09	AIV	NCR	0
Cable	ESM Cable Corp.	KMKM-72	EVY	11/3/2009	13
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	5/19/2009	13
Antenna, Horn	ETS	3160-08	AIA	NCR	0
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVI	6/26/2009	13
Antenna, Horn	ETS	3160.07	AHZ	10/14/2008	24
EV12 Cables		Standard Gain Horn Cables	EVU	6/25/2009	13
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVH	6/26/2009	13
Antenna, Horn	ETS	3115	AIB	8/25/2008	24
EV12 Cables		Double Ridge Horn Cables	EVT	10/23/2009	13
Pre-Amplifier	Miteq	AMF-3D00100800-32-13P	AVF	6/25/2009	13
Antenna, Biconilog	EMCO	3141	AXG	2/15/2010	13
EV12 Cables		Bilog Cables	EVS	6/25/2009	13
Pre-Amplifier	Miteq	AM-1616-1000	AVM	6/25/2009	13
Spectrum Analyzer	Agilent	E4440A	AFD	6/1/2009	24

#### MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

#### MEASUREMENT UNCERTAINTY

A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. The measurement uncertainty estimation is available upon request.

#### TEST DESCRIPTION

The highest gain of each type of antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. For each configuration, the spectrum was scanned throughout the specified range. In addition, measurements were made in the restricted bands to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and the EUT antenna in three orthogonal axis, and adjusting measurement antenna height and polarization, and manipulating the EUT antenna in 3 orthogonal planes (per ANSI C63.10:2009). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

<b>EUT:</b> A-00024	<b>Work Order:</b> LABT0371
<b>Serial Number:</b> #1	<b>Date:</b> 05/13/10
<b>Customer:</b> Logitech, Inc.	<b>Temperature:</b> 23°C
<b>Attendees:</b> none	<b>Humidity:</b> 33%
<b>Project:</b> None	<b>Barometric Pres.:</b> 30.19 in
<b>Tested by:</b> Ethan Schoonover	<b>Power:</b> 120VAC/60Hz
	<b>Job Site:</b> EV12

<b>TEST SPECIFICATIONS</b>	<b>Test Method</b>
FCC 15.247:2010	ANSI C63.10:2009

<b>TEST PARAMETERS</b>	
<b>Antenna Height(s) (m)</b> 1 - 4	<b>Test Distance (m)</b> 3

**COMMENTS**

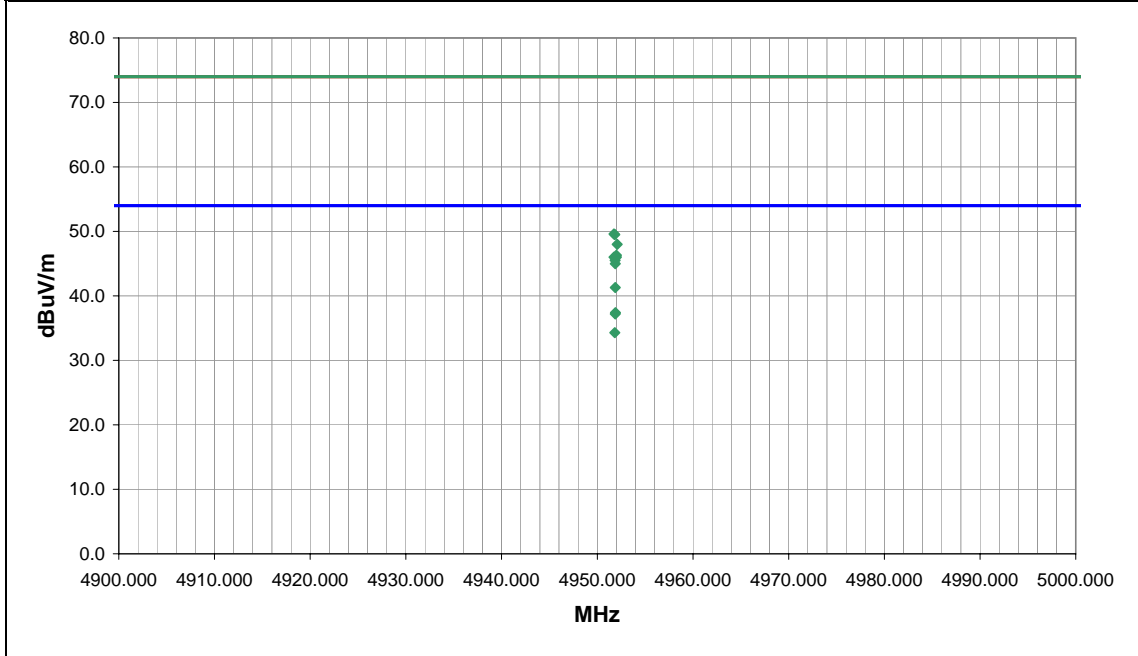
**EUT OPERATING MODES**

Tx Low Antenna Channel 2477 MHz

**DEVIATIONS FROM TEST STANDARD**

No deviations.

<b>Run #</b>	2	<i>Signature</i> 
<b>Configuration #</b>	5	
<b>Results</b>	Pass	



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4951.869	37.0	8.5	257.0	1.4	3.0	0.0	V-Horn	AV	0.0	45.5	54.0	-8.5	EUT on side.
4951.887	36.5	8.5	38.0	1.4	3.0	0.0	V-Horn	AV	0.0	45.0	54.0	-9.0	EUT Normal
4951.875	32.8	8.5	356.0	1.6	3.0	0.0	H-Horn	AV	0.0	41.3	54.0	-12.7	EUT Normal
4951.893	28.9	8.5	110.0	1.9	3.0	0.0	H-Horn	AV	0.0	37.4	54.0	-16.6	EUT on back
4951.881	28.7	8.5	196.0	1.4	3.0	0.0	V-Horn	AV	0.0	37.2	54.0	-16.8	EUT on back
4951.832	25.8	8.5	346.0	1.6	3.0	0.0	H-Horn	AV	0.0	34.3	54.0	-19.7	EUT on side.
4951.750	41.1	8.5	38.0	1.4	3.0	0.0	V-Horn	PK	0.0	49.6	74.0	-24.4	EUT Normal
4951.830	41.0	8.5	257.0	1.4	3.0	0.0	V-Horn	PK	0.0	49.5	74.0	-24.5	EUT on side.
4952.080	39.5	8.5	356.0	1.6	3.0	0.0	H-Horn	PK	0.0	48.0	74.0	-26.0	EUT Normal
4952.000	37.8	8.5	196.0	1.4	3.0	0.0	V-Horn	PK	0.0	46.3	74.0	-27.7	EUT on back
4951.750	37.5	8.5	346.0	1.6	3.0	0.0	H-Horn	PK	0.0	46.0	74.0	-28.0	EUT on side.
4952.000	37.5	8.5	110.0	1.9	3.0	0.0	H-Horn	PK	0.0	46.0	74.0	-28.0	EUT on back

