

Logitech, Inc.

F-0414A Dongle

September 23, 2005

Report No. LABT0146.1

Report Prepared By



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1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: September 23, 2005
Logitech, Inc.
Model: F-0414A Dongle

Specification	Emissions		
	Test Method	Pass	Fail
FCC 15.247(a) Occupied Bandwidth:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.247(b) Output Power:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.247(d) Band Edge Compliance:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.247(d) Spurious Conducted Emissions:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.247(d) Spurious Radiated Emissions:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.247(e) Power Spectral Density:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.207 AC Powerline Conducted Emissions:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.109(a) Radiated Emissions:2005-04	ANSI C63.4:2003	☒	☐
FCC 15.107 AC Powerline Conducted Emissions:2005-04	ANSI C63.4:2003	☒	☐

Modifications made to the product

See the Modifications section of this report

Test Facility

The measurement facility used to collect the radiated and AC powerline conducted data is located at:

Northwest EMC, Inc
41 Tesla Ave.
Irvine, CA 92618

Phone: (888) 364-2378

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Approved By:

Greg Kiemel, Director of Engineering

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.

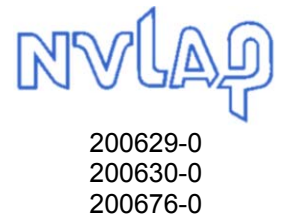
Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested,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

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 recognized 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 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. 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.



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 212, Issue 1 (Provisional) 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.



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.



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0401C.



TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



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).



Technology International: Assessed in accordance with ISO Guide 25 defining the general international requirements for the competence of calibration and testing laboratories and with ITI assessment criteria LACO196. Based upon that assessment, Interference Technology International, Ltd., has granted approval for specifications implementing the EU Directive on EMC (89/336/EEC and amendments). The scope of the approval was provided on a Schedule of Assessment supplied with the certificate and is available upon request.



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).



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 and R-1025, Irvine: C-2094 and R-1943, Newberg: C-1877 and R-1760, Sultan: R-871, C-1784 and R-1761*).



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. License No.SL2-IN-E-1017.



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



SCOPE

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

<http://www.nwemc.com/scope.asp>

What is measurement uncertainty?

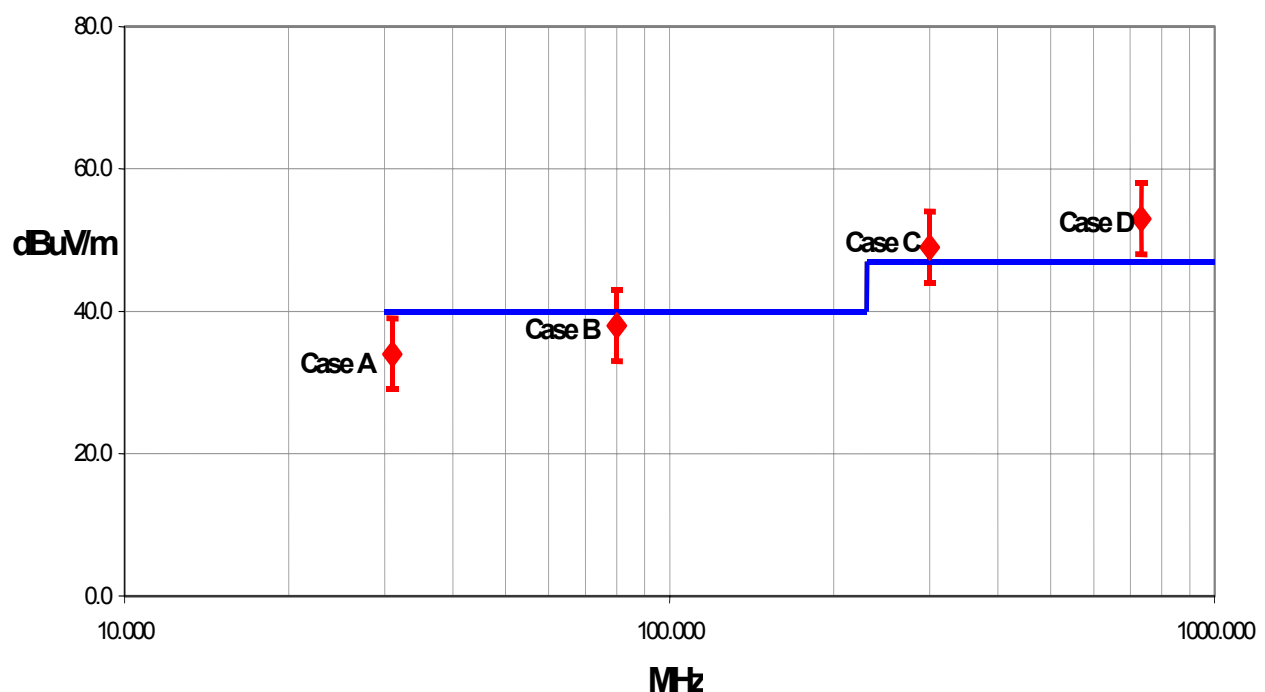
When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. The following statement of measurement uncertainty is used to reflect the accuracy of the measured result as compared with its “true” value. In the case of transient tests (ESD, EFT, Surge, Voltage Dips and Interruptions), the test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements.

The following documents were the basis for determining the uncertainty levels of our measurements:

- “ISO Guide to the Expression of Uncertainty in Measurements”, October 1993
- “NIS81: The Treatment of Uncertainty in EMC Measurements”, May 1994
- “IEC CISPR 16-3 A1 f1 Ed.1: Radio-interference measurements and statistical techniques”, December 2000

How might measurement uncertainty be applied to test results?

If the diamond marks the measured value for the test and the vertical bars bracket the range of + and – measurement uncertainty, then test results can be interpreted from the diagram below.

**Test Result Scenarios:**

Case A: Product complies.

Case B: Product conditionally complies. It is not possible to say with 95% confidence that the product complies.

Case C: Product conditionally does not comply. It is not possible to say with 95% confidence that the product does not comply.

Case D: Product does not comply.

Radiated Emissions ≤ 1 GHz

Value (dB)

Test Distance	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
		3m	10m	3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.86 - 1.88	+ 1.82 - 1.87	+ 2.23 - 1.41	+ 1.29 - 1.26	+ 1.31 - 1.27	+ 1.25 - 1.25
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 3.72 - 3.77	+ 3.64 - 3.73	+ 4.46 - 2.81	+ 2.59 - 2.52	+ 2.61 - 2.55	+ 2.49 - 2.49

Radiated Emissions > 1 GHz

Value (dB)

Test Distance	Probability Distribution	Without High Pass Filter		With High Pass Filter	
		3m	10m	3m	10m
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.29 - 1.25	+ 1.38 - 1.35	+ 1.38 - 1.35
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k=2)	+ 2.57 - 2.51	+ 2.57 - 2.51	+ 2.76 - 2.70	+ 2.76 - 2.70

Conducted Emissions

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.48
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.97

Radiated Immunity

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.11

Conducted Immunity

Test Distance	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $u_c(y)$	normal	1.05
Expanded uncertainty U (level of confidence $\approx 95\%$)	normal (k = 2)	2.10

Legend

$u_c(y)$ = square root of the sum of squares of the individual standard uncertainties

U = combined standard uncertainty multiplied by the coverage factor: k . This defines an interval about the measured result that will encompass the true value with a confidence level of approximately 95%. If a higher level of confidence is required, then $k=3$ (CL of 99.7%) can be used. Please note that with a coverage factor of one, $u_c(y)$ yields a confidence level of only 68%.

**California****Orange County Facility****Labs OC01 – OC13**

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Irvine, CA 92618
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**Oregon****Evergreen Facility****Labs EV01 – EV10**

22975 NW Evergreen Pkwy.
Suite 400
Hillsboro, OR 97124
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**Oregon****Trails End Facility****Labs TE01 – TE03**

30475 NE Trails End Lane
Newberg, OR 97132
(503) 844-4066
FAX (503) 537-0735

**Washington****Sultan Facility****Labs SU01 – SU07**

14128 339th Ave. SE
Sultan, WA 98294
(888) 364-2378
FAX (360) 793-2536

Party Requesting the Test

Company Name:	Logitech, Inc.
Address:	1499 SE Tech Center Place Suite 350
City, State, Zip:	Vancouver, WA 98683
Test Requested By:	Mitchell Phillipi
Model:	F-0414A Dongle
First Date of Test:	08/25/2005
Last Date of Test:	09/13/2005
Receipt Date of Samples:	08/24/2005
Equipment Design Stage:	Production
Equipment Condition:	No visual damage.

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	Not Provided
I/O Ports:	Receiver: Left and right audio out, headphone out. Dongle: USB

Functional Description of the EUT (Equipment Under Test):

The F-0414A is a Bluetooth audio system comprised of two transceivers. One transceiver is a USB dongle that transmits audio from a PC, and the second transceiver is a standalone "receiver" with stereo output jacks that receives the audio and feeds it to a stereo system. That way, PCs with MP3 libraries can wirelessly stream audio to nearby stereo systems. The two transceivers have identical schematics and parts list, just different PCB layouts and different host devices. So antenna port direct connect measurements will be made on just one unit, but radiated and conducted emissions will be performed on both the dongle and receiver. The F-0414A is seeking TCB certification of both the dongle and the receiver. Each will require separate FCC IDs.

Client Justification for EUT Selection:

The product is an engineering sample, representative of the final product.

Client Justification for Test Selection:

These tests satisfy the requirements for FCC Part 15.247 certification of the F-0414A Dongle.

EUT Photo

BLUETOOTH APPROVALS
FCC Procedure Received from Joe Dichoso on 2-15-02

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247 for devices meeting the Bluetooth Specifications in the 2.4 GHz band as of February 2001 operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This exhibit only specifies requirements in Section 15.247, requirements in other rule Sections for intentional radiators such as in Section 15.203 or 15.207 must be also be addressed. A Bluetooth device is a FHSS transmitter in the data mode and applies as a Hybrid spread spectrum device in the acquisition mode.

For each individual device, the following items, 1-7 will vary from one device to another and must be submitted.

- 1) The occupied bandwidth in Section 15.247(a)(1)(ii).
- 2) Conducted output power specified in Section 15.247(b)(1).
- 3) EIRP limit in Section 15.247(b)(3).
- 4) RF safety requirement in Section 15.247(b)(4)
- 5) Spurious emission limits in Section 15.247(c).
- 6) Processing gain and requirements for Hybrids in Section 15.247(f) in the acquisition mode.
- 7) Power spectral density requirement in Section 15.247(f) in the acquisition mode.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. This list can be copied into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Only a different hopping sequence will be used. For this reason, the RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

The maximum frequency of the device is: **2402 – 2480 MHz**.

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification must **not be** supported by the device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,
09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units, only the offsets are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 μ s. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions, the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence is generated. For transmitting the wanted data, the complete hopping sequence is not used and the connection ends. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 μ s). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth, synchronization and repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.

In every connection, one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing is according to the packet type of the connection. Also, the slave of the connection uses these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is as follows:

Dwell time = time slot length * hop rate / number of hopping channels * 30s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time = 625 μ s * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time = $5 * 625 \mu s * 1600 * 1/5 * 1/s / 79 * 30s = 0.3797s$ (in a 30s period)

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum "initial carrier frequency tolerance" which is allowed for Bluetooth is $f_{center} = 75 \text{ kHz}$.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:

****For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.**

****For the page hop sequence, the device address of the paged unit is used as the input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.**

So it is ensured that also in hybrid mode, the frequency is used equally on average.

Example of a hopping sequence in inquiry mode:

48, 50, 09, 13, 52, 54, 41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23

Example of a hopping sequence in paging mode:

08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code and the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.

Equipment modifications					
Item	Test	Date	Modification	Note	Disposition of EUT
1	Band Edge Compliance	08/26/2005	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
2	Occupied Bandwidth	08/26/2005	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
3	Output Power	08/26/2005	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.	EUT remained at Northwest EMC.
4	Radiated Spurious Emissions	09/02/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
5	Conducted Emissions	09/02/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
6	Radiated Spurious Emissions	09/7/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.
7	Spurious Conducted Emissions	09/13/2005	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.	EUT remained at Northwest EMC.

Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. All of the EUT parameters listed below were investigated. This includes, but may not be limited to, CPU speeds, video resolution settings, operational modes, and input voltages.

Operating Modes Investigated:

Standby/Receive

Operating Mode used for Final Test:

Standby/Receive

Power Input Settings Investigated:

120 VAC, 60 Hz

Input Power Setting used for Final Test:

120 VAC, 60 Hz

Frequency Range Investigated

Start Frequency	30 MHz	Stop Frequency	1 GHz
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Software\Firmware Applied During Test

Operating system	Windows	Version	XP
Exercise software	Simpleterm	Version	Unknown

Description

The system was tested using special operating software to exercise the functions of the device during the testing.

EUT and Peripherals in Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
EUT - USB Dongle/Docking Station	Logitech, Inc	F-0414A	Unknown
Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
Serial/RS485	RE Smith	ASC24TS	Unknown
Speakers	Altech Lansing	GCS100	Unknown
Headphones	Coby	Unknown	Unknown

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary.

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
Audio	No	1.0	No	Stereo Transceiver	Speakers
Audio	No	1.1	No	Headphones	Stereo Transceiver
RS485	No	1.2	No	Serial/RS485	EUT - USB Dongle/Docking Station
RS485	No	1.2	No	Serial/RS485	Stereo Transceiver
AC Power	PA	2.0	No	AC Adaptor	AC Mains
DC Power	PA	1.8	No	AC Adapters	Speakers
USB	No	4.2	No	Laptop	EUT - USB Dongle/Docking Station
RJ11	No	4.0	No	Serial/RS485	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	12/07/2004	13 mo
Receiver	Schaffner	SCR 3101	ARC	05/04/2005	13 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOM	10/20/2004	13 mo
Antenna, Biconilog	EMCO	3142	AXJ	07/31/2005	24 mo

Test Description

The final radiated emissions test was performed using the parameters described above as worst case. That final test was conducted at a facility that meets the ANSI C63.4 NSA requirements. The frequency range noted in the data sheets was scanned/tested at that facility. Emissions were maximized as specified, by maximizing table azimuth, antenna height, and cable manipulation.

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

Note: The specified distance is the horizontal separation between the closest periphery of the EUT and the center of the axis of the elements of the receiving antenna. However, if the receiving antenna is a log-periodic array, the specified distance shall be the distance between the closest periphery of the EUT and the front-to-back center of the array of elements.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 1 meter, 3 meters, 5 meters, 10 meters, or 30 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

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
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

Completed by:

NORTHWEST										ACQ 2005.8.22 EMI 2005.8.3																																																																																																																																			
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Serial Number: Unknown					Date: 09/08/05																																																																																																																																								
Customer: Logitech, Inc.					Temperature: 23 C																																																																																																																																								
Attendees: None					Humidity: 45%																																																																																																																																								
Project: None					Barometric Pressure: 29.97																																																																																																																																								
Tested by: Luis Flores			Power: 120VAC/60Hz		Job Site: OC10																																																																																																																																								
TEST SPECIFICATIONS										Test Method																																																																																																																																			
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Antenna Height(s) (m)			1m - 4m			Test Distance (m)			3																																																																																																																																				
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Configuration #																																																																																																																																													
Results		Pass																																																																																																																																											
<table border="1" style="width:100%; border-collapse: collapse; font-size: 0.8em;"> <thead> <tr style="background-color: #f2f2f2;"> <th>Freq (MHz)</th> <th>Amplitude (dBuV)</th> <th>Factor (dB)</th> <th>Azimuth (degrees)</th> <th>Height (meters)</th> <th>Distance (meters)</th> <th>External Attenuation (dB)</th> <th>Polarity</th> <th>Detector</th> <th>Distance Adjustment (dB)</th> <th>Adjusted dBuV/m</th> <th>Spec. Limit dBuV/m</th> <th>Compared to Spec. (dB)</th> </tr> </thead> <tbody> <tr><td>146.564</td><td>46.7</td><td>-6.0</td><td>189.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>40.7</td><td>43.5</td><td>-2.8</td></tr> <tr><td>56.425</td><td>43.4</td><td>-6.8</td><td>263.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>36.6</td><td>40.0</td><td>-3.4</td></tr> <tr><td>131.201</td><td>46.1</td><td>-7.1</td><td>293.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>39.0</td><td>43.5</td><td>-4.5</td></tr> <tr><td>74.603</td><td>41.5</td><td>-7.6</td><td>248.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>33.9</td><td>40.0</td><td>-6.1</td></tr> <tr><td>42.413</td><td>35.9</td><td>-2.9</td><td>10.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>33.0</td><td>40.0</td><td>-7.0</td></tr> <tr><td>48.028</td><td>36.1</td><td>-5.0</td><td>211.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>31.1</td><td>40.0</td><td>-8.9</td></tr> <tr><td>88.666</td><td>40.5</td><td>-6.2</td><td>51.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>34.3</td><td>43.5</td><td>-9.2</td></tr> <tr><td>35.692</td><td>30.1</td><td>0.6</td><td>359.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>30.7</td><td>40.0</td><td>-9.3</td></tr> <tr><td>60.118</td><td>35.7</td><td>-7.4</td><td>266.0</td><td>1.0</td><td>3.0</td><td>0.0</td><td>V-Bilog</td><td>QP</td><td>0.0</td><td>28.3</td><td>40.0</td><td>-11.7</td></tr> </tbody> </table>												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)	146.564	46.7	-6.0	189.0	1.0	3.0	0.0	V-Bilog	QP	0.0	40.7	43.5	-2.8	56.425	43.4	-6.8	263.0	1.0	3.0	0.0	V-Bilog	QP	0.0	36.6	40.0	-3.4	131.201	46.1	-7.1	293.0	1.0	3.0	0.0	V-Bilog	QP	0.0	39.0	43.5	-4.5	74.603	41.5	-7.6	248.0	1.0	3.0	0.0	V-Bilog	QP	0.0	33.9	40.0	-6.1	42.413	35.9	-2.9	10.0	1.0	3.0	0.0	V-Bilog	QP	0.0	33.0	40.0	-7.0	48.028	36.1	-5.0	211.0	1.0	3.0	0.0	V-Bilog	QP	0.0	31.1	40.0	-8.9	88.666	40.5	-6.2	51.0	1.0	3.0	0.0	V-Bilog	QP	0.0	34.3	43.5	-9.2	35.692	30.1	0.6	359.0	1.0	3.0	0.0	V-Bilog	QP	0.0	30.7	40.0	-9.3	60.118	35.7	-7.4	266.0	1.0	3.0	0.0	V-Bilog	QP	0.0	28.3	40.0	-11.7
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Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. All of the EUT parameters listed below were investigated. This includes, but may not be limited to, CPU speeds, video resolution settings, operational modes, and input voltages.

Operating Modes Investigated:

Standby/Receive

Power Input Settings Investigated:

120 VAC, 60 Hz

Software\Firmware Applied During Test

Operating system	Windows	Version	XP
Exercise software	Simple Terminal	Version	Unknown
Description			
The system was tested using special operating software to exercise the functions of the device during the testing. Modes include different transmit channels and modulation			

EUT and Peripherals in Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
EUT - USB Dongle/Docking Station	Logitech, Inc	F-0414A	Unknown
Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
Serial/RS485	RE Smith	ASC24TS	Unknown
Speakers	Altech Lansing	GCS100	Unknown
Headphones	Coby	Unknown	Unknown

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary.			

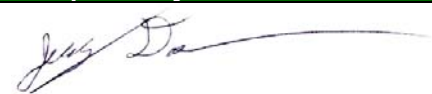
Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
Audio	No	1.0	No	Stereo Transceiver	Speakers
Audio	No	1.1	No	Headphones	Stereo Transceiver
RS485	No	1.2	No	Serial/RS485	EUT - USB Dongle/Docking Station
RS485	No	1.2	No	Serial/RS485	Stereo Transceiver
AC Power	PA	2.0	No	AC Adaptor	AC Mains
DC Power	PA	1.8	No	AC Adapters	Speakers
USB	No	4.2	No	Laptop	EUT - USB Dongle/Docking Station
RJ11	No	4.0	No	Serial/RS485	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment					
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	12/07/2004	13 mo
Receiver	Schaffner	SCR 3101	ARC	05/04/2005	13 mo
LISN	Solar	9252-50-24-BNC	LIB	02/16/2005	13 mo

Test Description

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50 Ω measuring port is terminated by a 50 Ω EMI meter or a 50 Ω resistive load. All 50 Ω measuring ports of the LISN are terminated by 50 Ω .

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.			

Completed by:


CONDUCTED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/09/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pressure:	29.95
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

FCC 15.107 Class B:2005-04

Test Method

ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested

L1

COMMENTS

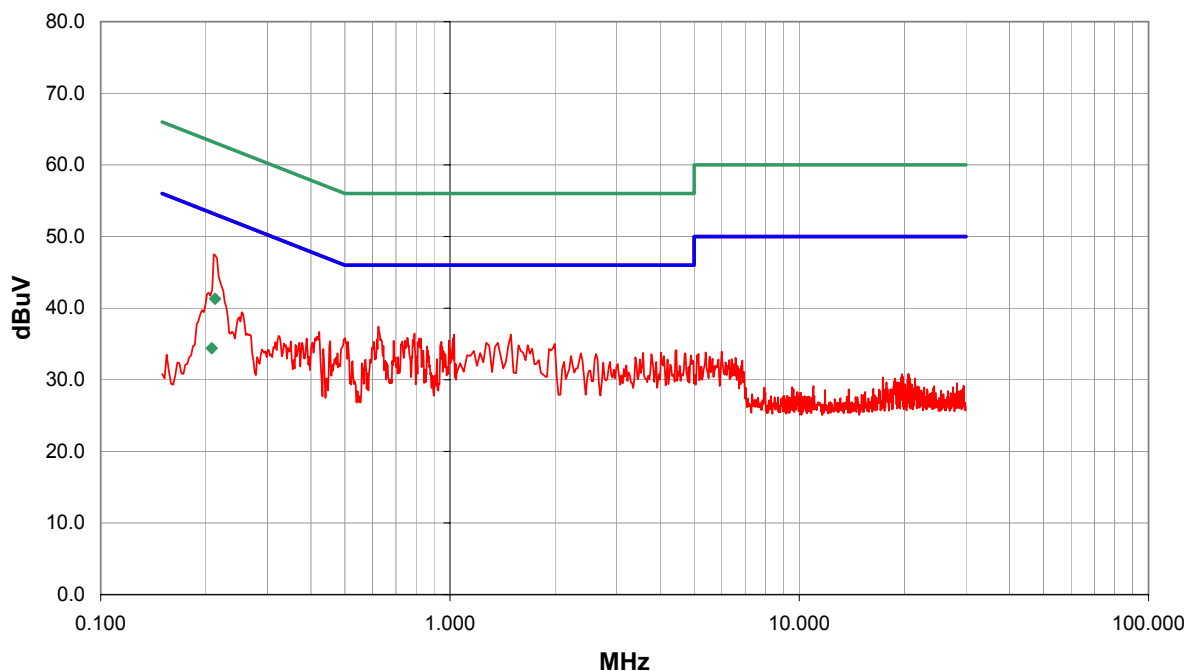
EUT OPERATING MODES

Standby/Receive

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	25	Signature 
Configuration #		
Results	Pass	



Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.208	14.4		0.0	0.0	20.0		AV		34.4	53.3	-18.9
0.213	21.3		0.0	0.0	20.0		QP		41.3	63.1	-21.8
0.211	27.4		0.0	0.1	20.0				47.5	53.2	-5.6
0.625	17.2		0.0	0.2	20.0				37.4	46.0	-8.6
0.791	16.2		0.0	0.3	20.0				36.5	46.0	-9.5
1.028	16.0		0.0	0.3	20.0				36.3	46.0	-9.7
1.495	15.9		0.0	0.4	20.0				36.3	46.0	-9.7
0.755	15.6		0.0	0.3	20.0				35.9	46.0	-10.1
1.021	15.5		0.0	0.3	20.0				35.8	46.0	-10.2
0.501	15.6		0.0	0.2	20.0				35.8	46.0	-10.2
0.825	15.5		0.0	0.3	20.0				35.8	46.0	-10.2
0.995	15.2		0.0	0.3	20.0				35.5	46.0	-10.5
0.690	15.2		0.0	0.2	20.0				35.4	46.0	-10.6
0.731	15.1		0.0	0.2	20.0				35.3	46.0	-10.7
0.604	15.1		0.0	0.2	20.0				35.3	46.0	-10.7
0.510	15.1		0.0	0.2	20.0				35.3	46.0	-10.7
0.944	15.0		0.0	0.3	20.0				35.3	46.0	-10.7
0.422	16.5		0.0	0.2	20.0				36.7	47.4	-10.7
1.370	14.8		0.0	0.4	20.0				35.2	46.0	-10.8

EMC

CONDUCTED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/09/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pressure:	29.95
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

Test Method

FCC 15.107 Class B:2005-04

ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested

N

COMMENTS

EUT OPERATING MODES

Standby/Receive

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #

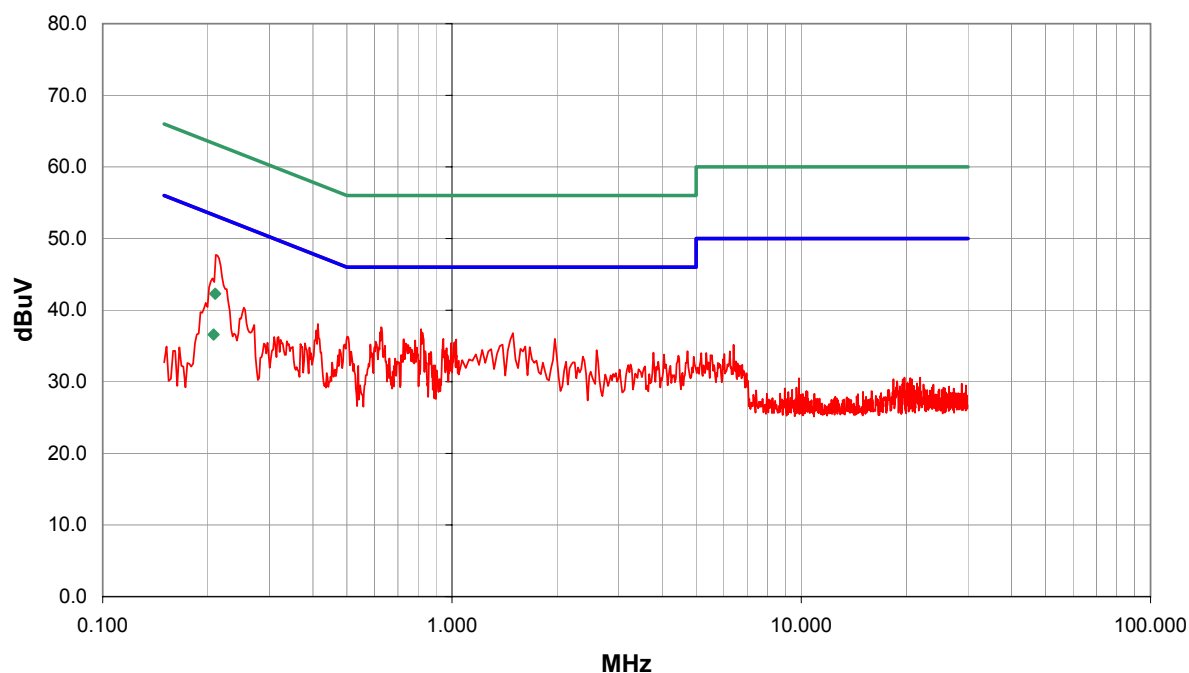
26

Configuration #

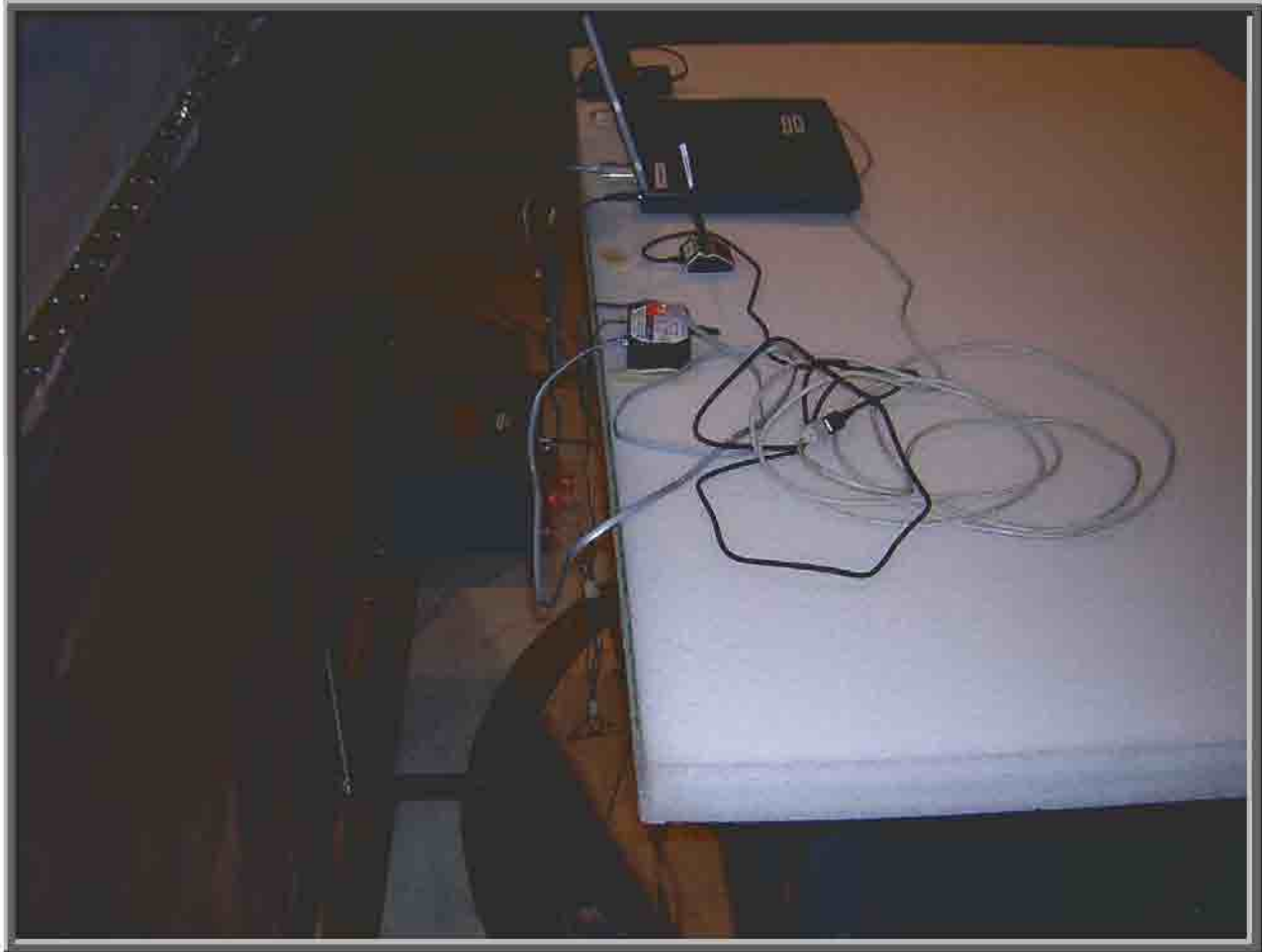
Results

Pass

Signature



Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.208	16.6		0.0	0.0	20.0		AV		36.6	53.3	-16.7
0.210	22.3		0.0	0.0	20.0		QP		42.3	63.2	-20.9
0.211	27.6		0.0	0.1	20.0				47.7	53.2	-5.4
0.627	17.4		0.0	0.2	20.0				37.6	46.0	-8.4
0.816	17.1		0.0	0.3	20.0				37.4	46.0	-8.6
1.495	16.4		0.0	0.4	20.0				36.8	46.0	-9.2
0.413	17.9		0.0	0.2	20.0				38.1	47.6	-9.5
0.503	16.1		0.0	0.2	20.0				36.3	46.0	-9.7
1.970	15.5		0.0	0.5	20.0				36.0	46.0	-10.0
0.944	15.7		0.0	0.3	20.0				36.0	46.0	-10.0
0.728	15.7		0.0	0.2	20.0				35.9	46.0	-10.1
1.028	15.6		0.0	0.3	20.0				35.9	46.0	-10.1
0.785	15.5		0.0	0.3	20.0				35.8	46.0	-10.2
0.604	15.4		0.0	0.2	20.0				35.6	46.0	-10.4
1.020	15.2		0.0	0.3	20.0				35.5	46.0	-10.5
0.995	15.1		0.0	0.3	20.0				35.4	46.0	-10.6
0.737	15.1		0.0	0.2	20.0				35.3	46.0	-10.7
0.584	15.0		0.0	0.2	20.0				35.2	46.0	-10.8
1.395	14.8		0.0	0.4	20.0				35.2	46.0	-10.8





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low
Mid
High

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

120VAC/60Hz

Software\Firmware Applied During Test

Exercise software	SimpleTerm	Version	none
Description			
The system was tested using special software developed to test all functions of the device during the test.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT-Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
RS-232 / RS-485 Converter	RE Smith	ASC24TS	none

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	EUT-Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RJ11	No	4.0	No	RS-232 / RS-485 Converter	Laptop
RS485	No	1.2	No	RS-232 / RS-485 Converter	EUT-Stereo Transceiver

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

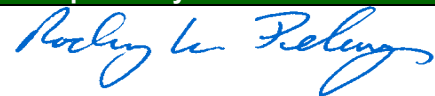
Test Description

Requirement: Per 47 CFR 15.247(a)(1), the 20 dB bandwidth of a hopping channel must be less than or equal to the channel separation. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have 20 dB bandwidths up to 1.5 times the channel separation, provided the systems operate with an output power no greater than 125 mW.

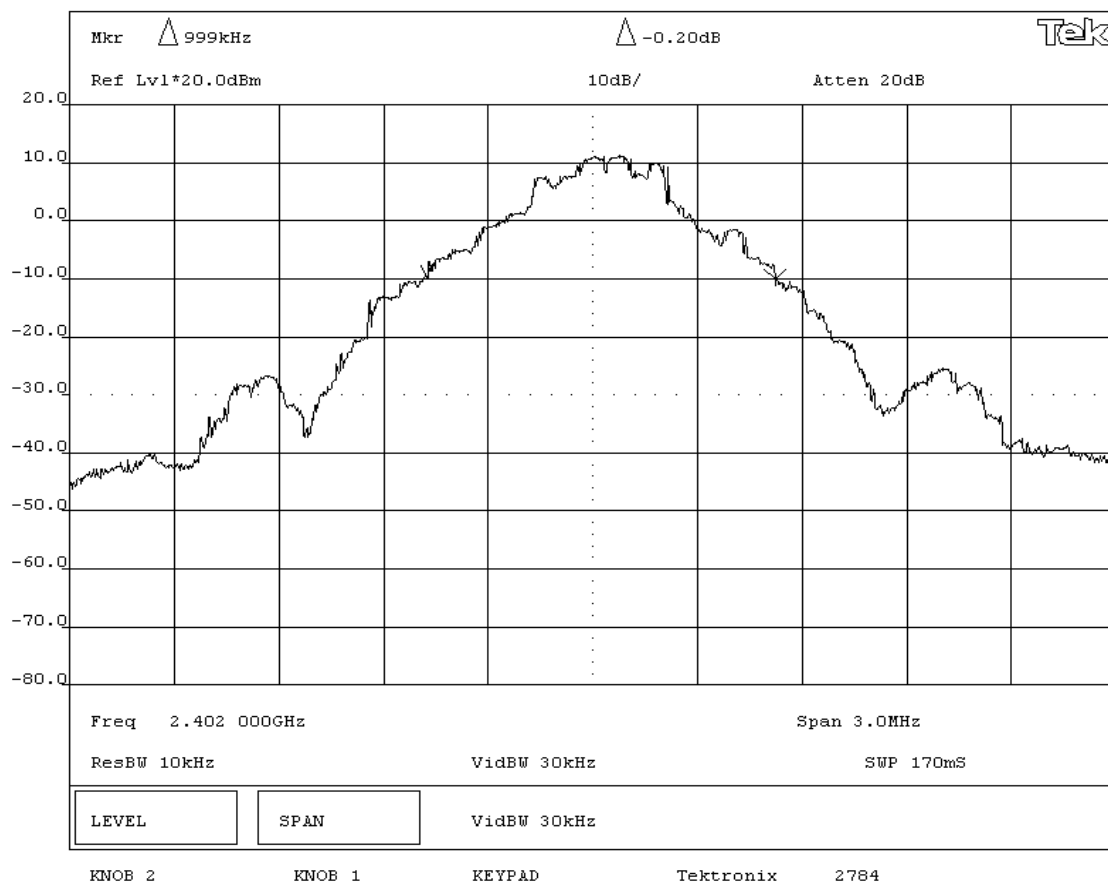
Per 47 CFR 15.247(a)(1)(I-iii), the maximum 20 dB bandwidth for frequency hopping systems operating in the 902-928 MHz band is 500 kHz. The maximum 20 dB bandwidth for frequency hopping systems operating in the 5725 – 5850 MHz band is 1 MHz.