EUT: A-00023	Work Order: LABT0371
Serial Number: #1	Date: 05/13/10
Customer: Logitech, Inc.	Temperature: 23°C
Attendees: none	Humidity: 33%
Project: none	Barometric Pres.: 30.19 in
Tested by:	Power: Battery
	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247:2010	ANSI C63.10:2009

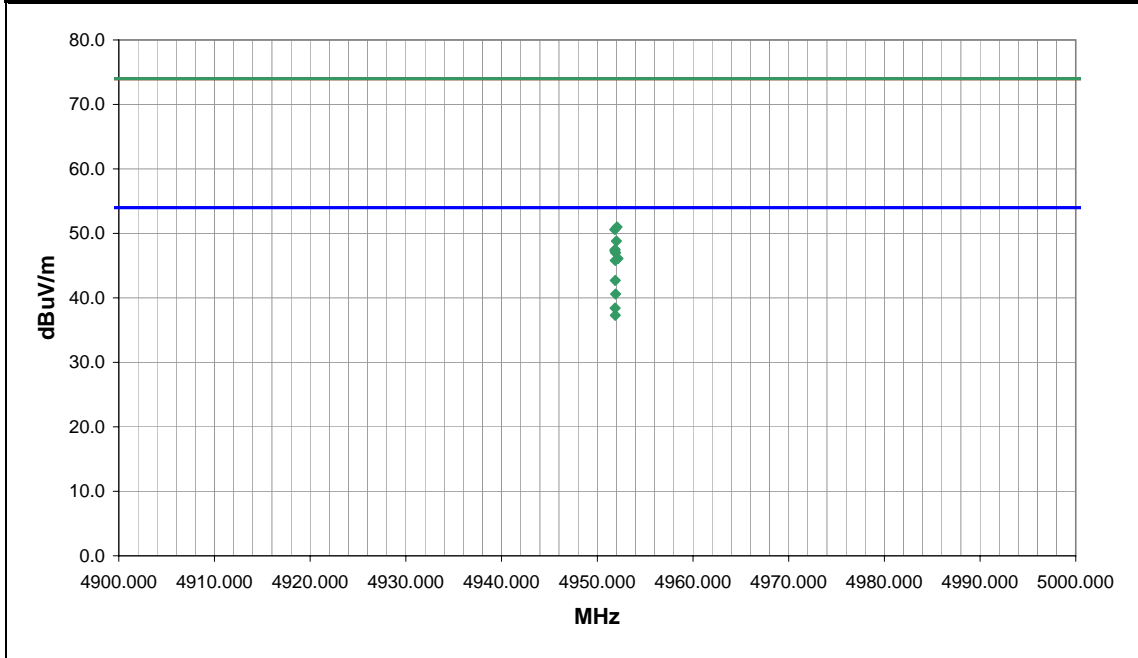
TEST PARAMETERS	
Antenna Height(s) (m) 1 - 4	Test Distance (m) 3

COMMENTS

EUT OPERATING MODES  
Tx 2477, High antenna

DEVIATIONS FROM TEST STANDARD  
No deviations.

Run #	3	Signature 
Configuration #	5	
Results	Pass	



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
4951.871	39.0	8.5	356.0	1.0	3.0	0.0	V-Horn	AV	0.0	47.5	54.0	-6.5	EUT normal
4951.877	37.3	8.5	294.0	1.6	3.0	0.0	H-Horn	AV	0.0	45.8	54.0	-8.2	EUT on back
4951.877	34.2	8.5	235.0	1.3	3.0	0.0	V-Horn	AV	0.0	42.7	54.0	-11.3	EUT on back
4951.910	32.1	8.5	321.0	1.4	3.0	0.0	H-Horn	AV	0.0	40.6	54.0	-13.4	EUT normal
4951.858	29.9	8.5	333.0	1.6	3.0	0.0	H-Horn	AV	0.0	38.4	54.0	-15.6	EUT on side
4951.883	28.8	8.5	295.0	1.3	3.0	0.0	V-Horn	AV	0.0	37.3	54.0	-16.7	EUT on side
4952.070	42.5	8.5	356.0	1.0	3.0	0.0	V-Horn	PK	0.0	51.0	74.0	-23.0	EUT normal
4951.830	42.1	8.5	294.0	1.6	3.0	0.0	H-Horn	PK	0.0	50.6	74.0	-23.4	EUT on back
4951.990	40.3	8.5	235.0	1.3	3.0	0.0	V-Horn	PK	0.0	48.8	74.0	-25.2	EUT on back
4951.830	38.8	8.5	333.0	1.6	3.0	0.0	H-Horn	PK	0.0	47.3	74.0	-26.7	EUT on side
4951.910	38.5	8.5	321.0	1.4	3.0	0.0	H-Horn	PK	0.0	47.0	74.0	-27.0	EUT normal
4952.160	37.6	8.5	295.0	1.3	3.0	0.0	V-Horn	PK	0.0	46.1	74.0	-27.9	EUT on side



EUT: A-00024	Work Order: LABT0371
Serial Number: #1	Date: 05/13/10
Customer: Logitech, Inc.	Temperature: 23°C
Attendees: none	Humidity: 33%
Project: None	Barometric Pres.: 30.19 in
Tested by: Ethan Schoonover	Power: 120VAC/60Hz
	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247:2010	ANSI C63.10:2009