The measurement is made with the spectrum analyzer's resolution bandwidth set to $\geq 1\%$ of the 20dB bandwidth, and the video bandwidth set to greater than or equal to the resolution bandwidth.

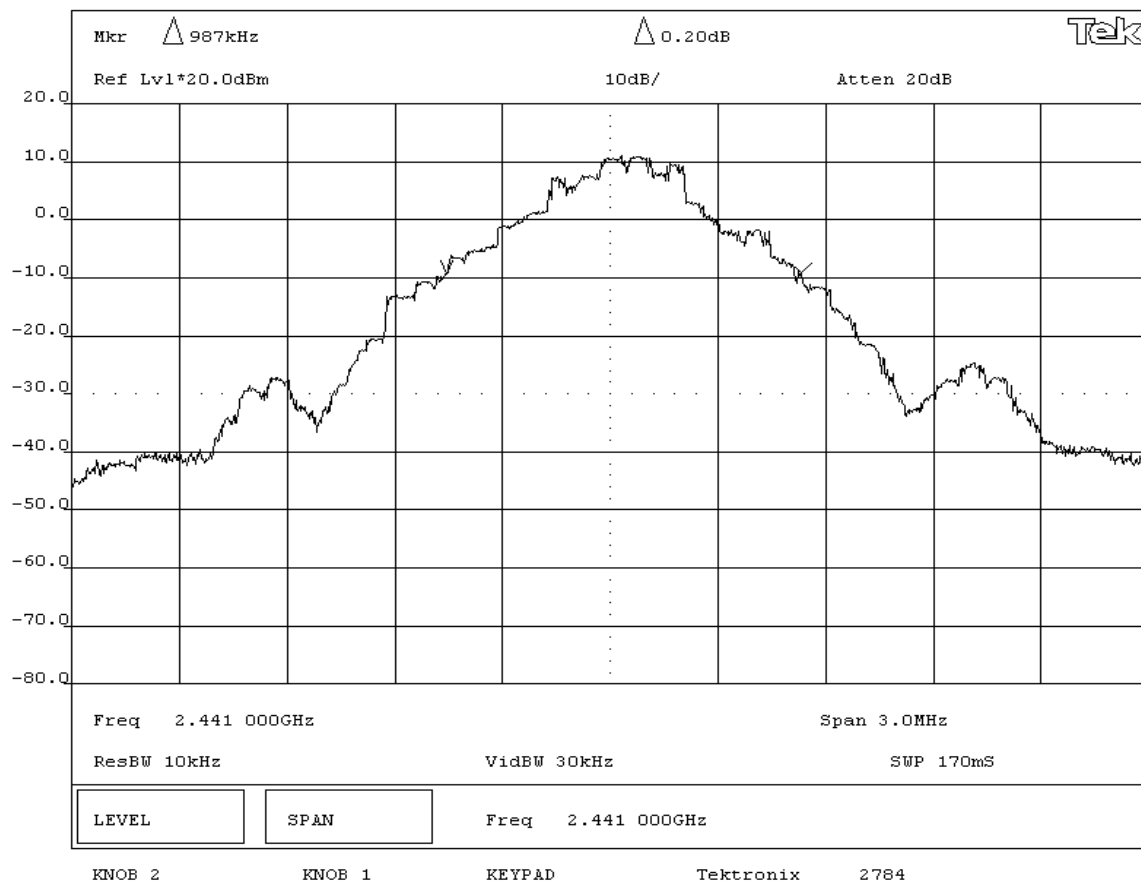
Configuration: The occupied bandwidth was measured with the EUT set to low, medium, and high transmit frequencies. The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The EUT was transmitting at its maximum data rate in a no hop mode.

Completed by:

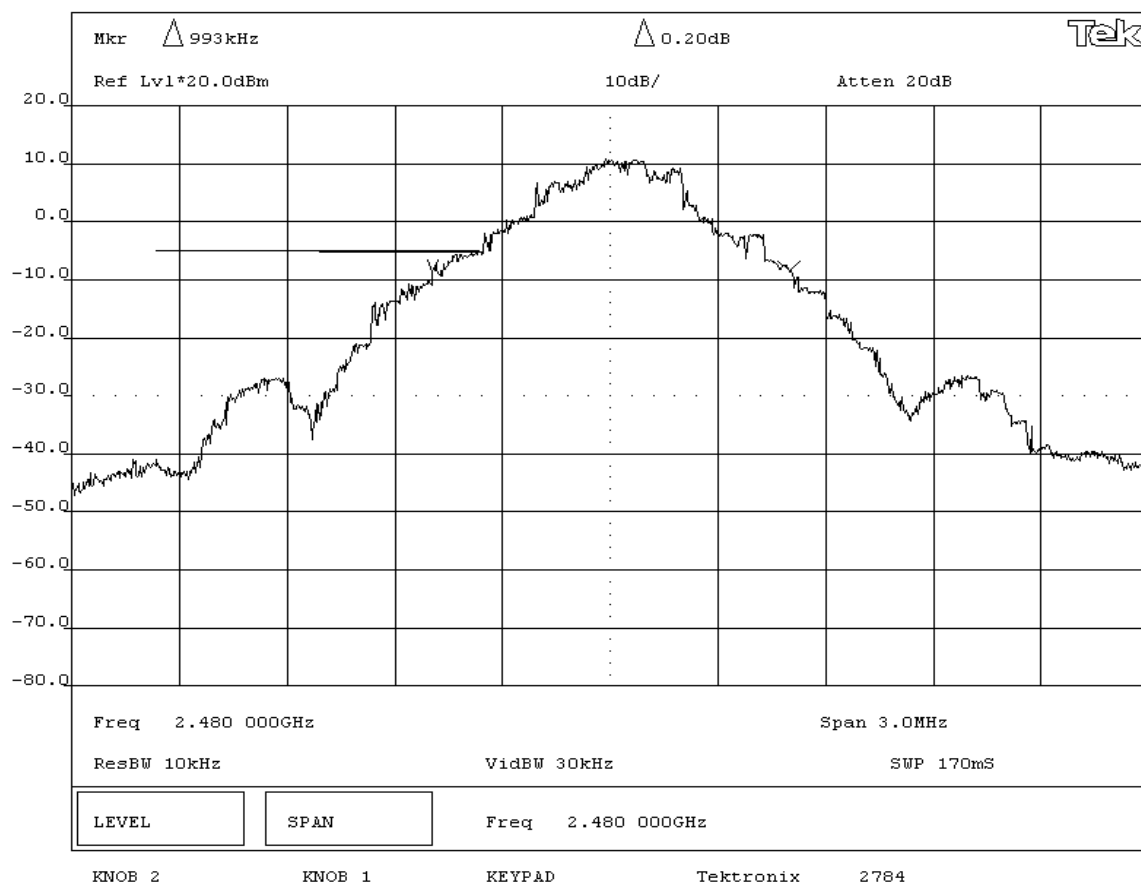
NORTHWEST EMC		OCCUPIED BANDWIDTH		Rev BETA 01/30/01	
EUT: F-0414A		Work Order: LABT0146			
Serial Number: unknown		Date: 08/26/05			
Customer: Logitech, Inc.		Temperature: 73 °F			
Attendees:		Tested by: Rod Peloquin		Humidity: 42% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(a)		Year: 2005-06		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
Measured with a direct connection between the RF output and a spectrum analyzer.					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Bluetooth can be authorized as either a Frequency Hopping System (FHSS), a Digital Transmission System (DTS), or a Hybrid System.					
As a FHSS, the maximum 20dB bandwidth of the hopping channel is equal to 1.5 times the channel separation. For example, channel separation for Bluetooth is 1 MHz, therefore the maximum 20 dB bandwidth is 1.5 MHz.					
As a DTS system, the minimum 6 dB bandwidth is 500 kHz. As a Hybrid, it must meet the FHSS requirement as described above.					
RESULTS		BANDWIDTH			
Pass		0.999 MHz			
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
20dB Bandwidth - Low Channel					



NORTHWEST EMC		OCCUPIED BANDWIDTH		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 08/26/05		
Customer: Logitech, Inc.			Temperature: 73 °F		
Attendees:		Tested by: Rod Peloquin		Humidity: 42% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(a)		Year: 2005-06		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
Measured with a direct connection between the RF output and a spectrum analyzer.					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Bluetooth can be authorized as either a Frequency Hopping System (FHSS), a Digital Transmission System (DTS), or a Hybrid System.					
As a FHSS, the maximum 20dB bandwidth of the hopping channel is equal to 1.5 times the channel separation. For example, channel separation for Bluetooth is 1 MHz, therefore the maximum 20 dB bandwidth is 1.5 MHz.					
As a DTS system, the minimum 6 dB bandwidth is 500 kHz. As a Hybrid, it must meet the FHSS requirement as described above.					
RESULTS					
Pass			BANDWIDTH		
			0.987 MHz		
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
20dB Bandwidth - Mid Channel					



NORTHWEST EMC		OCCUPIED BANDWIDTH		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 08/26/05		
Customer: Logitech, Inc.			Temperature: 73 °F		
Attendees:		Tested by: Rod Peloquin		Humidity: 42% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(a)		Year: 2005-06		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
Measured with a direct connection between the RF output and a spectrum analyzer.					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Bluetooth can be authorized as either a Frequency Hopping System (FHSS), a Digital Transmission System (DTS), or a Hybrid System.					
As a FHSS, the maximum 20dB bandwidth of the hopping channel is equal to 1.5 times the channel separation. For example, channel separation for Bluetooth is 1 MHz, therefore the maximum 20 dB bandwidth is 1.5 MHz.					
As a DTS system, the minimum 6 dB bandwidth is 500 kHz. As a Hybrid, it must meet the FHSS requirement as described above.					
RESULTS					
Pass			BANDWIDTH 0.993 MHz		
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
20dB Bandwidth - High Channel					





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low

Mid

High

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

120VAC/60Hz

Software\Firmware Applied During Test

Exercise software	SimpleTerm	Version	none
Description			
The system was tested using special software developed to test all functions of the device during the test.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT-Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
RS-232 / RS-485 Converter	RE Smith	ASC24TS	none

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	EUT-Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RJ11	No	4.0	No	RS-232 / RS-485 Converter	Laptop
RS485	No	1.2	No	RS-232 / RS-485 Converter	EUT-Stereo Transceiver

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

Requirement: Per 47 CFR 15.247(b)(1-2), the peak output power shall be measured. 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.

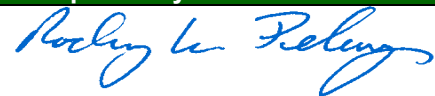
For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

The measurement is made using a spectrum analyzer using the following settings:

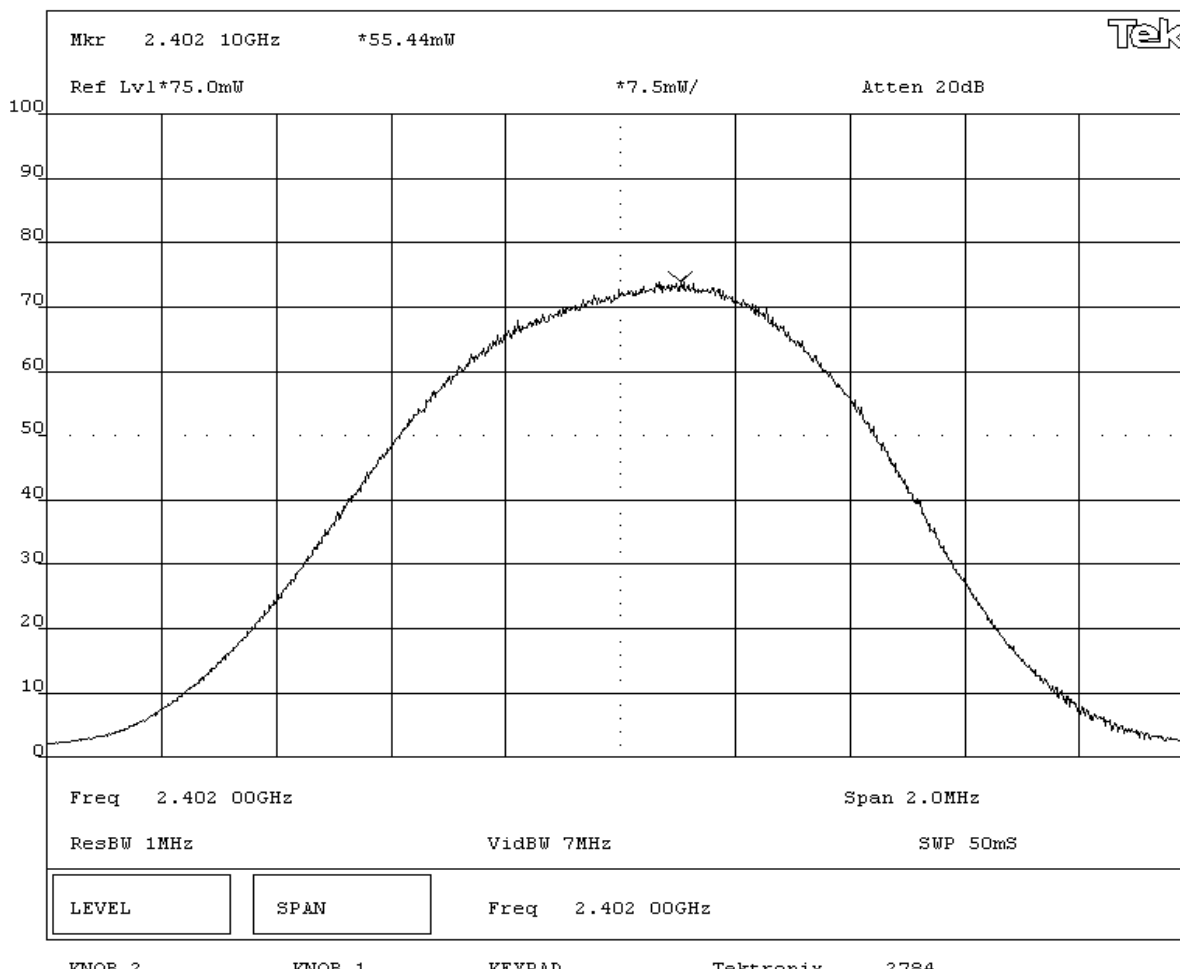
- Resolution bandwidth set to greater than the 6 dB bandwidth of the modulated carrier, and
- The video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: 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.

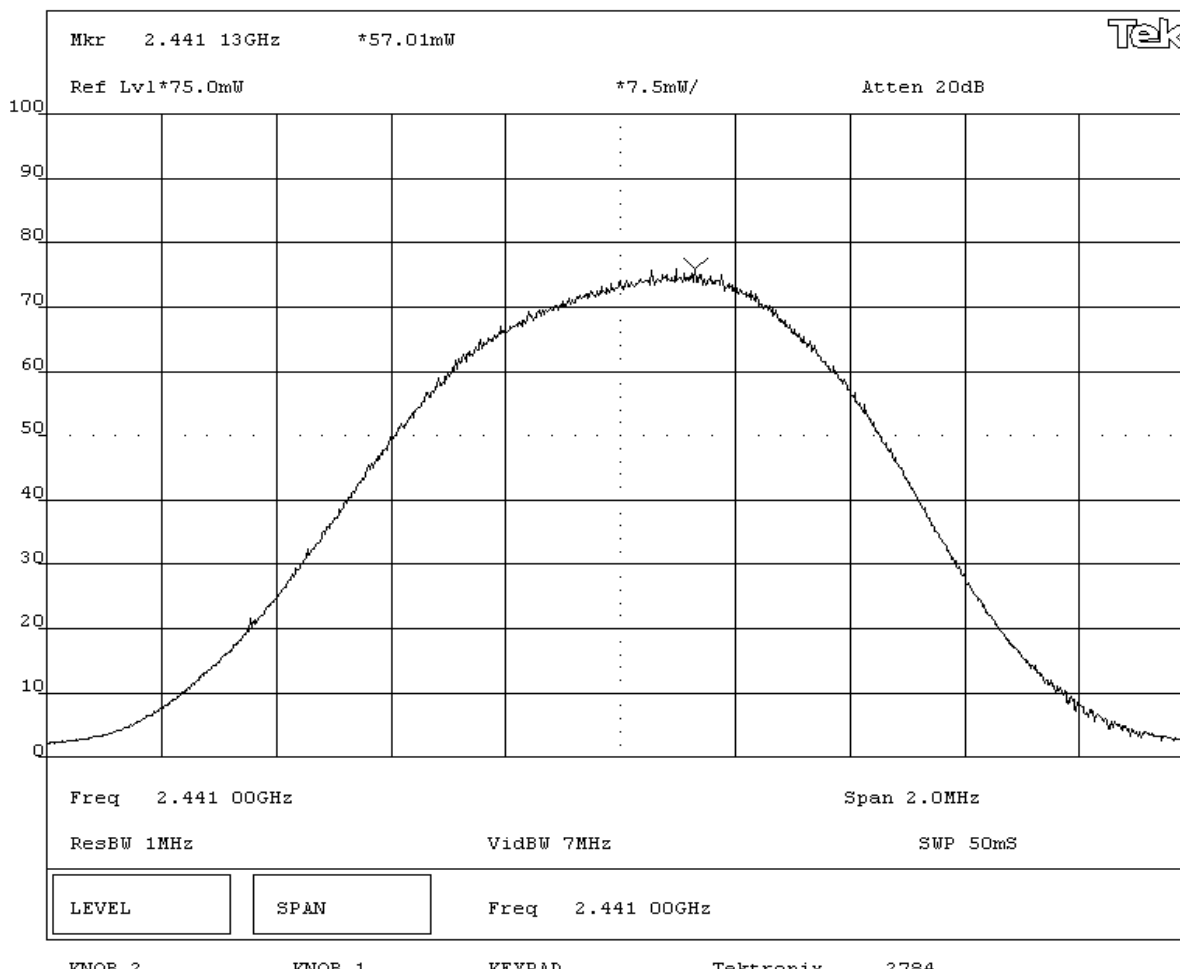
De Facto EIRP Limit: Per 47 CFR 15.247 (b)(1-3), the EUT meets the de facto EIRP limit of +36dBm.