TEST PARAMETERS
Antenna Height(s) (m)   1 - 4   Test Distance (m)   3

COMMENTS

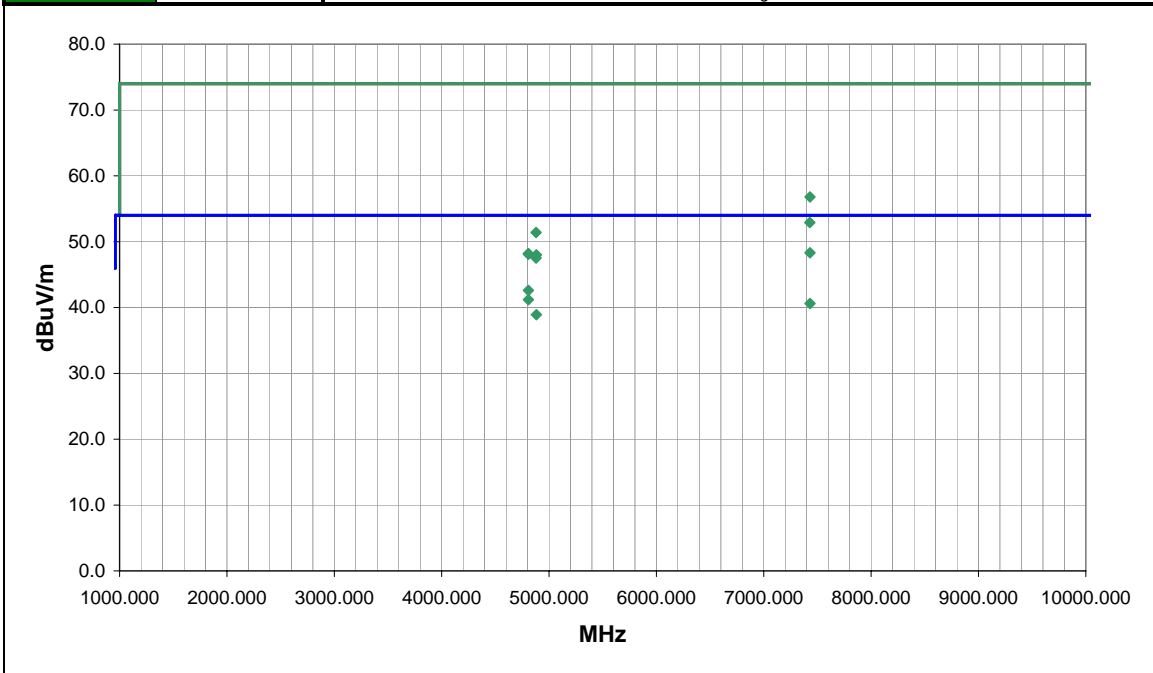
EUT OPERATING MODES

Tx High Antenna channel 2477MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	4	Signature 
Configuration #	5	
Results	Pass	



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
7430.765	32.8	15.5	52.0	1.2	3.0	0.0	V-Horn	AV	0.0	48.3	54.0	-5.7	
4879.879	38.9	8.6	360.0	1.3	3.0	0.0	V-Horn	AV	0.0	47.5	54.0	-6.5	
4807.869	34.0	8.6	76.0	1.0	3.0	0.0	V-Horn	AV	0.0	42.6	54.0	-11.4	
4807.893	32.6	8.6	154.0	1.3	3.0	0.0	H-Horn	AV	0.0	41.2	54.0	-12.8	
7430.678	25.1	15.5	280.0	1.0	3.0	0.0	H-Horn	AV	0.0	40.6	54.0	-13.4	
4881.923	30.3	8.6	357.0	1.0	3.0	0.0	H-Horn	AV	0.0	38.9	54.0	-15.1	
7431.037	41.3	15.5	52.0	1.2	3.0	0.0	V-Horn	PK	0.0	56.8	74.0	-17.2	
7429.588	37.4	15.5	280.0	1.0	3.0	0.0	H-Horn	PK	0.0	52.9	74.0	-21.1	
4879.800	42.8	8.6	360.0	1.3	3.0	0.0	V-Horn	PK	0.0	51.4	74.0	-22.6	
4807.760	39.6	8.6	154.0	1.3	3.0	0.0	H-Horn	PK	0.0	48.2	74.0	-25.8	
4807.840	39.5	8.6	76.0	1.0	3.0	0.0	V-Horn	PK	0.0	48.1	74.0	-25.9	
4881.760	39.4	8.6	357.0	1.0	3.0	0.0	H-Horn	PK	0.0	48.0	74.0	-26.0	

EUT: A-00024	Work Order: LABT0371
Serial Number: #1	Date: 05/14/10
Customer: Logitech, Inc.	Temperature: 23°C
Attendees: none	Humidity: 33%
Project: None	Barometric Pres.: 30.19 in
Tested by: Ethan Schoonover	Power: 120VAC/60Hz
	Job Site: EV12

TEST SPECIFICATIONS	Test Method
FCC 15.247:2010	ANSI C63.10:2009

TEST PARAMETERS
Antenna Height(s) (m)   1 - 4   Test Distance (m)   3

COMMENTS

EUT OPERATING MODES

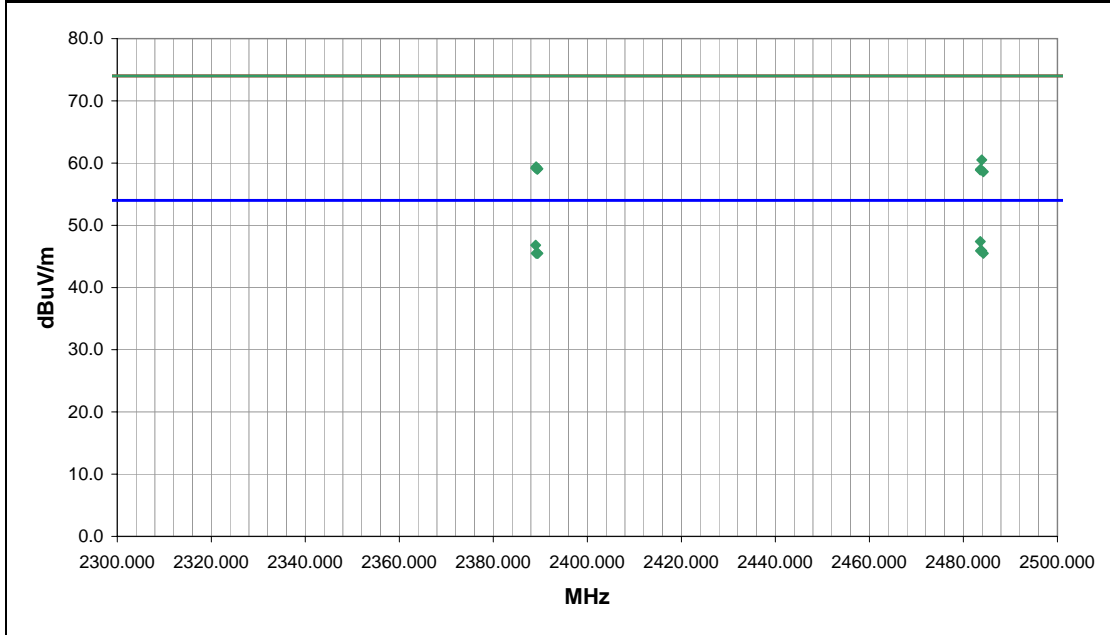
Tx High Antenna

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	5
Configuration #	5
Results	Pass