Completed by:

NORTHWEST EMC				OUTPUT POWER				Rev BETA 01/30/01	
EUT: F-0414A						Work Order: LABT0146			
Serial Number: unknown						Date: 08/26/05			
Customer: Logitech, Inc.						Temperature: 73 °F			
Attendees:		Tested by: Rod Peloquin				Humidity: 42% RH			
Customer Ref. No.:		Power: 120VAC/60Hz				Job Site: EV06			
TEST SPECIFICATIONS									
Specification: 47 CFR 15.247(b)		Year: 2005-06		Method: DA 00-705, ANSI C63.4		Year: 2003			
SAMPLE CALCULATIONS									
COMMENTS									
Measured with a direct connection between the RF output and a spectrum analyzer.									
EUT OPERATING MODES									
Modulated by PRBS at maximum data rate									
DEVIATIONS FROM TEST STANDARD									
None									
REQUIREMENTS									
Maximum peak conducted output power does not exceed 1 Watt									
RESULTS					AMPLITUDE				
Pass					55.44 mW				
SIGNATURE									
 Tested By: _____									
DESCRIPTION OF TEST									
Output Power									



NORTHWEST		OUTPUT POWER		Rev BETA 01/30/01	
EUT: F-0414A		Work Order: LABT0146			
Serial Number: unknown		Date: 08/26/05			
Customer: Logitech, Inc.		Temperature: 73 °F			
Attendees:		Tested by: Rod Peloquin		Humidity: 42% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(b)		Year: 2005-06		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
Measured with a direct connection between the RF output and a spectrum analyzer.					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum peak conducted output power does not exceed 1 Watt					
RESULTS		AMPLITUDE			
Pass		57.01 mW			
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Output Power					



NORTHWEST

EMC**OUTPUT POWER**Rev BETA
01/30/01

EUT:	F-0414A	Work Order:	LABT0146
Serial Number:	unknown	Date:	08/26/05
Customer:	Logitech, Inc.	Temperature:	73 °F
Attendees:		Humidity:	42% RH
Customer Ref. No.:		Power:	120VAC/60Hz
		Job Site:	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(b)	Year:	2005-06	Method:	DA 00-705, ANSI C63.4	Year:	2003
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SAMPLE CALCULATIONS**COMMENTS**

Measured with a direct connection between the RF output and a spectrum analyzer.

EUT OPERATING MODES

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

None

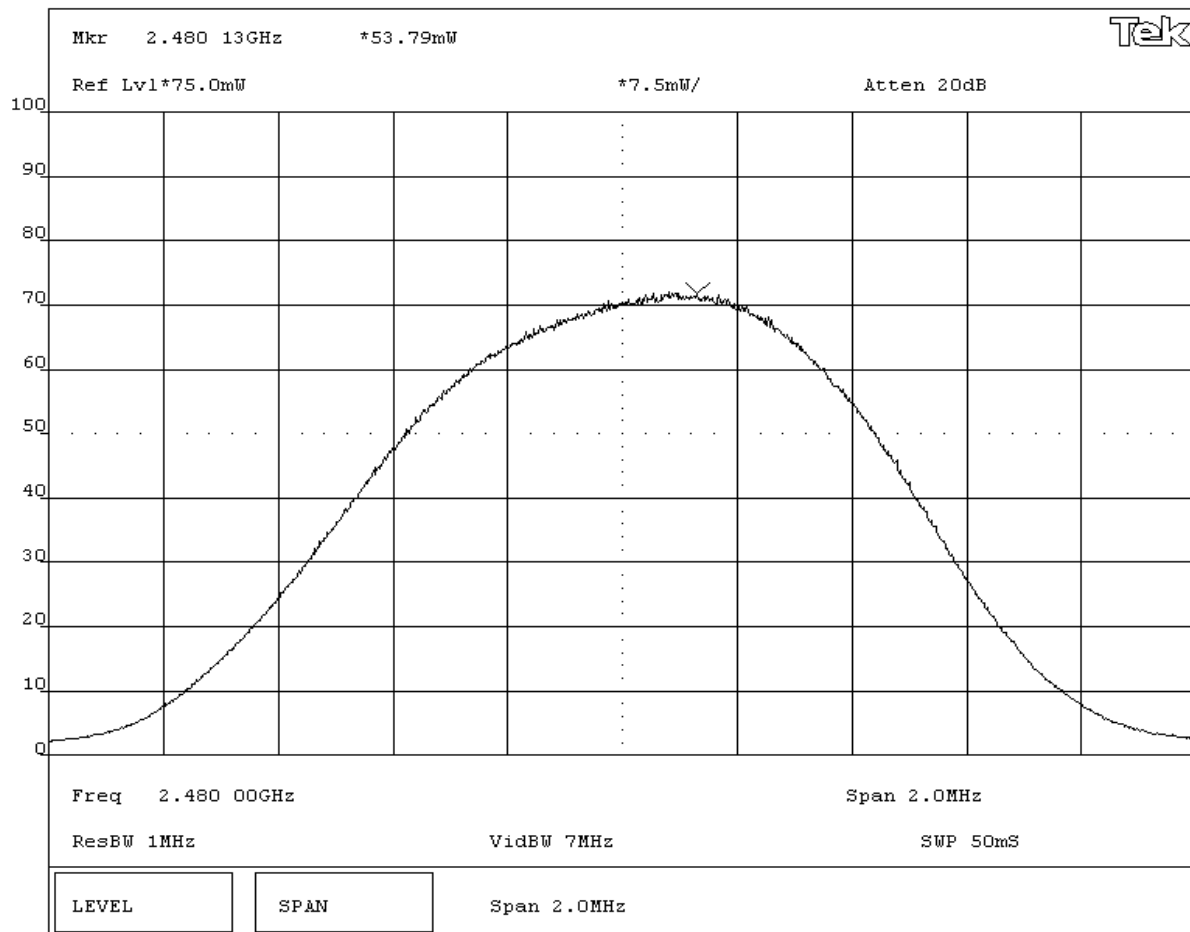
REQUIREMENTS

Maximum peak conducted output power does not exceed 1 Watt

RESULTS

Pass

53.78 mW

SIGNATURETested By: **DESCRIPTION OF TEST****Output Power**



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low

High

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

120VAC/60Hz

Software\Firmware Applied During Test

Exercise software	SimpleTerm	Version	none
Description			
The system was tested using special software developed to test all functions of the device during the test.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT-Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
RS-232 / RS-485 Converter	RE Smith	ASC24TS	none

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	EUT-Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RJ11	No	4.0	No	RS-232 / RS-485 Converter	Laptop
RS485	No	1.2	No	RS-232 / RS-485 Converter	EUT-Stereo Transceiver

Measurement Equipment

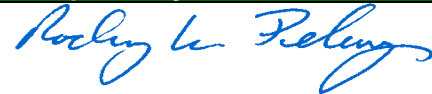
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

Requirement: Per 47 CFR 15.247(d), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: The spurious RF conducted emissions at the edges of the authorized band were measured with the EUT set to low 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 in a no hop mode. The channels closest to the band edges were selected. The spectrum was scanned across each band edge from 5 MHz below the band edge to 5 MHz above the band edge.

Completed by:



NORTHWEST
EMC**BAND EDGE COMPLIANCE**Rev BETA
01/30/01

EUT: F-0414A		Work Order: LABT0146	
Serial Number: Unknown		Date: 08/26/05	
Customer: Logitech, Inc.		Temperature: 73 °F	
Attendees:		Humidity: 36% RH	
Customer Ref. No.:		Tested by: Rod Peloquin	Job Site: EV06
		Power: 120VAC/60Hz	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)	Year: 2005-06	Method: DA 00-705, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS**COMMENTS**

Measured with a direct connection between the RF output and a spectrum analyzer.

EUT OPERATING MODES

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

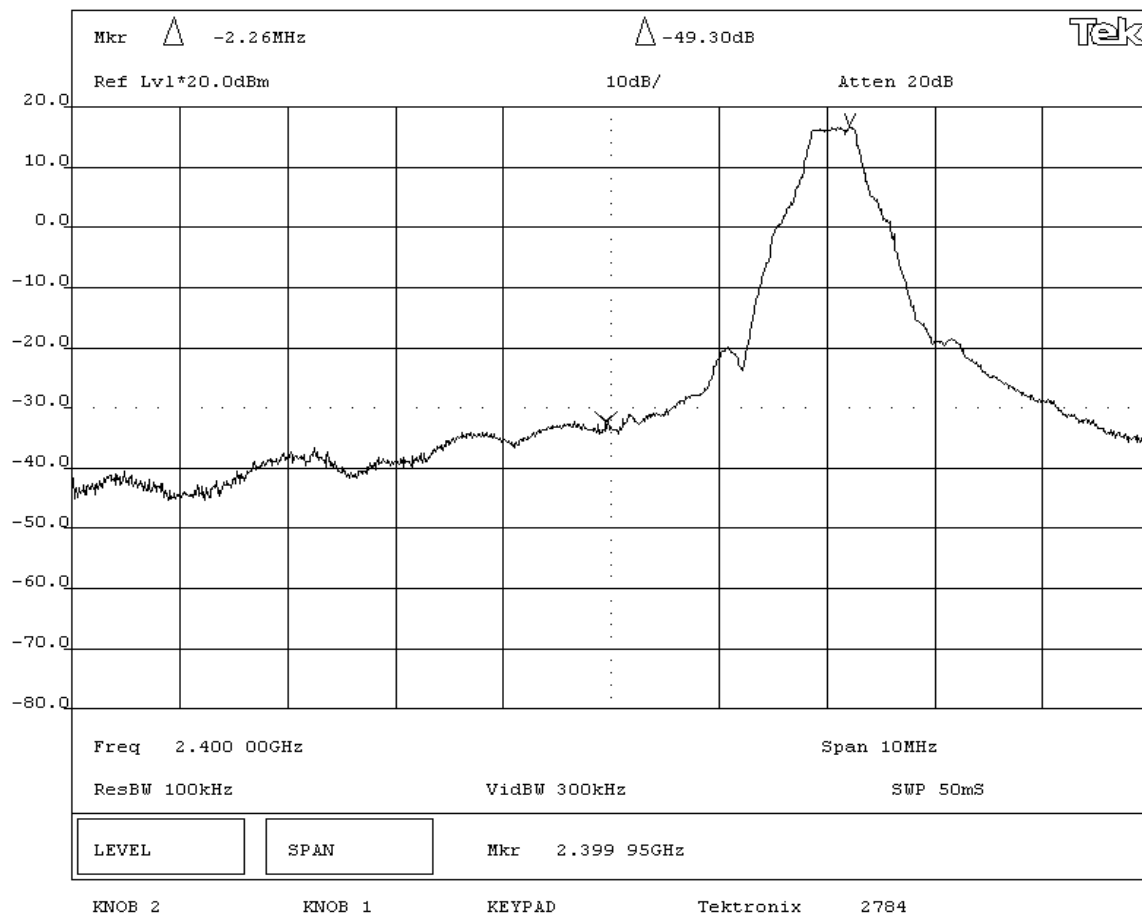
None

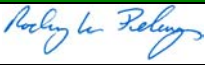
REQUIREMENTS

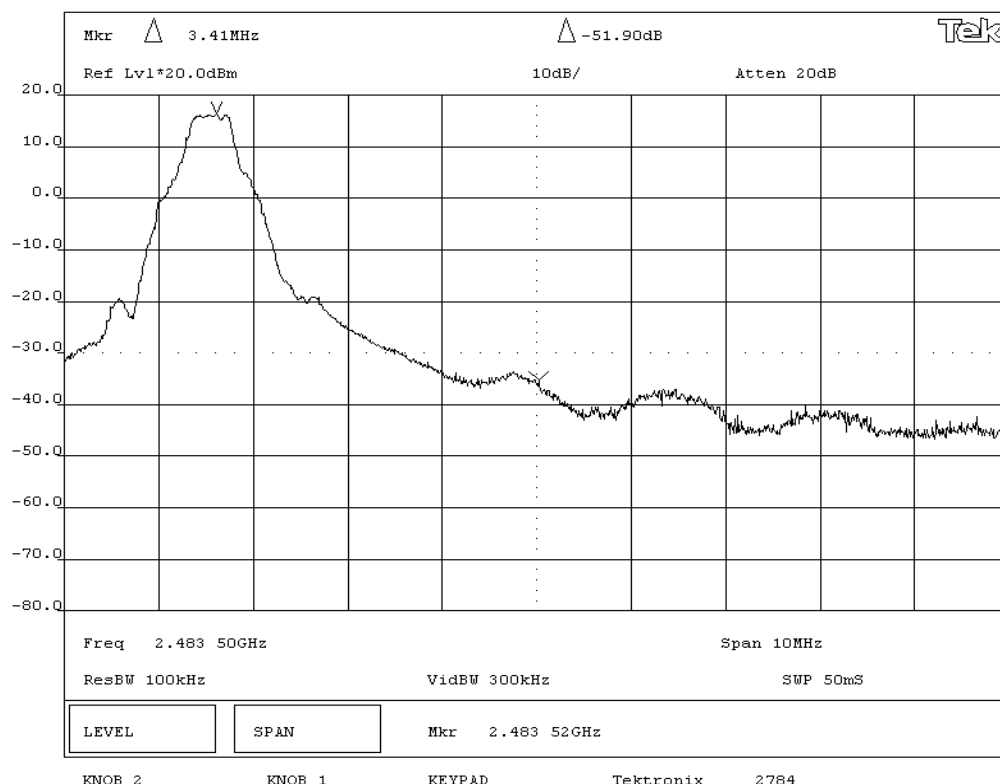
Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental

RESULTS

Pass -49.3 dB

SIGNATURETested By: **DESCRIPTION OF TEST****Band Edge Compliance - Low Channel**

NORTHWEST EMC		BAND EDGE COMPLIANCE		Rev BETA 01/30/01	
EUT:	F-0414A	Work Order:	LABT0146		
Serial Number:	unknown	Date:	08/26/05		
Customer:	Logitech, Inc.	Temperature:	73 °F		
Attendees:		Tested by:	Rod Poloquin	Humidity:	36% RH
Customer Ref. No.:		Power:	120VAC/60Hz	Job Site:	EV06
TEST SPECIFICATIONS					
Specification:	47 CFR 15.247(d)	Year:	2005-06	Method:	DA 00-705, ANSI C63.4
				Year:	2003
SAMPLE CALCULATIONS					
COMMENTS					
Measured with a direct connection between the RF output and a spectrum analyzer.					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission at the edge of the authorized band is 20 dB down from the fundamental					
RESULTS		AMPLITUDE			
Pass		-51.9 dB			
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Band Edge Compliance - High Channel					





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low
Mid
High

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

120VAC/60Hz

Software\Firmware Applied During Test

Exercise software	SimpleTerm	Version	none
Description			
The system was tested using special software developed to test all functions of the device during the test.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT-Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
RS-232 / RS-485 Converter	RE Smith	ASC24TS	none

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	EUT-Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RJ11	No	4.0	No	RS-232 / RS-485 Converter	Laptop
RS485	No	1.2	No	RS-232 / RS-485 Converter	EUT-Stereo Transceiver

Measurement Equipment

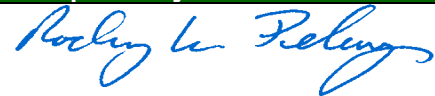
Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

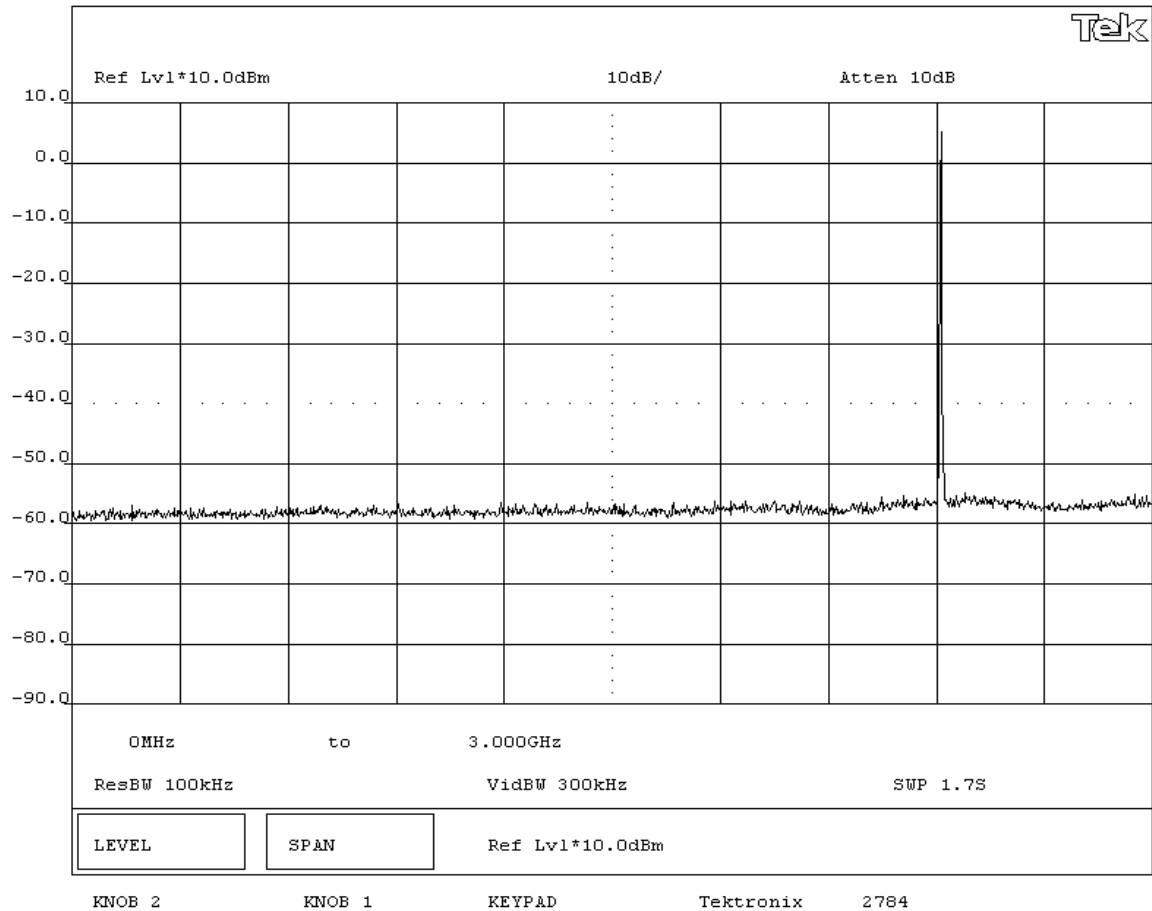
Requirement: Per 47 CFR 15.247(d), in any 100 kHz bandwidth outside the authorized band, the maximum level of radio frequency power must be at least 20dB down from the highest emission level within the authorized band. The measurement is made with the spectrum analyzer's resolution bandwidth set to 100 kHz, and the video bandwidth set to greater than or equal to the resolution bandwidth.

Configuration: 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 in a no hop mode. For each transmit frequency, the spectrum was scanned throughout the specified frequency.

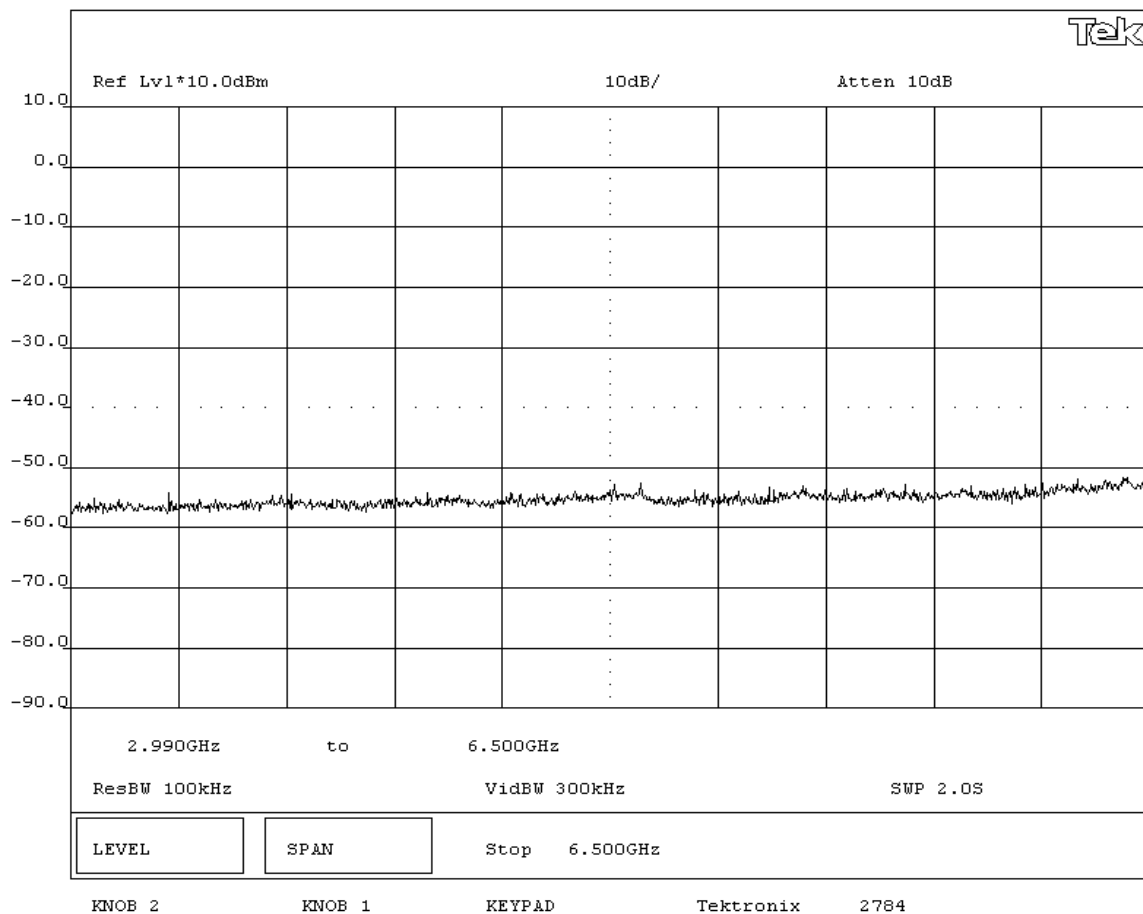
Completed by:



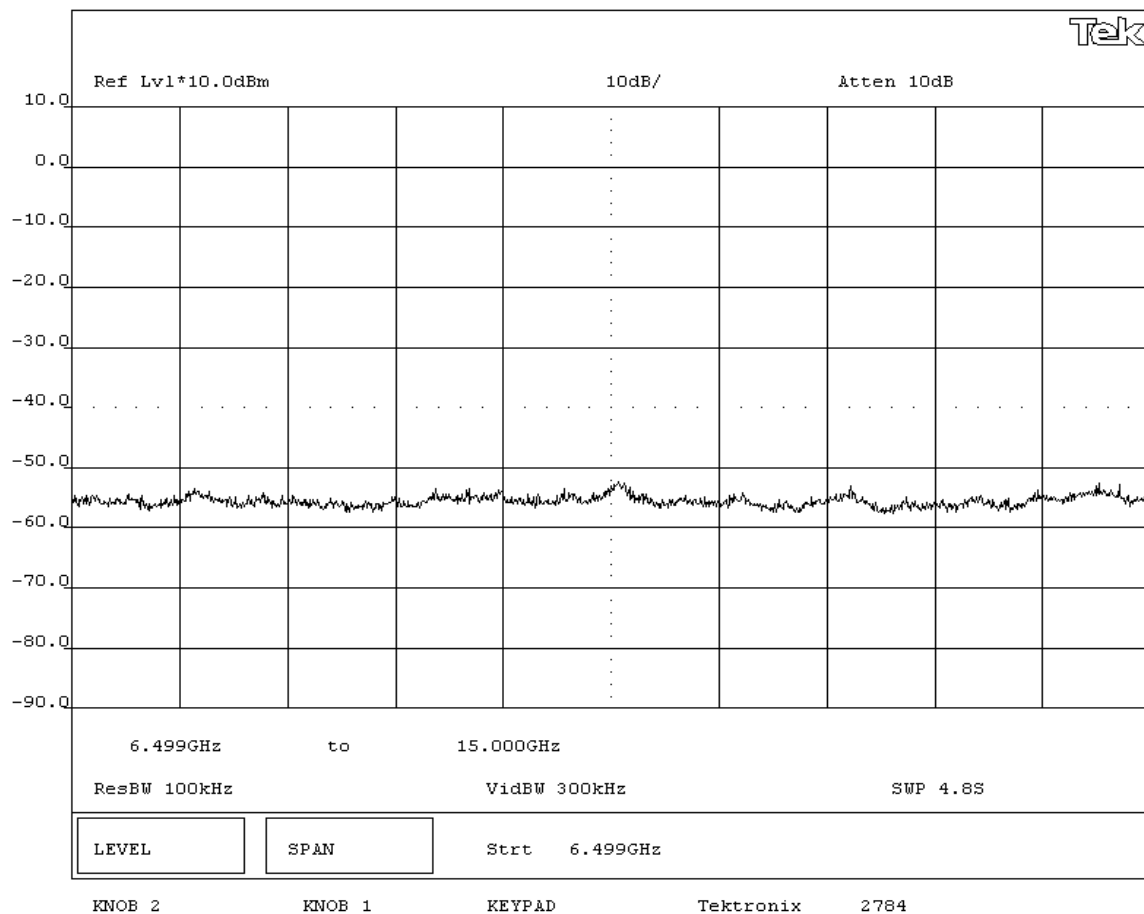
NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 09/13/05		
Customer: Logitech, Inc.			Temperature: 71 °F		
Attendees: none		Tested by: Rod Peloquin		Humidity: 41% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Low Channel 0MHz-3GHz					



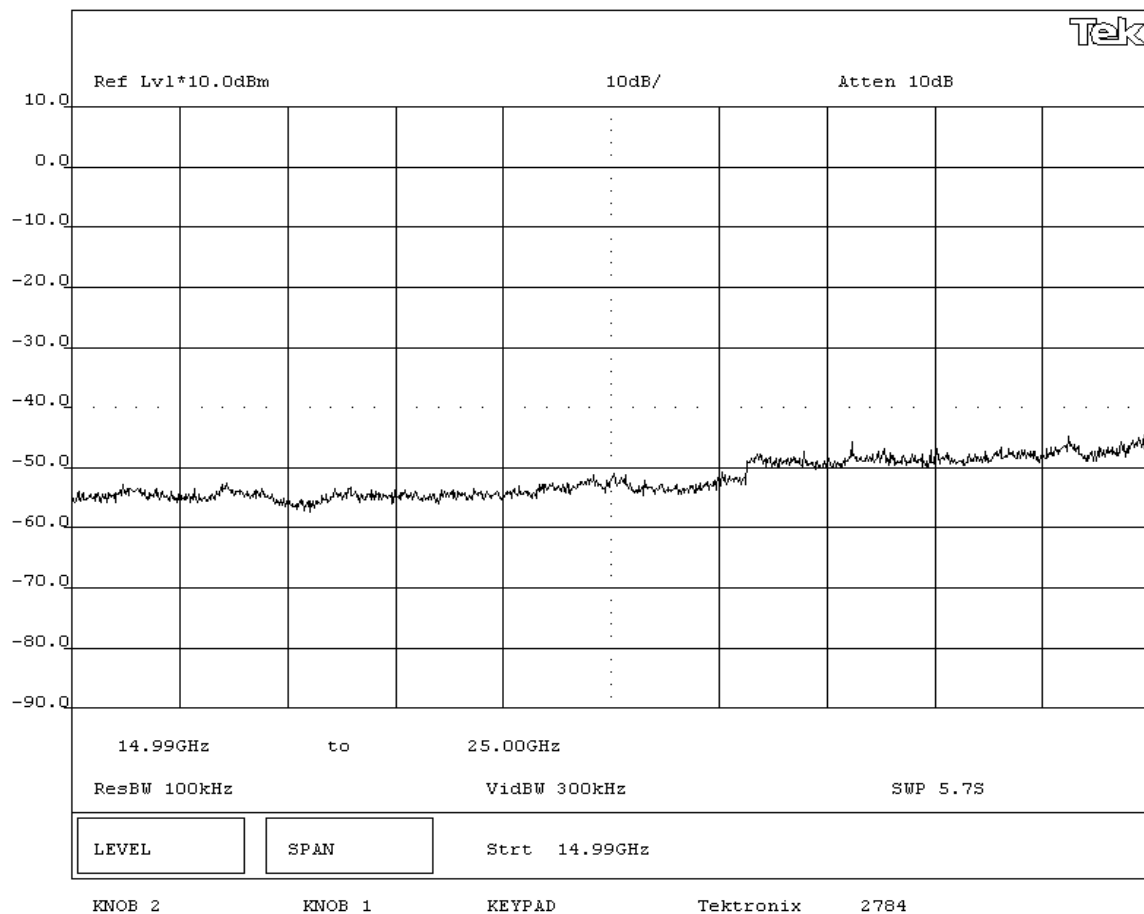
NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number: unknown				Date: 09/13/05	
Customer: Logitech, Inc.				Temperature: 71 °F	
Attendees: none		Tested by: Rod Peloquin		Humidity: 41% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Low Channel 3GHz-6.5GHz					



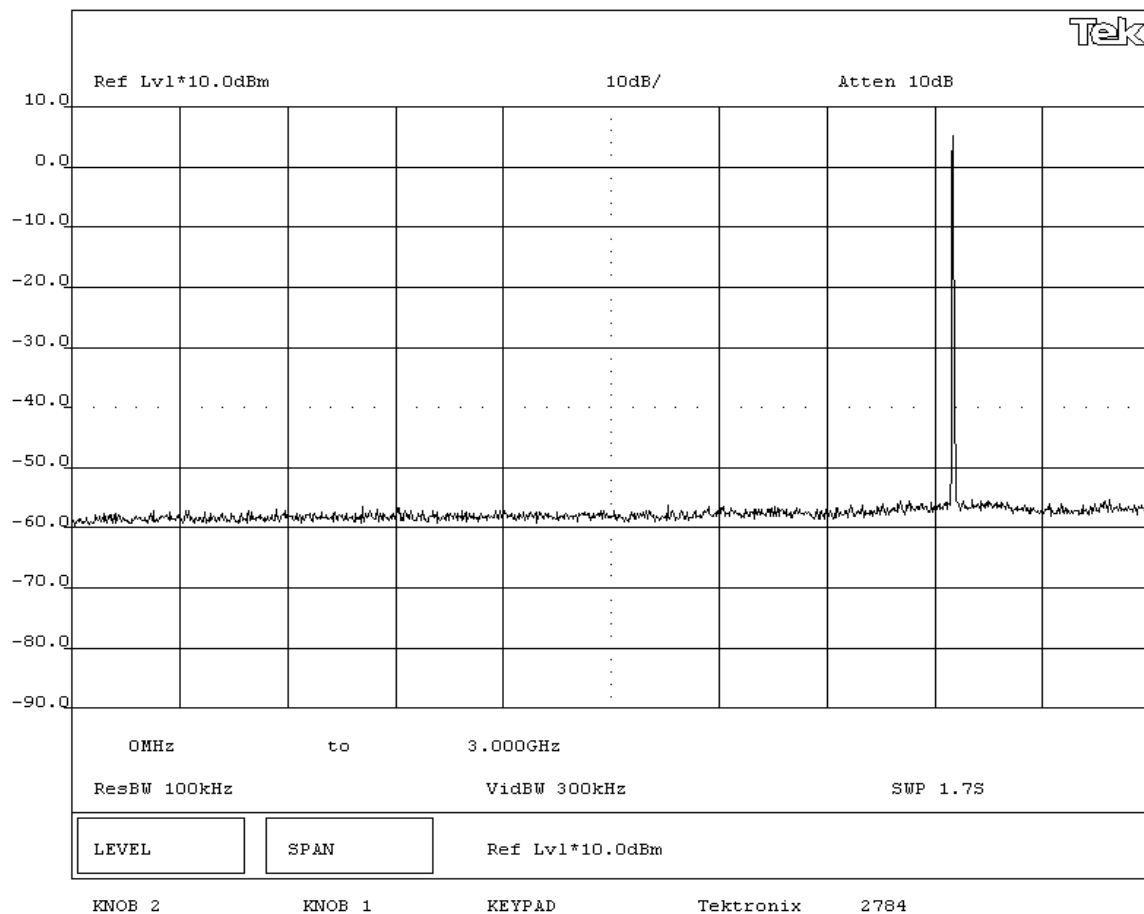
NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 09/13/05		
Customer: Logitech, Inc.			Temperature: 71 °F		
Attendees: none		Tested by: Rod Peloquin		Humidity: 41% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Low Channel 6.5GHz-15GHz					



NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number: unknown				Date: 09/13/05	
Customer: Logitech, Inc.				Temperature: 71 °F	
Attendees: none		Tested by: Rod Peloquin		Humidity: 41% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Low Channel 15GHz - 25GHz					



NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number: unknown				Date: 09/13/05	
Customer: Logitech, Inc.				Temperature: 71 °F	
Attendees: none		Tested by: Rod Peloquin		Humidity: 41% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Mid Channel 0MHz-3GHz					



NORTHWEST
EMC**Spurious Conducted Emissions**Rev BETA
01/30/01

EUT: F-0414A				Work Order: LABT0146	
Serial Number: unknown				Date: 09/13/05	
Customer: Logitech, Inc.				Temperature: 71 °F	
Attendees: none				Humidity: 41% RH	
Customer Ref. No.:		Tested by: Rod Peloquin		Power: 120VAC/60Hz	
				Job Site: EV06	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)	Year: 2005-04	Method: DA 00-705, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS**COMMENTS****EUT OPERATING MODES**