Signature 



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.598	28.4	-1.0	87.0	1.0	3.0	20.0	H-Horn	AV	0.0	47.4	54.0	-6.6	EUT Normal
2389.018	28.1	-1.3	83.0	1.0	3.0	20.0	H-Horn	AV	0.0	46.8	54.0	-7.2	EUT Normal
2483.620	26.9	-1.0	144.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.9	54.0	-8.1	EUT Normal
2483.885	26.9	-1.0	218.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.9	54.0	-8.1	EUT on Back
2484.242	26.5	-1.0	285.0	1.0	3.0	20.0	V-Horn	AV	0.0	45.5	54.0	-8.5	EUT on Back
2389.098	26.8	-1.3	279.0	2.0	3.0	20.0	V-Horn	AV	0.0	45.5	54.0	-8.5	EUT Normal
2389.333	26.8	-1.3	293.0	1.0	3.0	20.0	H-Horn	AV	0.0	45.5	54.0	-8.5	EUT on Back
2389.498	26.8	-1.3	359.0	2.0	3.0	20.0	V-Horn	AV	0.0	45.5	54.0	-8.5	EUT on Back
2483.885	41.5	-1.0	218.0	1.0	3.0	20.0	V-Horn	PK	0.0	60.5	74.0	-13.5	EUT on Back
2389.098	40.7	-1.3	279.0	2.0	3.0	20.0	V-Horn	PK	0.0	59.4	74.0	-14.6	EUT Normal
2389.018	40.5	-1.3	83.0	1.0	3.0	20.0	H-Horn	PK	0.0	59.2	74.0	-14.8	EUT Normal
2389.498	40.4	-1.3	359.0	2.0	3.0	20.0	V-Horn	PK	0.0	59.1	74.0	-14.9	EUT on Back
2483.620	40.0	-1.0	144.0	1.0	3.0	20.0	H-Horn	PK	0.0	59.0	74.0	-15.0	EUT Normal
2389.333	40.3	-1.3	293.0	1.0	3.0	20.0	H-Horn	PK	0.0	59.0	74.0	-15.0	EUT on Back
2483.598	39.9	-1.0	87.0	1.0	3.0	20.0	H-Horn	PK	0.0	58.9	74.0	-15.1	EUT Normal
2484.242	39.6	-1.0	285.0	1.0	3.0	20.0	V-Horn	PK	0.0	58.6	74.0	-15.4	EUT on Back

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

**MODES OF OPERATION**

Tx Low Antenna High channel
Tx Low Antenna Mid channel
Tx Low Antenna Low channel

**POWER SETTINGS INVESTIGATED**

120VAC/60Hz
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**CONFIGURATIONS INVESTIGATED**

LABT0371 - 4
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**SAMPLE CALCULATIONS**

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator
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**TEST EQUIPMENT**

Description	Manufacturer	Model	ID	Last Cal.	Interval
LISN	Solar	9252-50-R-24-BNC	LIR	3/2/2010	13 mo
Attenuator	Coaxicom	66702 2910-20	ATO	7/21/2009	13 mo
High Pass Filter	TTE	H97-100K-50-720B	HFX	2/16/2010	13 mo
Receiver	Rohde & Schwarz	ESCI	ARE	4/29/2010	12 mo
EV07 Cables	N/A	Conducted Cables	EVG	6/1/2009	13 mo
LISN	Solar	9252-50-R-24-BNC	LIP	3/2/2010	13 mo

**MEASUREMENT BANDWIDTHS**

	Frequency Range	Peak Data	Quasi-Peak Data	Average Data
	(MHz)	(kHz)	(kHz)	(kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

**MEASUREMENT UNCERTAINTY**


A measurement uncertainty estimation has been performed for each test per our internal quality document WP 342. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty for radiated emissions measurements is less than +/- 4 dB, and for conducted emissions measurements is less than +/- 2.7 dB. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for measurement uncertainty are available upon request.

**TEST DESCRIPTION**

The EUT will be powered either directly or indirectly from the AC power line. Therefore, conducted emissions measurements were made on the AC input of the EUT, or on the AC input of the device used to power the EUT. The AC power line conducted emissions were measured with the EUT operating at the lowest, the highest, and a middle channel in the operational band. The EUT was transmitting at its maximum data rate. For each mode, the spectrum was scanned from 150 kHz to 30 MHz. The test setup and procedures were in accordance with ANSI C63.10-2009.

# EMC

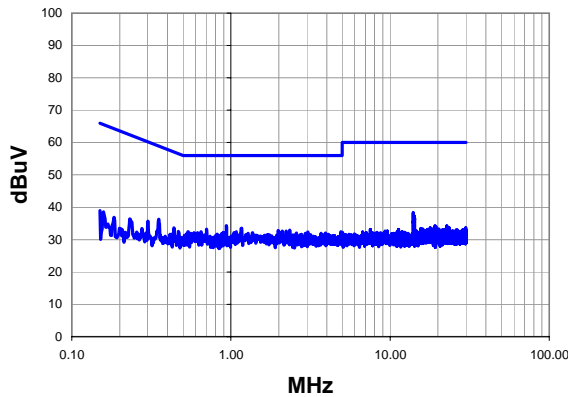
## AC POWERLINE CONDUCTED EMISSIONS

<b>Work Order:</b>	LABT0371	<b>Date:</b>	05/12/10	 <b>Tested by:</b> Ethan Schoonover
<b>Project:</b>	None	<b>Temperature:</b>	23°C	
<b>Job Site:</b>	EV07	<b>Humidity:</b>	33	
<b>Serial Number:</b>	#1	<b>Barometric Pres.:</b>	30.19 in	
<b>EUT:</b>	A-00024			
<b>Configuration:</b>	4			
<b>Customer:</b>	Logitech, Inc.			
<b>Attendees:</b>	None			
<b>EUT Power:</b>	120VAC/60Hz			
<b>Operating Mode:</b>	Tx Low Antenna Low channel			
<b>Deviations:</b>	None			
<b>Comments:</b>	None			

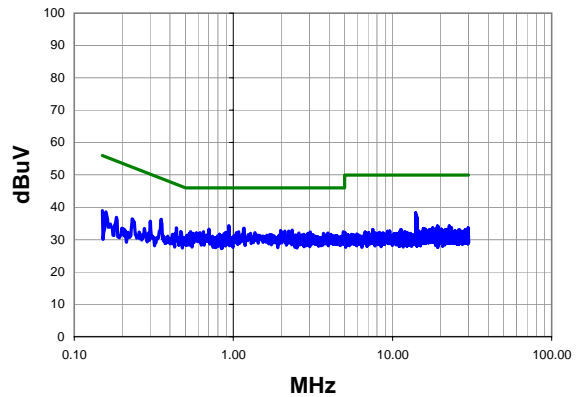
<b>Test Specifications</b> FCC 15.209:2010	<b>Test Method</b> ANSI C63.10:2009
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<b>Run #</b>	1	<b>Line:</b> High Line	<b>Ext. Attenuation:</b> 20	<b>Results</b>	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.937	14.1	20.2	34.3	56.0	-21.7
14.000	17.6	20.7	38.3	60.0	-21.7
1.168	13.3	20.2	33.5	56.0	-22.5
0.352	16.1	20.2	36.3	58.9	-22.6
14.190	16.6	20.7	37.3	60.0	-22.7
0.703	13.1	20.2	33.3	56.0	-22.7
2.344	12.6	20.3	32.9	56.0	-23.1
1.984	12.6	20.3	32.9	56.0	-23.1
2.224	12.4	20.3	32.7	56.0	-23.3
2.104	12.4	20.3	32.7	56.0	-23.3
14.240	15.9	20.7	36.6	60.0	-23.4
0.437	13.5	20.2	33.7	57.1	-23.4
1.080	12.3	20.2	32.5	56.0	-23.5
0.538	12.3	20.2	32.5	56.0	-23.5
0.648	12.3	20.2	32.5	56.0	-23.5
4.920	12.1	20.4	32.5	56.0	-23.5
3.040	12.0	20.3	32.3	56.0	-23.7
0.895	12.1	20.2	32.3	56.0	-23.7
1.048	12.0	20.2	32.2	56.0	-23.8
0.587	12.0	20.2	32.2	56.0	-23.8