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

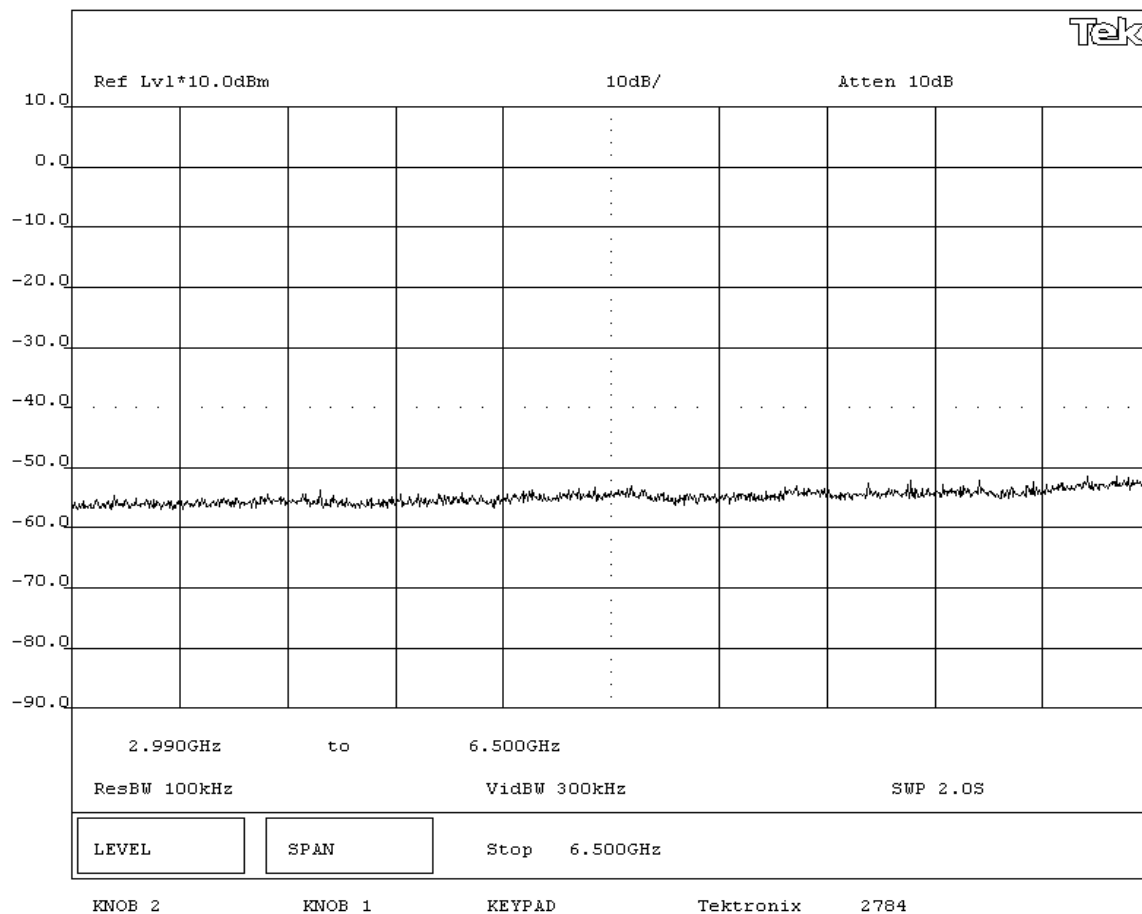
None

REQUIREMENTS

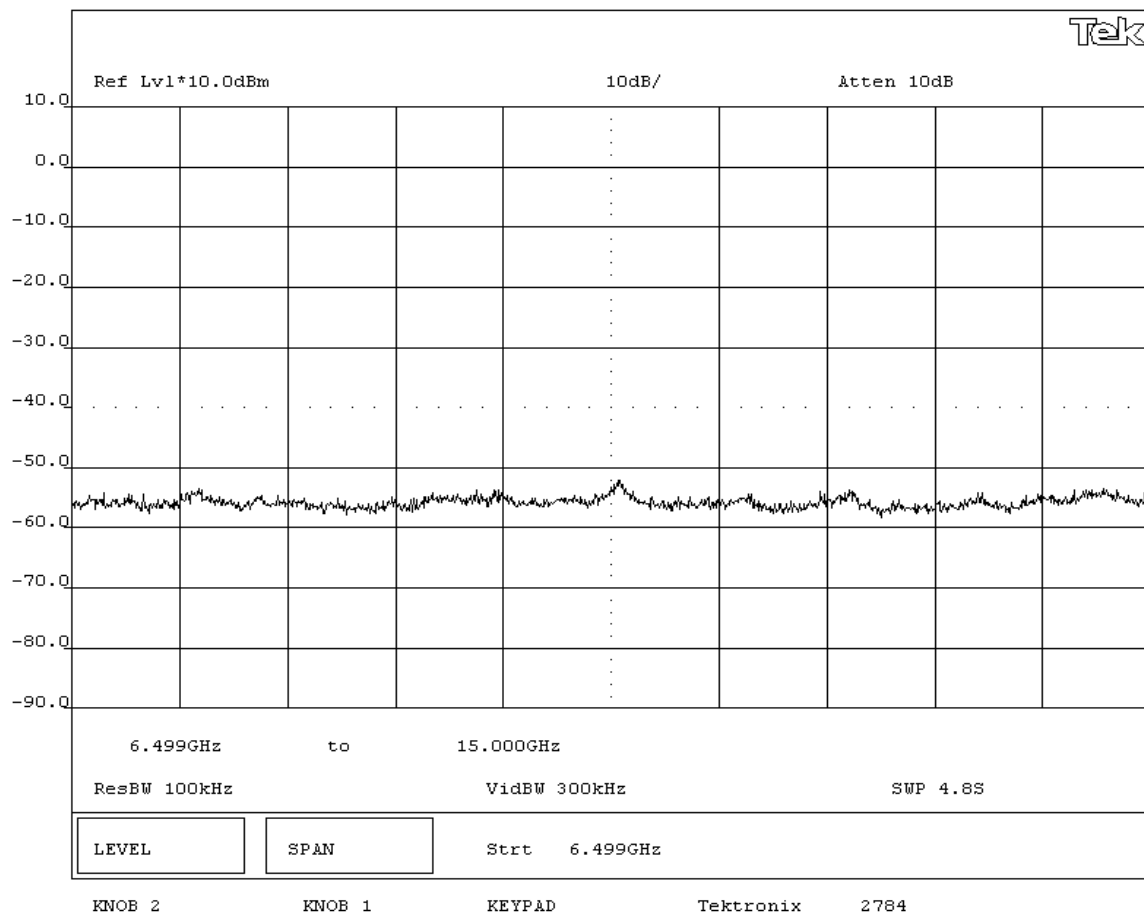
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

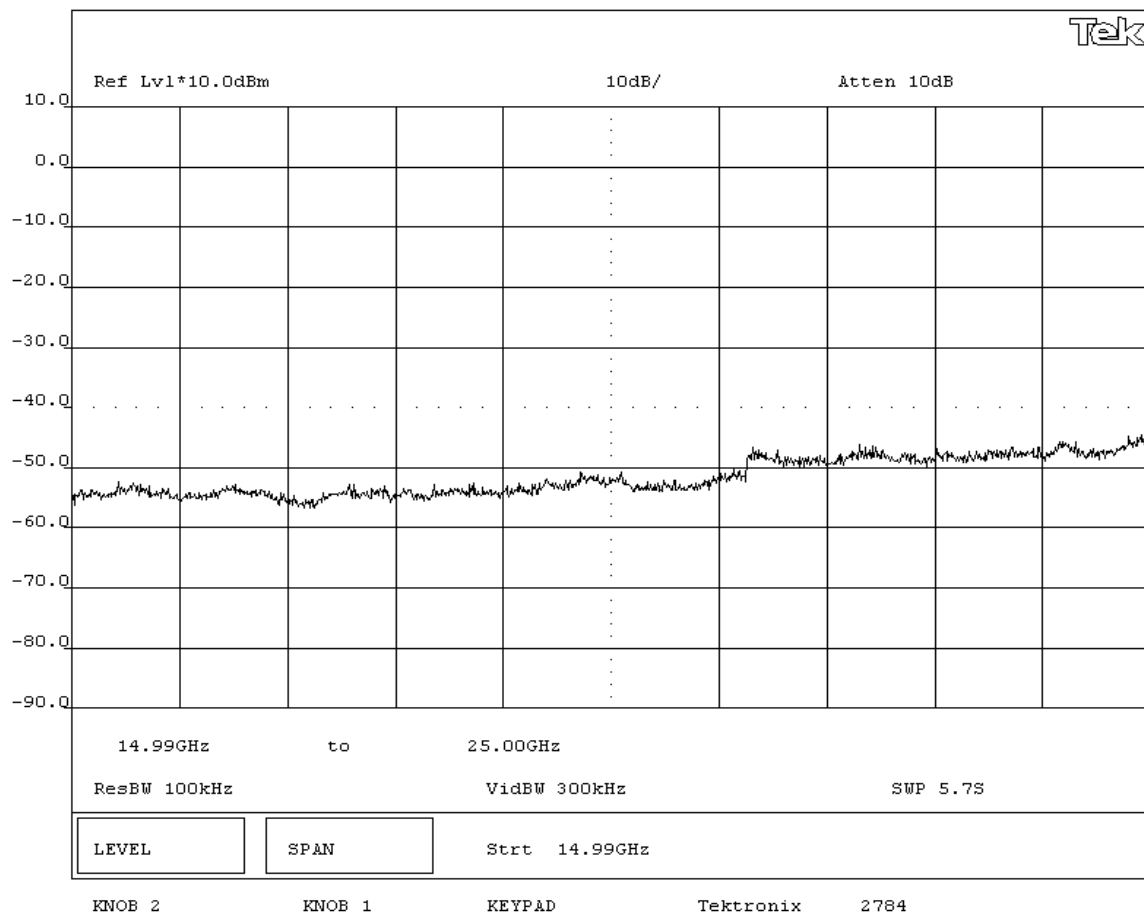
Pass

SIGNATURETested By: **DESCRIPTION OF TEST****Antenna Conducted Spurious Emissions - Mid Channel 3GHz-6.5GHz**

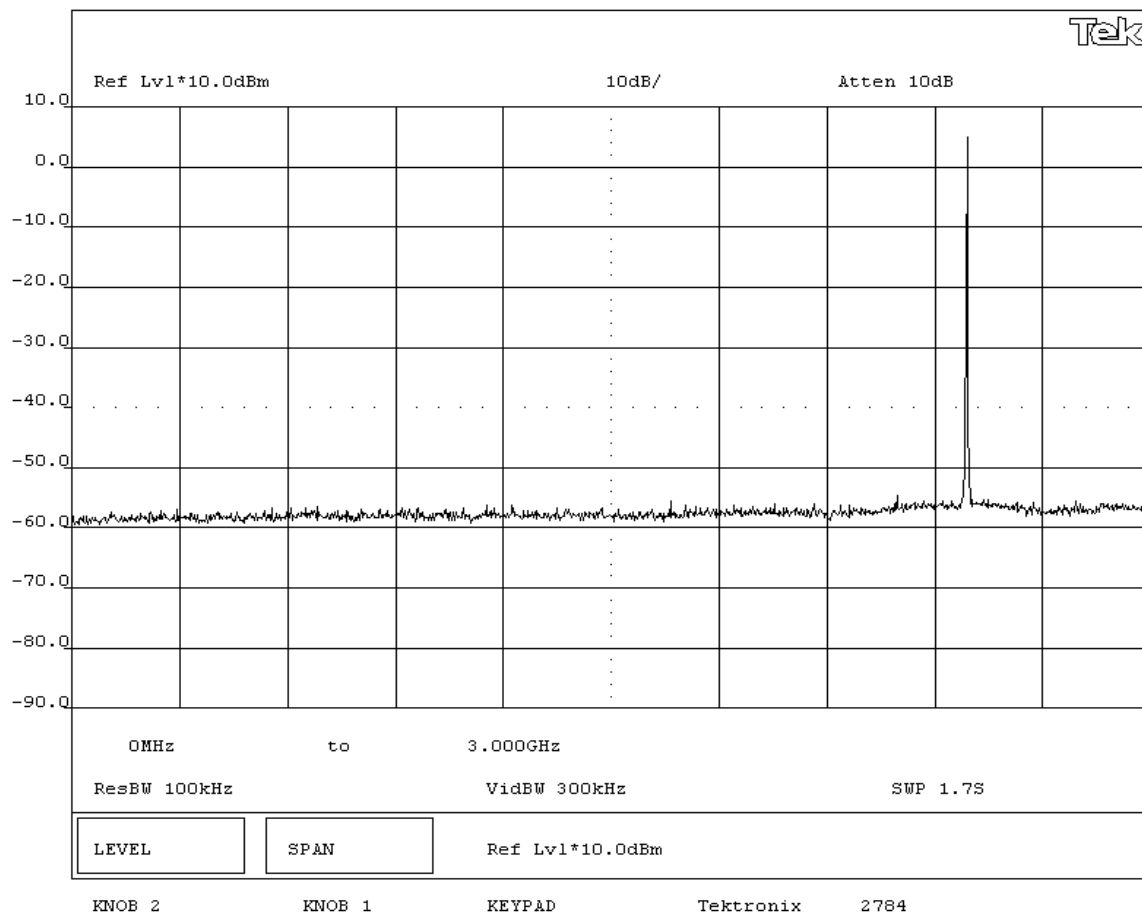
NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 09/13/05		
Customer: Logitech, Inc.			Temperature: 71 °F		
Attendees: none			Tested by: Rod Peloquin		
Customer Ref. No.:			Power: 120VAC/60Hz		
			Humidity: 41% RH		
			Job Site: EV06		
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Mid Channel 6.5GHz-15GHz					



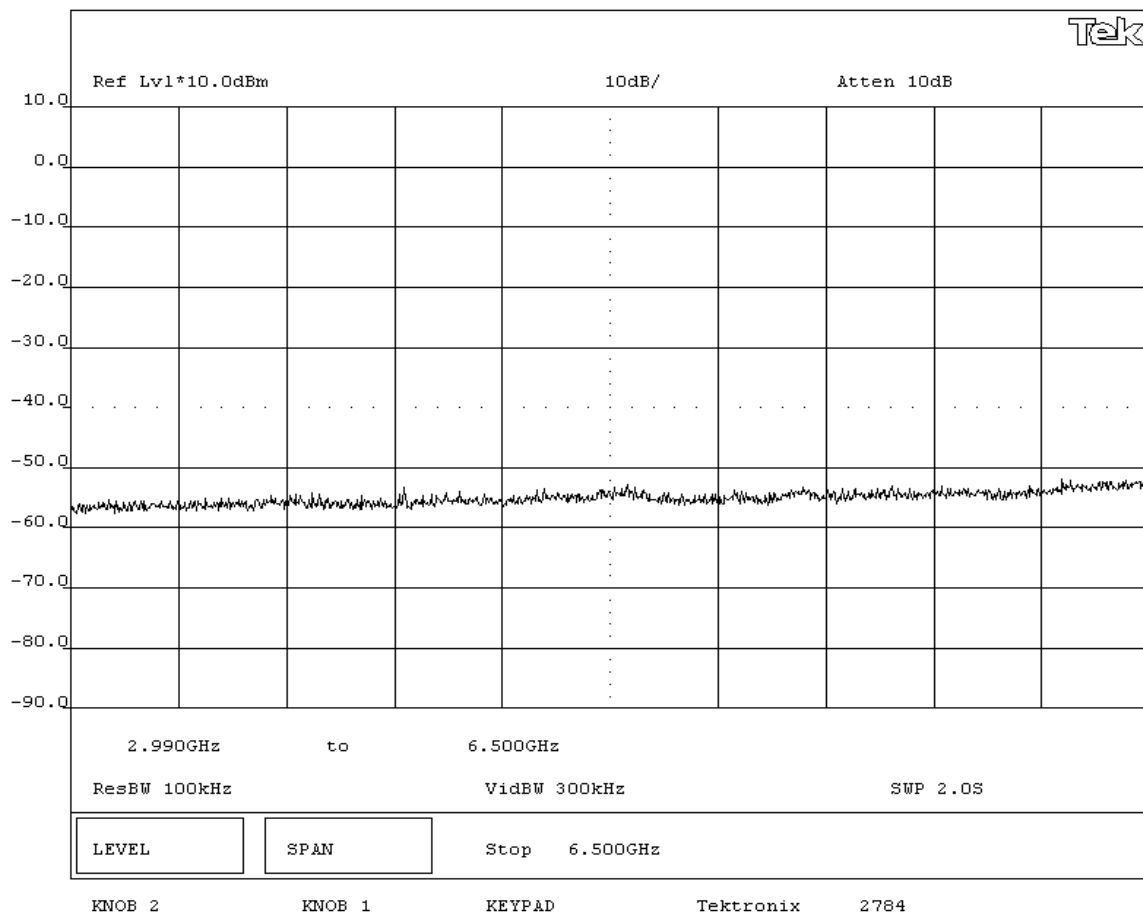
NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 09/13/05		
Customer: Logitech, Inc.			Temperature: 71 °F		
Attendees: none			Tested by: Rod Peloquin		
Customer Ref. No.:			Power: 120VAC/60Hz		
			Humidity: 41% RH		
			Job Site: EV06		
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - Mid Channel 15GHz-25GHz					



NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A			Work Order: LABT0146		
Serial Number: unknown			Date: 09/13/05		
Customer: Logitech, Inc.			Temperature: 71 °F		
Attendees: none			Humidity: 41% RH		
Customer Ref. No.:			Tested by: Rod Peloquin		Job Site: EV06
			Power: 120VAC/60Hz		
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - High Channel 0MHz-3GHz					



NORTHWEST EMC		Spurious Conducted Emissions		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number: unknown				Date: 09/13/05	
Customer: Logitech, Inc.				Temperature: 71 °F	
Attendees: none		Tested by: Rod Peloquin		Humidity: 41% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(d)		Year: 2005-04		Method: DA 00-705, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental					
RESULTS					
Pass					
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Antenna Conducted Spurious Emissions - High Channel 3GHz-6.5GHz					



NORTHWEST
EMC

Spurious Conducted Emissions

Rev BETA
01/30/01

EUT: F-0414A	Work Order: LABT0146
Serial Number: unknown	Date: 09/13/05
Customer: Logitech, Inc.	Temperature: 71 °F
Attendees: none	Humidity: 41% RH
Customer Ref. No.:	Tested by: Rod Peloquin
	Power: 120VAC/60Hz
	Job Site: EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)	Year: 2005-04	Method: DA 00-705, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