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
0.937	14.1	20.2	34.3	46.0	-11.7
14.000	17.6	20.7	38.3	50.0	-11.7
1.168	13.3	20.2	33.5	46.0	-12.5
0.352	16.1	20.2	36.3	48.9	-12.6
14.190	16.6	20.7	37.3	50.0	-12.7
0.703	13.1	20.2	33.3	46.0	-12.7
2.344	12.6	20.3	32.9	46.0	-13.1
1.984	12.6	20.3	32.9	46.0	-13.1
2.224	12.4	20.3	32.7	46.0	-13.3
2.104	12.4	20.3	32.7	46.0	-13.3
14.240	15.9	20.7	36.6	50.0	-13.4
0.437	13.5	20.2	33.7	47.1	-13.4
1.080	12.3	20.2	32.5	46.0	-13.5
0.538	12.3	20.2	32.5	46.0	-13.5
0.648	12.3	20.2	32.5	46.0	-13.5
4.920	12.1	20.4	32.5	46.0	-13.5
3.040	12.0	20.3	32.3	46.0	-13.7
0.895	12.1	20.2	32.3	46.0	-13.7
1.048	12.0	20.2	32.2	46.0	-13.8
0.587	12.0	20.2	32.2	46.0	-13.8

# EMC

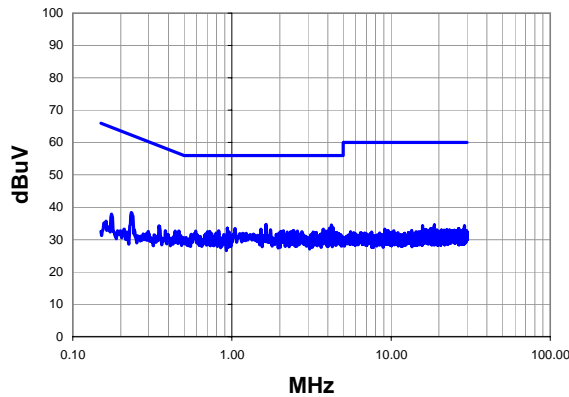
## AC POWERLINE CONDUCTED EMISSIONS

<b>Work Order:</b>	LABT0371	<b>Date:</b>	05/12/10	 <b>Tested by:</b> Ethan Schoonover
<b>Project:</b>	None	<b>Temperature:</b>	23°C	
<b>Job Site:</b>	EV07	<b>Humidity:</b>	33	
<b>Serial Number:</b>	#1	<b>Barometric Pres.:</b>	30.19 in	
<b>EUT:</b>	A-00024			
<b>Configuration:</b>	4			
<b>Customer:</b>	Logitech, Inc.			
<b>Attendees:</b>	None			
<b>EUT Power:</b>	120VAC/60Hz			
<b>Operating Mode:</b>	Tx Low Antenna Low channel			
<b>Deviations:</b>	None			
<b>Comments:</b>	None			

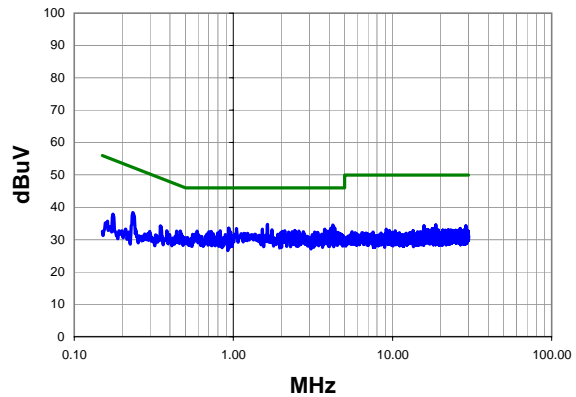
<b>Test Specifications</b> FCC 15.209:2010	<b>Test Method</b> ANSI C63.10:2009
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<b>Run #</b>	2	<b>Line:</b>	Neutral	<b>Ext. Attenuation:</b>	20	<b>Results</b>	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.640	14.5	20.2	34.7	56.0	-21.3
4.216	14.2	20.3	34.5	56.0	-21.5
4.336	13.3	20.3	33.6	56.0	-22.4
0.935	13.4	20.2	33.6	56.0	-22.4
4.104	13.2	20.3	33.5	56.0	-22.5
1.048	13.2	20.2	33.4	56.0	-22.6
3.752	12.9	20.3	33.2	56.0	-22.8
1.520	13.0	20.2	33.2	56.0	-22.8
1.752	12.8	20.3	33.1	56.0	-22.9
2.424	12.5	20.3	32.8	56.0	-23.2
0.827	12.6	20.2	32.8	56.0	-23.2
2.104	12.5	20.3	32.8	56.0	-23.2
0.592	12.5	20.2	32.7	56.0	-23.3
3.984	12.3	20.3	32.6	56.0	-23.4
3.864	12.3	20.3	32.6	56.0	-23.4
2.456	12.3	20.3	32.6	56.0	-23.4
2.576	12.3	20.3	32.6	56.0	-23.4
0.726	12.4	20.2	32.6	56.0	-23.4
2.032	12.3	20.3	32.6	56.0	-23.4
0.701	12.3	20.2	32.5	56.0	-23.5

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.640	14.5	20.2	34.7	46.0	-11.3
4.216	14.2	20.3	34.5	46.0	-11.5
4.336	13.3	20.3	33.6	46.0	-12.4
0.935	13.4	20.2	33.6	46.0	-12.4
4.104	13.2	20.3	33.5	46.0	-12.5
1.048	13.2	20.2	33.4	46.0	-12.6
3.752	12.9	20.3	33.2	46.0	-12.8
1.520	13.0	20.2	33.2	46.0	-12.8
1.752	12.8	20.3	33.1	46.0	-12.9
2.424	12.5	20.3	32.8	46.0	-13.2
0.827	12.6	20.2	32.8	46.0	-13.2
2.104	12.5	20.3	32.8	46.0	-13.2
0.592	12.5	20.2	32.7	46.0	-13.3
3.984	12.3	20.3	32.6	46.0	-13.4
3.864	12.3	20.3	32.6	46.0	-13.4
2.456	12.3	20.3	32.6	46.0	-13.4
2.576	12.3	20.3	32.6	46.0	-13.4
0.726	12.4	20.2	32.6	46.0	-13.4
2.032	12.3	20.3	32.6	46.0	-13.4
0.701	12.3	20.2	32.5	46.0	-13.5

# EMC

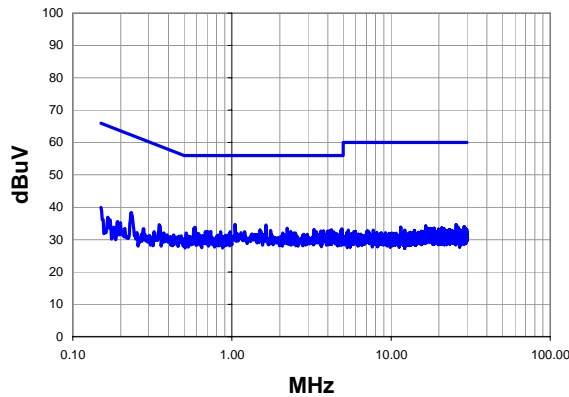
## AC POWERLINE CONDUCTED EMISSIONS

<b>Work Order:</b>	LABT0371	<b>Date:</b>	05/12/10	
<b>Project:</b>	None	<b>Temperature:</b>	23°C	
<b>Job Site:</b>	EV07	<b>Humidity:</b>	33	
<b>Serial Number:</b>	#1	<b>Barometric Pres.:</b>	30.19 in	
<b>EUT:</b>	A-00024			
<b>Configuration:</b>	4			
<b>Customer:</b>	Logitech, Inc.			
<b>Attendees:</b>	None			
<b>EUT Power:</b>	120VAC/60Hz			
<b>Operating Mode:</b>	Tx Low Antenna Mid channel			
<b>Deviations:</b>	None			
<b>Comments:</b>	None			

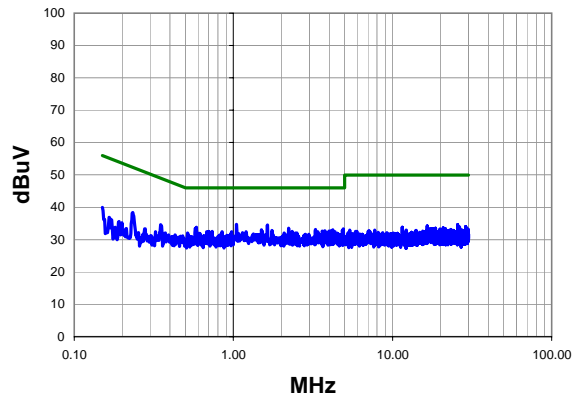
<b>Test Specifications</b> FCC 15.209:2010	<b>Test Method</b> ANSI C63.10:2009
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<b>7</b>	<b>3</b>	<b>Line:</b> Neutral	<b>Ext. Attenuation:</b> 20	<b>Results</b> Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.048	14.5	20.2	34.7	56.0	-21.3
1.640	14.3	20.2	34.5	56.0	-21.5
0.585	13.6	20.2	33.8	56.0	-22.2
2.224	13.2	20.3	33.5	56.0	-22.5
4.920	13.0	20.4	33.4	56.0	-22.6
3.280	12.8	20.3	33.1	56.0	-22.9
4.216	12.7	20.3	33.0	56.0	-23.0
1.504	12.8	20.2	33.0	56.0	-23.0
4.848	12.6	20.4	33.0	56.0	-23.0
1.752	12.6	20.3	32.9	56.0	-23.1
4.096	12.4	20.3	32.7	56.0	-23.3
3.760	12.4	20.3	32.7	56.0	-23.3
3.984	12.3	20.3	32.6	56.0	-23.4
3.624	12.3	20.3	32.6	56.0	-23.4
0.701	12.4	20.2	32.6	56.0	-23.4
0.735	12.4	20.2	32.6	56.0	-23.4
2.344	12.2	20.3	32.5	56.0	-23.5
0.974	12.3	20.2	32.5	56.0	-23.5
0.680	12.3	20.2	32.5	56.0	-23.5
0.849	12.3	20.2	32.5	56.0	-23.5

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.048	14.5	20.2	34.7	46.0	-11.3
1.640	14.3	20.2	34.5	46.0	-11.5
0.585	13.6	20.2	33.8	46.0	-12.2
2.224	13.2	20.3	33.5	46.0	-12.5
4.920	13.0	20.4	33.4	46.0	-12.6
3.280	12.8	20.3	33.1	46.0	-12.9
4.216	12.7	20.3	33.0	46.0	-13.0
1.504	12.8	20.2	33.0	46.0	-13.0
4.848	12.6	20.4	33.0	46.0	-13.0
1.752	12.6	20.3	32.9	46.0	-13.1
4.096	12.4	20.3	32.7	46.0	-13.3
3.760	12.4	20.3	32.7	46.0	-13.3
3.984	12.3	20.3	32.6	46.0	-13.4
3.624	12.3	20.3	32.6	46.0	-13.4
0.701	12.4	20.2	32.6	46.0	-13.4
0.735	12.4	20.2	32.6	46.0	-13.4
2.344	12.2	20.3	32.5	46.0	-13.5
0.974	12.3	20.2	32.5	46.0	-13.5
0.680	12.3	20.2	32.5	46.0	-13.5
0.849	12.3	20.2	32.5	46.0	-13.5

# EMC

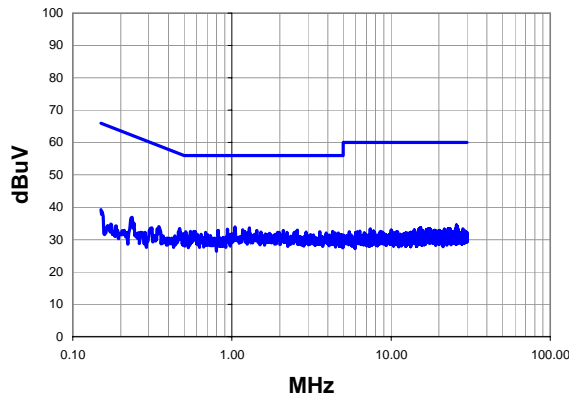
## AC POWERLINE CONDUCTED EMISSIONS

<b>Work Order:</b>	LABT0371	<b>Date:</b>	05/12/10	 <b>Tested by:</b> Ethan Schoonover
<b>Project:</b>	None	<b>Temperature:</b>	23°C	
<b>Job Site:</b>	EV07	<b>Humidity:</b>	33	
<b>Serial Number:</b>	#1	<b>Barometric Pres.:</b>	30.19 in	
<b>EUT:</b>	A-00024			
<b>Configuration:</b>	4			
<b>Customer:</b>	Logitech, Inc.			
<b>Attendees:</b>	None			
<b>EUT Power:</b>	120VAC/60Hz			
<b>Operating Mode:</b>	Tx Low Antenna Mid channel			
<b>Deviations:</b>	None			
<b>Comments:</b>	None			

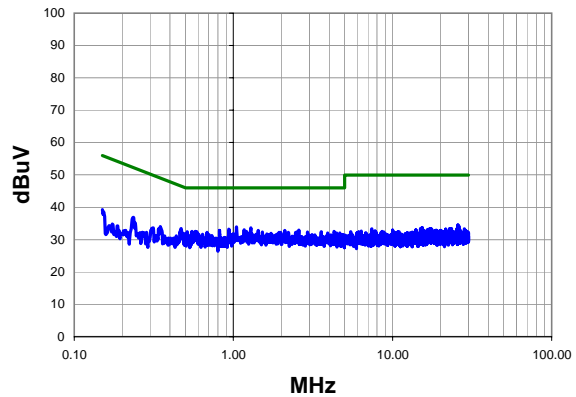
<b>Test Specifications</b> FCC 15.209:2010	<b>Test Method</b> ANSI C63.10:2009
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<b>Run #</b>	4	<b>Line:</b>	High Line	<b>Ext. Attenuation:</b>	20	<b>Results</b>	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

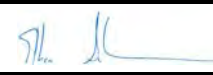
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.048	13.7	20.2	33.9	56.0	-22.1
1.288	13.4	20.2	33.6	56.0	-22.4
0.937	13.1	20.2	33.3	56.0	-22.7
1.168	12.8	20.2	33.0	56.0	-23.0
0.470	13.3	20.2	33.5	56.5	-23.1
2.576	12.6	20.3	32.9	56.0	-23.1
0.818	12.7	20.2	32.9	56.0	-23.1
2.104	12.6	20.3	32.9	56.0	-23.1
1.432	12.6	20.2	32.8	56.0	-23.2
0.550	12.4	20.2	32.6	56.0	-23.4
0.577	12.4	20.2	32.6	56.0	-23.4
4.296	12.2	20.3	32.5	56.0	-23.5
0.512	12.3	20.2	32.5	56.0	-23.5
3.560	12.1	20.3	32.4	56.0	-23.6
1.520	12.1	20.2	32.3	56.0	-23.7
2.928	12.0	20.3	32.3	56.0	-23.7
2.216	12.0	20.3	32.3	56.0	-23.7
0.682	12.1	20.2	32.3	56.0	-23.7
1.984	12.0	20.3	32.3	56.0	-23.7
4.656	11.7	20.4	32.1	56.0	-24.0

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.048	13.7	20.2	33.9	46.0	-12.1
1.288	13.4	20.2	33.6	46.0	-12.4
0.937	13.1	20.2	33.3	46.0	-12.7
1.168	12.8	20.2	33.0	46.0	-13.0
0.470	13.3	20.2	33.5	46.5	-13.1
2.576	12.6	20.3	32.9	46.0	-13.1
0.818	12.7	20.2	32.9	46.0	-13.1
2.104	12.6	20.3	32.9	46.0	-13.1
1.432	12.6	20.2	32.8	46.0	-13.2
0.550	12.4	20.2	32.6	46.0	-13.4
0.577	12.4	20.2	32.6	46.0	-13.4
4.296	12.2	20.3	32.5	46.0	-13.5
0.512	12.3	20.2	32.5	46.0	-13.5
3.560	12.1	20.3	32.4	46.0	-13.6
1.520	12.1	20.2	32.3	46.0	-13.7
2.928	12.0	20.3	32.3	46.0	-13.7
2.216	12.0	20.3	32.3	46.0	-13.7
0.682	12.1	20.2	32.3	46.0	-13.7
1.984	12.0	20.3	32.3	46.0	-13.7
4.656	11.7	20.4	32.1	46.0	-14.0

# EMC

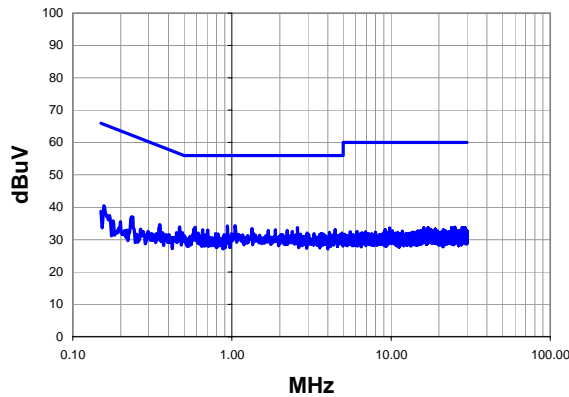
## AC POWERLINE CONDUCTED EMISSIONS

<b>Work Order:</b>	LABT0371	<b>Date:</b>	05/12/10	 <b>Tested by:</b> Ethan Schoonover
<b>Project:</b>	None	<b>Temperature:</b>	23°C	
<b>Job Site:</b>	EV07	<b>Humidity:</b>	33	
<b>Serial Number:</b>	#1	<b>Barometric Pres.:</b>	30.19 in	
<b>EUT:</b>	A-00024			
<b>Configuration:</b>	4			
<b>Customer:</b>	Logitech, Inc.			
<b>Attendees:</b>	None			
<b>EUT Power:</b>	120VAC/60Hz			
<b>Operating Mode:</b>	Tx Low Antenna High channel			
<b>Deviations:</b>	None			
<b>Comments:</b>	None			

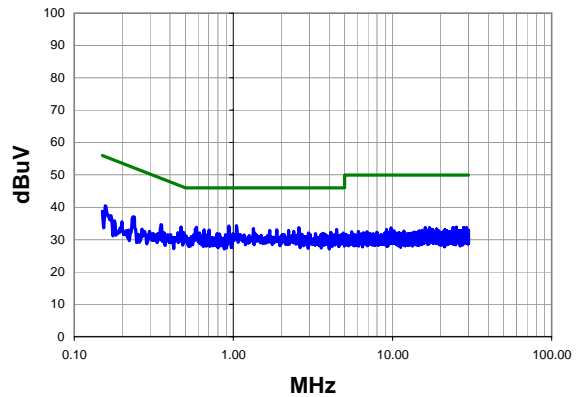
<b>Test Specifications</b> FCC 15.209:2010	<b>Test Method</b> ANSI C63.10:2009
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<b>Run #</b>	5	<b>Line:</b> High Line	<b>Ext. Attenuation:</b> 20	<b>Results</b>	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.048	14.1	20.2	34.3	56.0	-21.7
0.937	14.0	20.2	34.2	56.0	-21.8
0.585	13.6	20.2	33.8	56.0	-22.2
2.584	13.4	20.3	33.7	56.0	-22.3
0.470	13.8	20.2	34.0	56.5	-22.6
1.336	13.2	20.2	33.4	56.0	-22.6
4.448	12.8	20.3	33.1	56.0	-22.9
0.655	12.9	20.2	33.1	56.0	-22.9
1.872	12.8	20.3	33.1	56.0	-22.9
0.703	12.8	20.2	33.0	56.0	-23.0
2.224	12.6	20.3	32.9	56.0	-23.1
1.696	12.6	20.2	32.8	56.0	-23.2
2.392	12.2	20.3	32.5	56.0	-23.5
4.104	11.9	20.3	32.2	56.0	-23.8
0.614	11.9	20.2	32.1	56.0	-23.9
4.904	11.7	20.4	32.1	56.0	-23.9
2.968	11.7	20.3	32.0	56.0	-24.0
1.360	11.8	20.2	32.0	56.0	-24.0
0.488	12.0	20.2	32.2	56.2	-24.0
0.789	11.7	20.2	31.9	56.0	-24.1


Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
1.048	14.1	20.2	34.3	46.0	-11.7
0.937	14.0	20.2	34.2	46.0	-11.8
0.585	13.6	20.2	33.8	46.0	-12.2
2.584	13.4	20.3	33.7	46.0	-12.3
0.470	13.8	20.2	34.0	46.5	-12.6
1.336	13.2	20.2	33.4	46.0	-12.6
4.448	12.8	20.3	33.1	46.0	-12.9
0.655	12.9	20.2	33.1	46.0	-12.9
1.872	12.8	20.3	33.1	46.0	-12.9
0.703	12.8	20.2	33.0	46.0	-13.0
2.224	12.6	20.3	32.9	46.0	-13.1
1.696	12.6	20.2	32.8	46.0	-13.2
2.392	12.2	20.3	32.5	46.0	-13.5
4.104	11.9	20.3	32.2	46.0	-13.8
0.614	11.9	20.2	32.1	46.0	-13.9
4.904	11.7	20.4	32.1	46.0	-13.9
2.968	11.7	20.3	32.0	46.0	-14.0
1.360	11.8	20.2	32.0	46.0	-14.0
0.488	12.0	20.2	32.2	46.2	-14.0
0.789	11.7	20.2	31.9	46.0	-14.1



# EMC

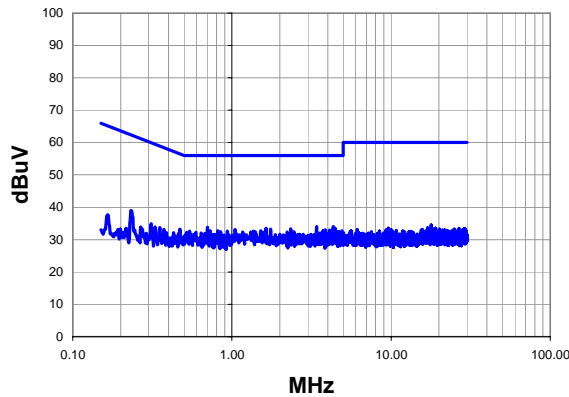
## AC POWERLINE CONDUCTED EMISSIONS

<b>Work Order:</b>	LABT0371	<b>Date:</b>	05/12/10	 <b>Tested by:</b> Ethan Schoonover
<b>Project:</b>	None	<b>Temperature:</b>	23°C	
<b>Job Site:</b>	EV07	<b>Humidity:</b>	33	
<b>Serial Number:</b>	#1	<b>Barometric Pres.:</b>	30.19 in	
<b>EUT:</b>	A-00024			
<b>Configuration:</b>	4			
<b>Customer:</b>	Logitech, Inc.			
<b>Attendees:</b>	None			
<b>EUT Power:</b>	120VAC/60Hz			
<b>Operating Mode:</b>	Tx Low Antenna High channel			
<b>Deviations:</b>	None			
<b>Comments:</b>	None			

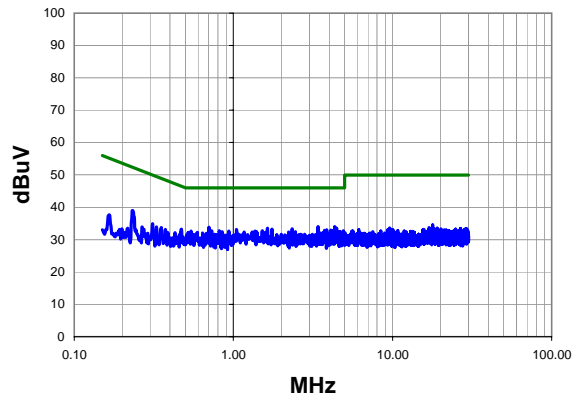
<b>Test Specifications</b> FCC 15.209:2010	<b>Test Method</b> ANSI C63.10:2009
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<b>Run #</b>	6	<b>Line:</b>	Neutral	<b>Ext. Attenuation:</b>	20	<b>Results</b>	Pass
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Peak Data - vs - Quasi Peak Limit



Peak Data - vs - Average Limit



Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
4.336	13.7	20.3	34.0	56.0	-22.0
3.400	13.7	20.3	34.0	56.0	-22.0
0.701	13.6	20.2	33.8	56.0	-22.2
4.448	13.2	20.3	33.5	56.0	-22.5
1.640	13.3	20.2	33.5	56.0	-22.5
2.344	13.0	20.3	33.3	56.0	-22.7
1.752	13.0	20.3	33.3	56.0	-22.7
1.048	13.0	20.2	33.2	56.0	-22.8
4.304	12.8	20.3	33.1	56.0	-22.9
3.864	12.7	20.3	33.0	56.0	-23.0
4.104	12.6	20.3	32.9	56.0	-23.1
3.744	12.5	20.3	32.8	56.0	-23.2
0.730	12.6	20.2	32.8	56.0	-23.2
0.815	12.6	20.2	32.8	56.0	-23.2
0.471	13.1	20.2	33.3	56.5	-23.2
4.920	12.4	20.4	32.8	56.0	-23.2
4.216	12.4	20.3	32.7	56.0	-23.3
1.520	12.5	20.2	32.7	56.0	-23.3
0.541	12.5	20.2	32.7	56.0	-23.3
0.937	12.5	20.2	32.7	56.0	-23.3

Peak Data - vs - Average Limit

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Compared to Spec. (dB)
4.336	13.7	20.3	34.0	46.0	-12.0
3.400	13.7	20.3	34.0	46.0	-12.0
0.701	13.6	20.2	33.8	46.0	-12.2
4.448	13.2	20.3	33.5	46.0	-12.5
1.640	13.3	20.2	33.5	46.0	-12.5
2.344	13.0	20.3	33.3	46.0	-12.7
1.752	13.0	20.3	33.3	46.0	-12.7
1.048	13.0	20.2	33.2	46.0	-12.8
4.304	12.8	20.3	33.1	46.0	-12.9
3.864	12.7	20.3	33.0	46.0	-13.0
4.104	12.6	20.3	32.9	46.0	-13.1
3.744	12.5	20.3	32.8	46.0	-13.2
0.730	12.6	20.2	32.8	46.0	-13.2
0.815	12.6	20.2	32.8	46.0	-13.2
0.471	13.1	20.2	33.3	46.5	-13.2
4.920	12.4	20.4	32.8	46.0	-13.2
4.216	12.4	20.3	32.7	46.0	-13.3
1.520	12.5	20.2	32.7	46.0	-13.3
0.541	12.5	20.2	32.7	46.0	-13.3
0.937	12.5	20.2	32.7	46.0	-13.3