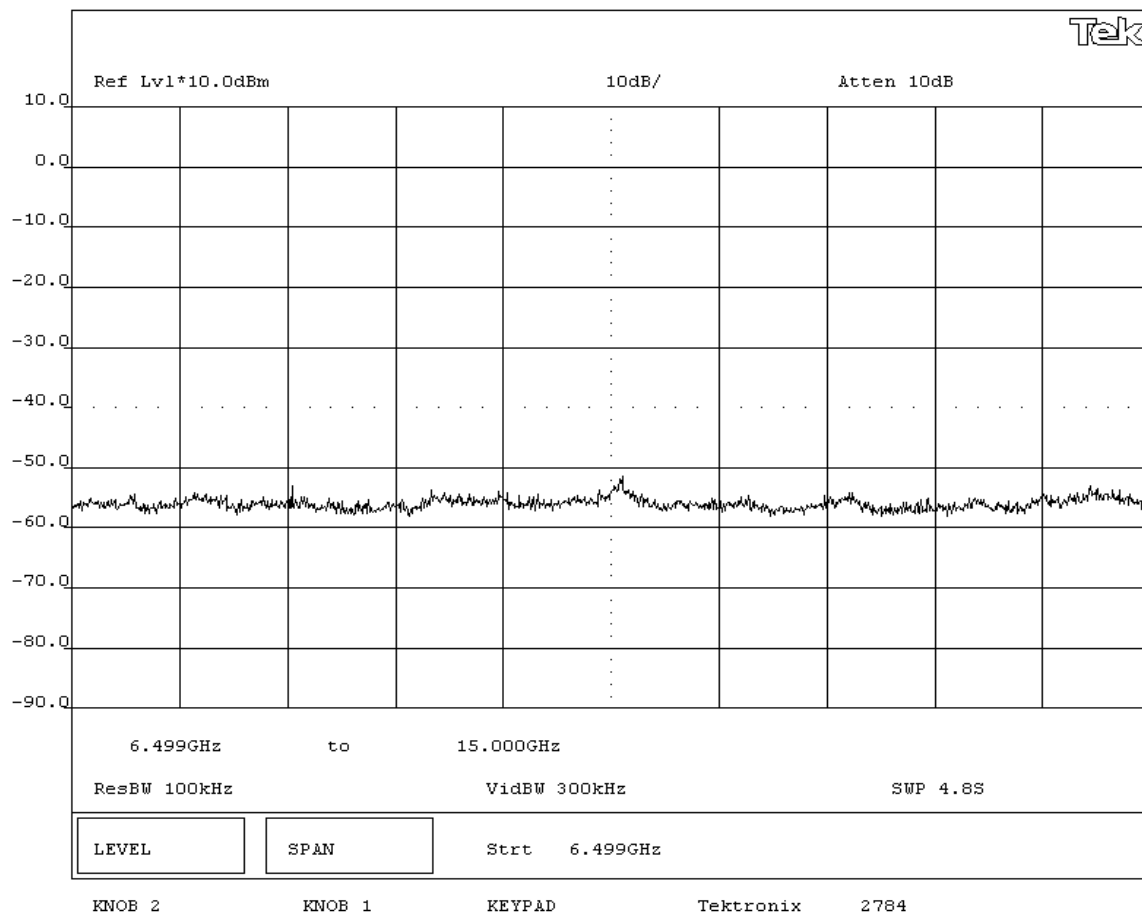
Pass

SIGNATURE

Tested By: 

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - High Channel 6.5GHz-15GHz



NORTHWEST
EMC**Spurious Conducted Emissions**Rev BETA
01/30/01

EUT: F-0414A		Work Order: LABT0146	
Serial Number: unknown		Date: 09/13/05	
Customer: Logitech, Inc.		Temperature: 71 °F	
Attendees: none		Humidity: 41% RH	
Customer Ref. No.:		Tested by: Rod Peloquin	Job Site: EV06
		Power: 120VAC/60Hz	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)	Year: 2005-04	Method: DA 00-705, ANSI C63.4	Year: 2003
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SAMPLE CALCULATIONS**COMMENTS****EUT OPERATING MODES**

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

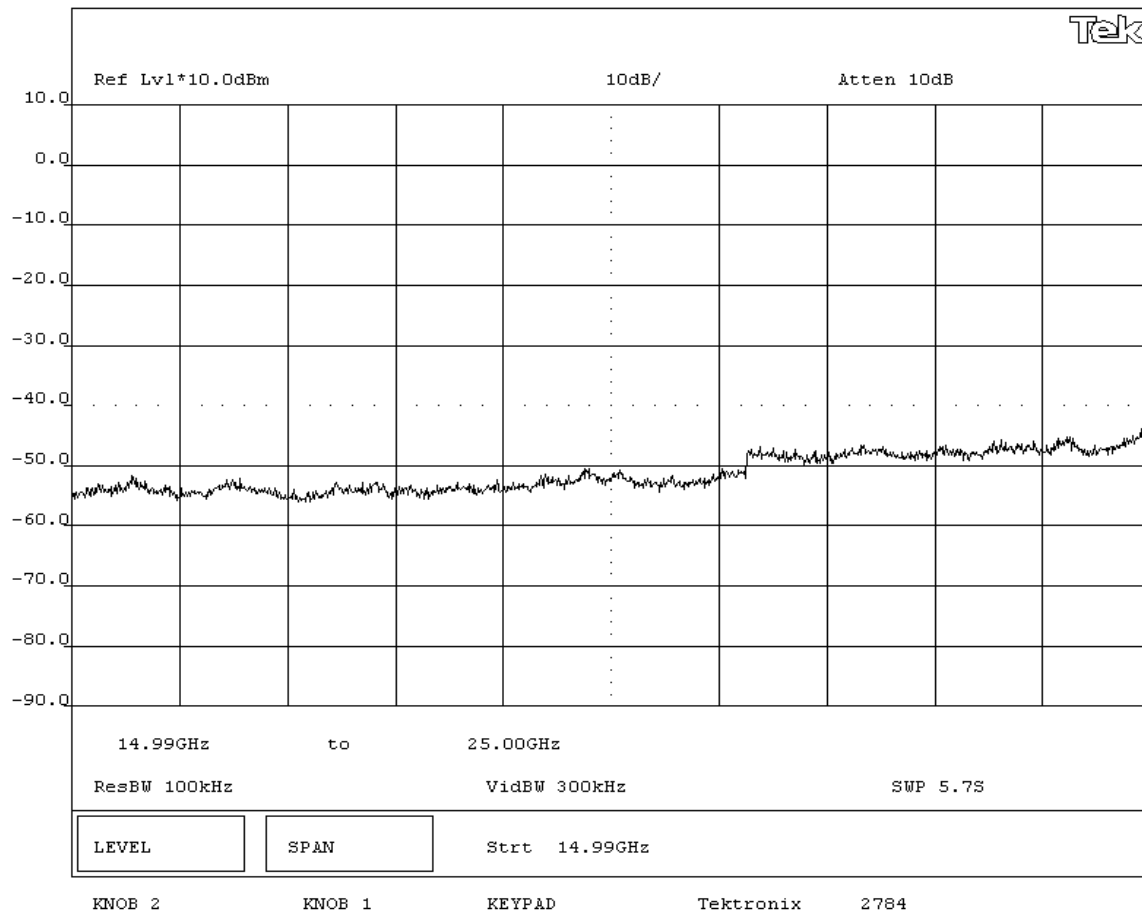
None

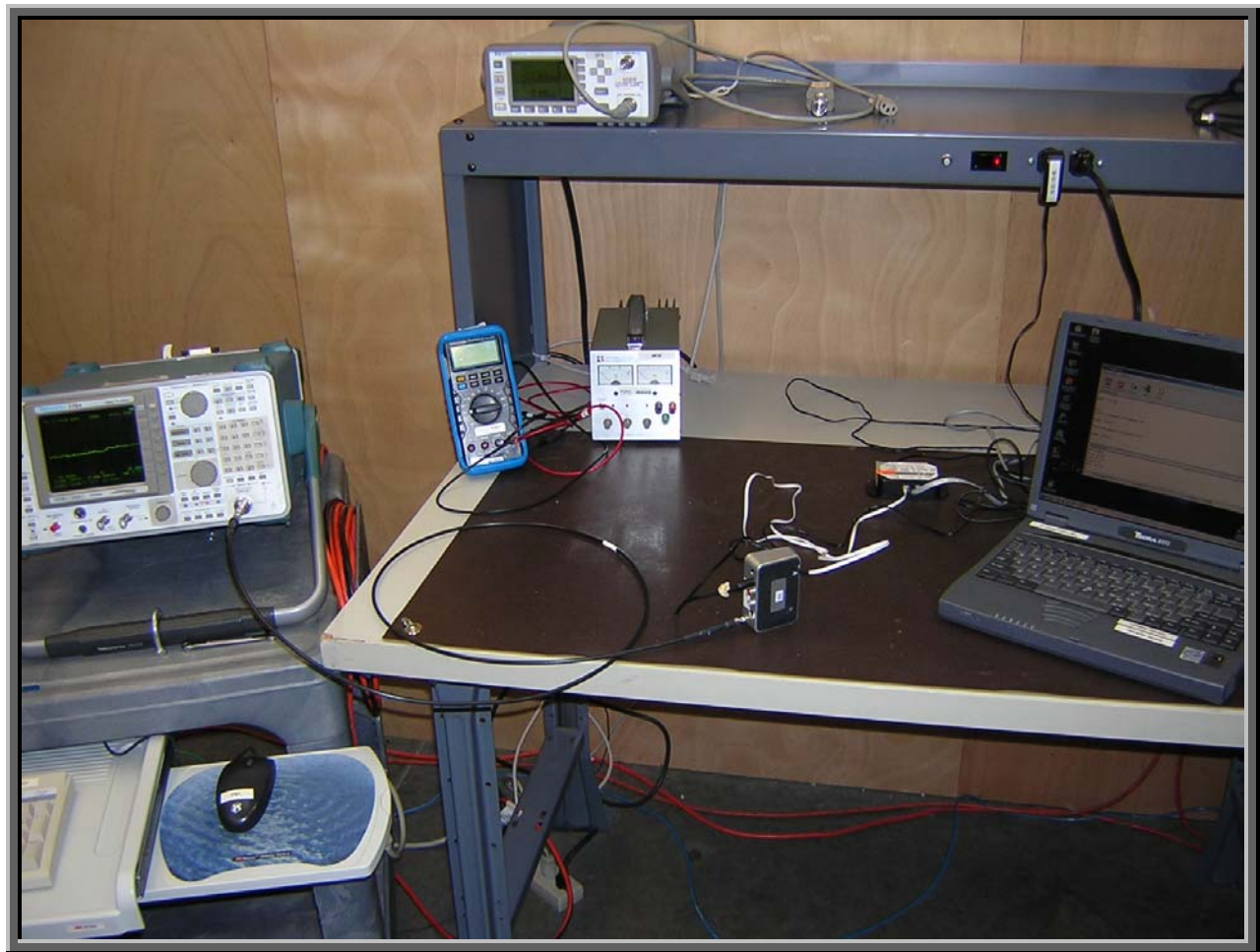
REQUIREMENTS

Maximum level of any spurious emission outside of the authorized band is 20 dB down from the fundamental

RESULTS

Pass

SIGNATURETested By: **DESCRIPTION OF TEST****Antenna Conducted Spurious Emissions - High Channel 15GHz-25GHz**



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Low

Mid

High

Operating Modes Investigated:

No Hop

Data Rates Investigated:

Maximum

Power Input Settings Investigated:

120VAC/60Hz

Software\Firmware Applied During Test

Exercise software	SimpleTerm	Version	none
Description			
The system was tested using special software developed to test all functions of the device during the test.			

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
EUT-Stereo Transceiver	Logitech, Inc	F-0414A	Unknown
RS-232 / RS-485 Converter	RE Smith	ASC24TS	none

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	EUT-Stereo Transceiver	AC Adapter
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RJ11	No	4.0	No	RS-232 / RS-485 Converter	Laptop
RS485	No	1.2	No	RS-232 / RS-485 Converter	EUT-Stereo Transceiver

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Tektronix	2784	AAO	01/02/2005	12 mo

Test Description

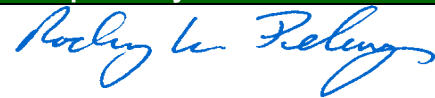
Requirement: Per 47 CFR 15.247(e), the peak power spectral density conducted from the antenna port of a direct sequence transmitter must not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission.

Configuration: 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 using direct sequence modulation. Per the procedure outlined in FCC 97-114, the spectrum analyzer was used as follows:

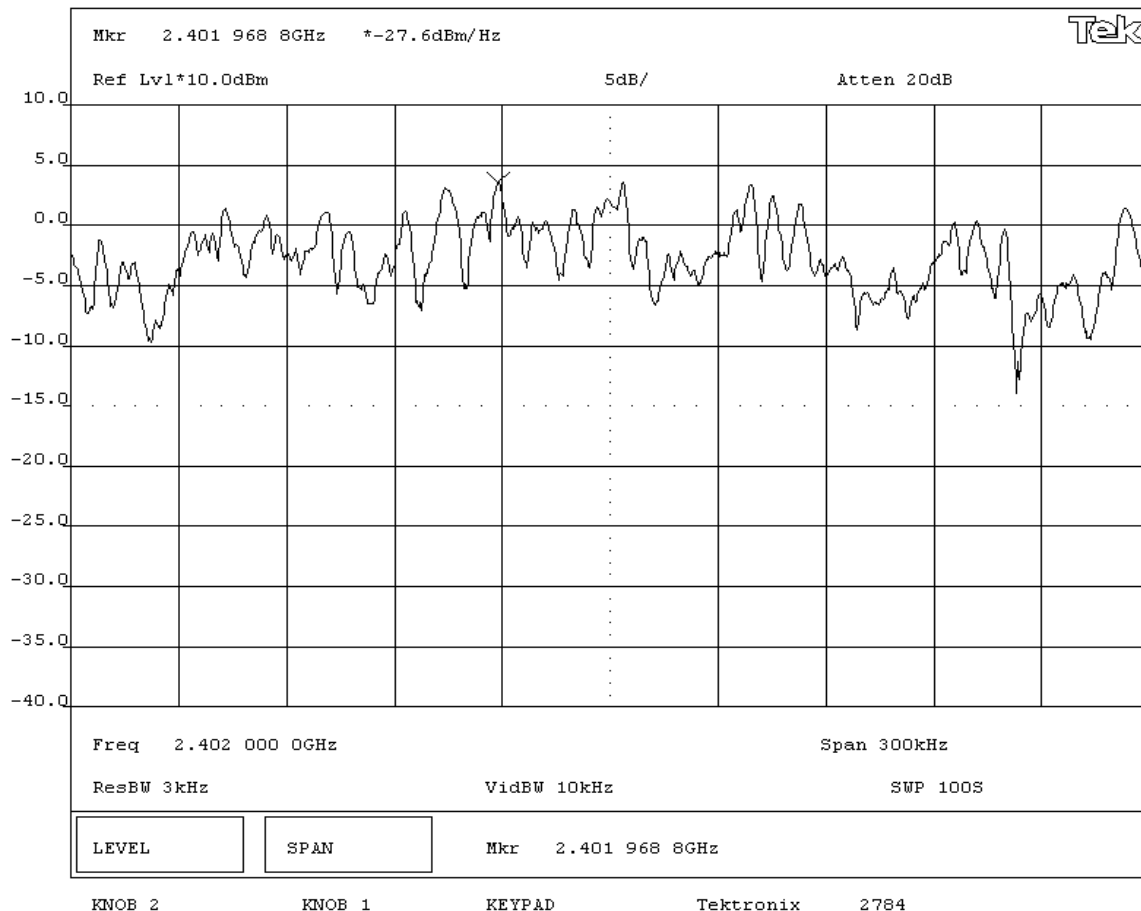
The emission peak(s) were located and zoom in on within the passband. The resolution bandwidth was set to 3 kHz, the video bandwidth was set to greater than or equal to the resolution bandwidth. The sweep speed was set equal to the span divided by 3 kHz (sweep = $(\text{SPAN}/3 \text{ kHz})$). For example, 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 34.8 dB for correction to 3 kHz."

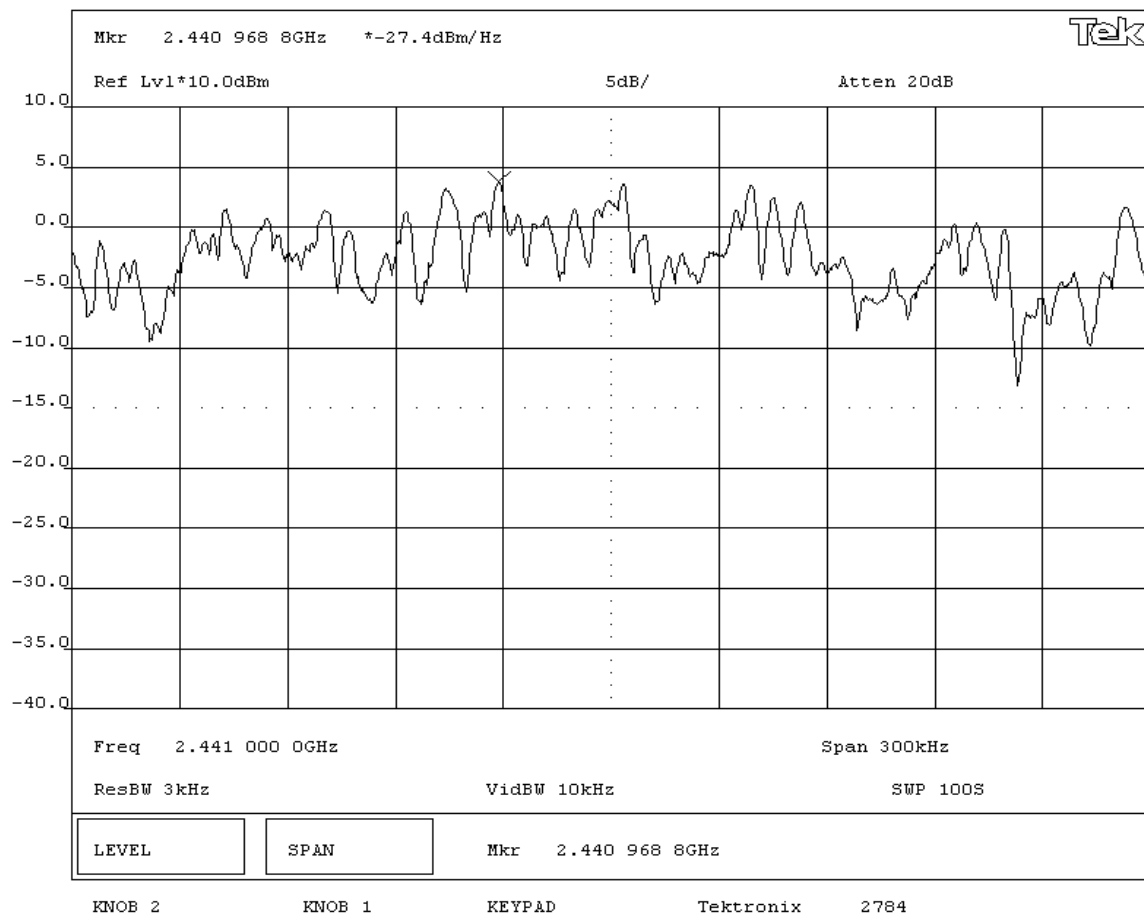
Completed by:



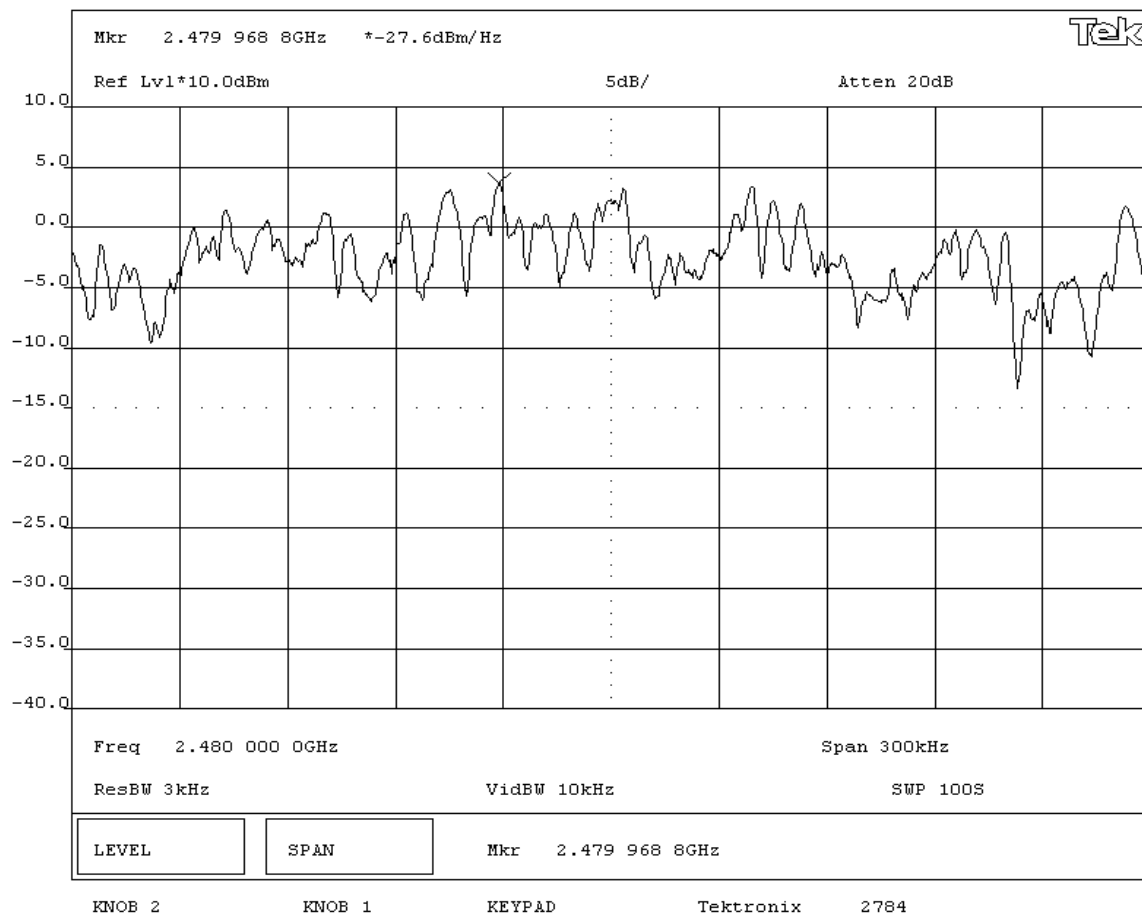
NORTHWEST EMC		POWER SPECTRAL DENSITY		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number:				Date: 08/26/05	
Customer: Logitech, Inc.				Temperature: 73 °F	
Attendees:		Tested by: Rod Peloquin		Humidity: 36% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(e)		Year: 2005-06		Method: FCC 97-114, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation.					
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.					
Bandwidth Correction Factor = $10 \cdot \log(3\text{kHz}/1\text{Hz}) = 34.8 \text{ dB}$					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum peak power spectral density conducted from a DTS transmitter does not exceed 8 dBm in any 3 kHz band					
RESULTS					
				AMPLITUDE	
Pass				Power Spectral Density = 7.2dBm / 3kHz	
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Power Spectral Density - Low Channel					



NORTHWEST EMC		POWER SPECTRAL DENSITY		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number:				Date: 08/26/05	
Customer: Logitech, Inc.				Temperature: 73 °F	
Attendees:		Tested by: Rod Peloquin		Humidity: 36% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(e)		Year: 2005-06		Method: FCC 97-114, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation					
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.					
Bandwidth Correction Factor = $10 \cdot \log(3\text{kHz}/1\text{Hz}) = 34.8 \text{ dB}$					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum peak power spectral density conducted from a DTS transmitter does not exceed 8 dBm in any 3 kHz band					
RESULTS					
				AMPLITUDE	
Pass				Power Spectral Density = 7.4dBm / 3kHz	
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Power Spectral Density - Mid Channel					



NORTHWEST EMC		POWER SPECTRAL DENSITY		Rev BETA 01/30/01	
EUT: F-0414A				Work Order: LABT0146	
Serial Number:				Date: 08/26/05	
Customer: Logitech, Inc.				Temperature: 73 °F	
Attendees:		Tested by: Rod Peloquin		Humidity: 36% RH	
Customer Ref. No.:		Power: 120VAC/60Hz		Job Site: EV06	
TEST SPECIFICATIONS					
Specification: 47 CFR 15.247(e)		Year: 2005-06		Method: FCC 97-114, ANSI C63.4	
				Year: 2003	
SAMPLE CALCULATIONS					
Meter reading on spectrum analyzer is internally compensated for cable loss and external attenuation					
Power Spectral Density per 3kHz bandwidth = Power Spectral Density per 1 Hz bandwidth + Bandwidth Correction Factor.					
Bandwidth Correction Factor = $10 \cdot \log(3\text{kHz}/1\text{Hz}) = 34.8 \text{ dB}$					
COMMENTS					
EUT OPERATING MODES					
Modulated by PRBS at maximum data rate					
DEVIATIONS FROM TEST STANDARD					
None					
REQUIREMENTS					
Maximum peak power spectral density conducted from a DTS transmitter does not exceed 8 dBm in any 3 kHz band					
RESULTS					
				AMPLITUDE	
Pass				Power Spectral Density = 7.2dBm / 3kHz	
SIGNATURE					
 Tested By: _____					
DESCRIPTION OF TEST					
Power Spectral Density - High Channel					





Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. All of the EUT parameters listed below were investigated. This includes, but may not be limited to, CPU speeds, video resolution settings, operational modes, and input voltages.

Channels in Specified Band Investigated:

2.402 GHz
2.441 GHz
2.480 GHz

Operating Modes Investigated:

Transmit Mode (Modulated) – No Hop

Operating Mode used for Final Test:

Transmit Mode (Modulated) – No Hop

Operating Modes Investigated:

Transmit Mode – Tested in Dock

Transmit Mode – Tested in Stand Alone

Power Input Settings Investigated:

120 VAC, 60 Hz

Input Power Setting used for Final Test:

120 VAC, 60 Hz

Frequency Range Investigated

Start Frequency	30 MHz	Stop Frequency	26 GHz
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Software\Firmware Applied During Test

Operating system	Windows	Version	XP
Exercise software	Simple Terminal	Version	Unknown

Description

The system was tested using special operating software to exercise the functions of the device during the testing.

EUT and Peripherals in Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
EUT-USB Dongle/Docking Station	Logitech, Inc	F-0414A	Unknown
Serial/RS485	RE Smith	ASC24TS	Unknown

Remote Equipment Outside of Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Toshiba	Tecra 8100	41298161U
Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary.			

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RS485	No	1.2	No	Serial/RS485	EUT-USB Dongle/Docking Station
AC Power	PA	2.0	No	AC Adaptor	AC Mains
USB	No	4.2	No	Laptop	EUT-USB Dongle/Docking Station
RJ11	No	4.0	No	Serial/RS485	Laptop
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	12/07/2004	13 mo
Receiver	Schaffner	SCR 3101	ARC	05/04/2005	13 mo
Pre-Amplifier	Miteq	AM-1616-1000	AOM	10/20/2004	13 mo
Antenna, Biconilog	EMCO	3142	AXJ	07/31/2005	24 mo
Antenna, Horn	EMCO	3115	AHB	08/01/2005	24 mo
Pre-Amplifier 0.5-18 GHz	Miteq	AMF-4D-005180-24-10P	APP	09/07/2005	16 mo
Antenna, Horn	EMCO	3160-07	AHP	NCR	NA
Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	12/26/2004	13 mo
Antenna, Horn	EMCO	3160-08	AHO	NCR	NA
Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	12/26/2004	13 mo
Antenna, Horn	EMCO	3160-09	AHN	NCR	NA
Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AOI	02/15/2005	13 mo
High Pass Filter	Micro-Tronics	HPM50114	HFN	03/09/2005	13 mo

Test Description

Requirement: The field strength of any spurious emissions or modulation products that fall in a restricted band, as defined in 47 CFR 15.205, is measured. The peak level must comply with the limits specified in 47 CFR 15.35(b). The average level (taken with a 10Hz VBW) must comply with the limits specified in 15.209.

Configuration: 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 C63.4:2003). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Per FCC Test Procedure for Frequency Hoppers, Public Notice DA 00-705, the average data was reduced by a duty cycle correction factor for comparison to the average radiated emissions limit. The duty cycle correction factor was calculated as follows:

From the attached FCC Procedure for Bluetooth transmitters, we can determine the duty cycle on a single hopping channel:

“Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is as follows:

$$\text{Dwell time} = \text{time slot length} * \text{hop rate} / \text{number of hopping channels} * 30\text{s}$$

Example for a DH1 packet (with a maximum length of one time slot)

$$\text{Dwell time} = 625 \mu\text{s} * 1600 \text{ 1/s} / 79 * 30\text{s} = 0.3797\text{s (in a 30s period)}$$

For multi-slot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

$$\text{Dwell time} = 5 * 625 \mu\text{s} * 1600 * 1/5 * 1\text{s} / 79 * 30\text{s} = 0.3797\text{s (in a 30s period)}$$

This is according to the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore, all Bluetooth devices **comply** with the FCC dwell time requirement in the data mode. This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)”

A Bluetooth radio hops 1600 times a second across 79 channels. Each channel is used equally on average. Therefore $1600/79 = 20.25$ hops/sec on a single channel. The period of a single hop is $1\text{sec}/20.25 = 49.375 \text{ ms}$

The maximum length of a DH1 data packet is 625 us. The highest duty cycle = $.625\text{ms}/49.375\text{ms} = .01266$

The duty cycle correction factor for frequency hoppers is $20 \cdot \log(\text{highest duty cycle})$ for the actual period or 100 ms - whichever is shorter. So the duty cycle correction factor for a Bluetooth is:

$$20 \cdot \log (.01266) = -38 \text{ dB.}$$

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
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

Completed by:



EMC

RADIATED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/07/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	52%
Project:	None	Barometric Pressure:	29.95
Tested by:	Dean Ghizzone	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

Test Method

FCC 15.247(d) Spurious Radiated Emissions:2005-04

ANSI C63.4:2003

TEST PARAMETERS

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

See Comments, Data shows EUT in maximized positions (Typical use position unless otherwise noted)

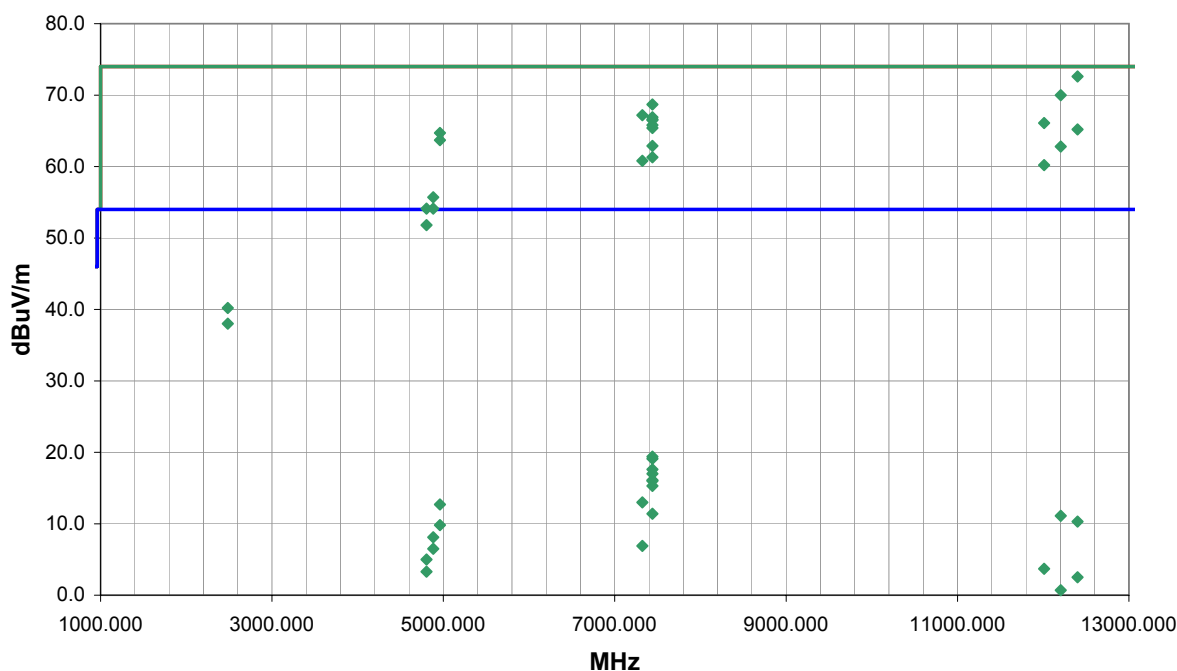
EUT OPERATING MODES

Modulated, No-Hop

DEVIATIONS FROM TEST STANDARD

No deviations.

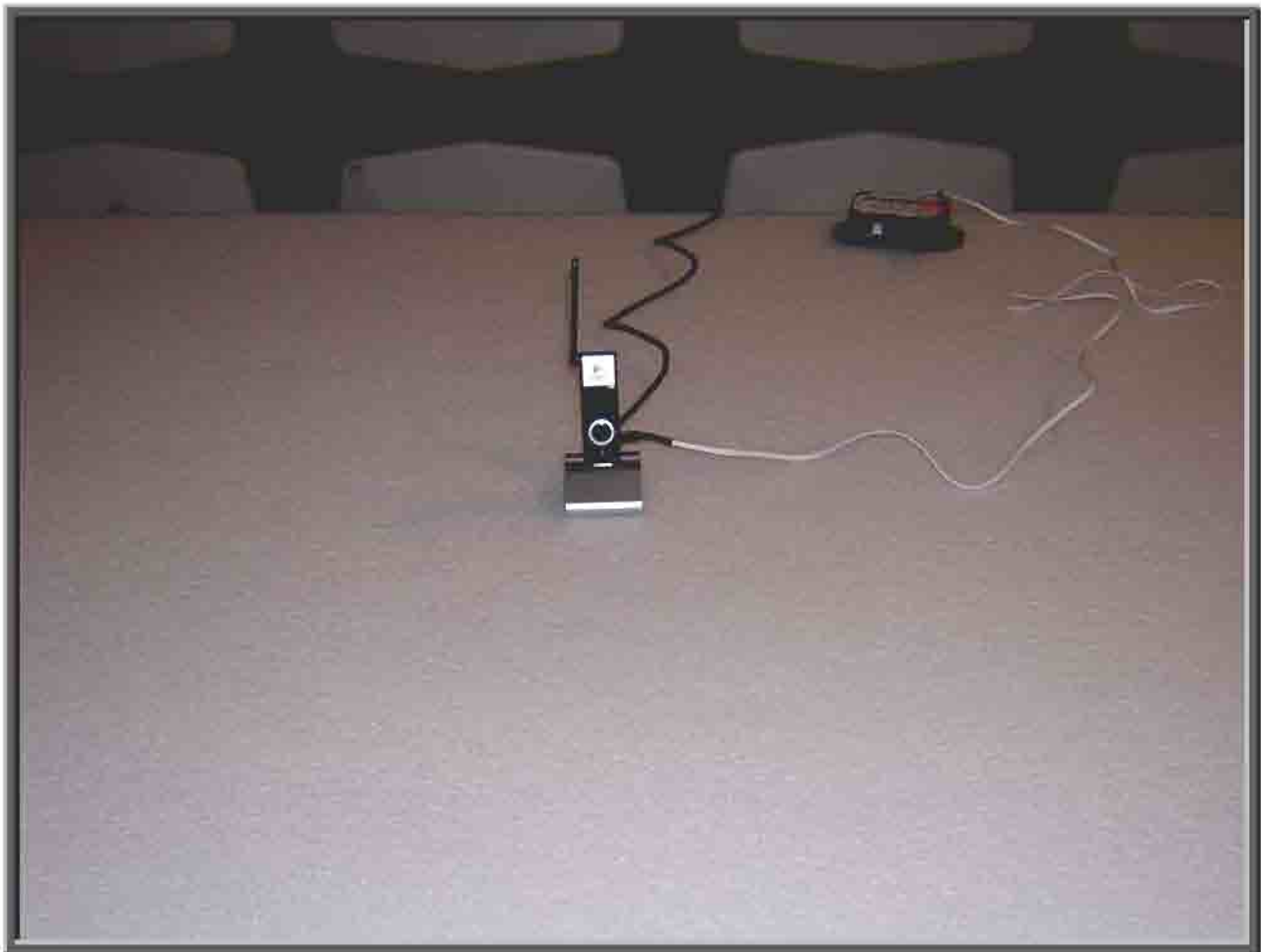
Run #	1	Signature 
Configuration #		
Results	Pass	

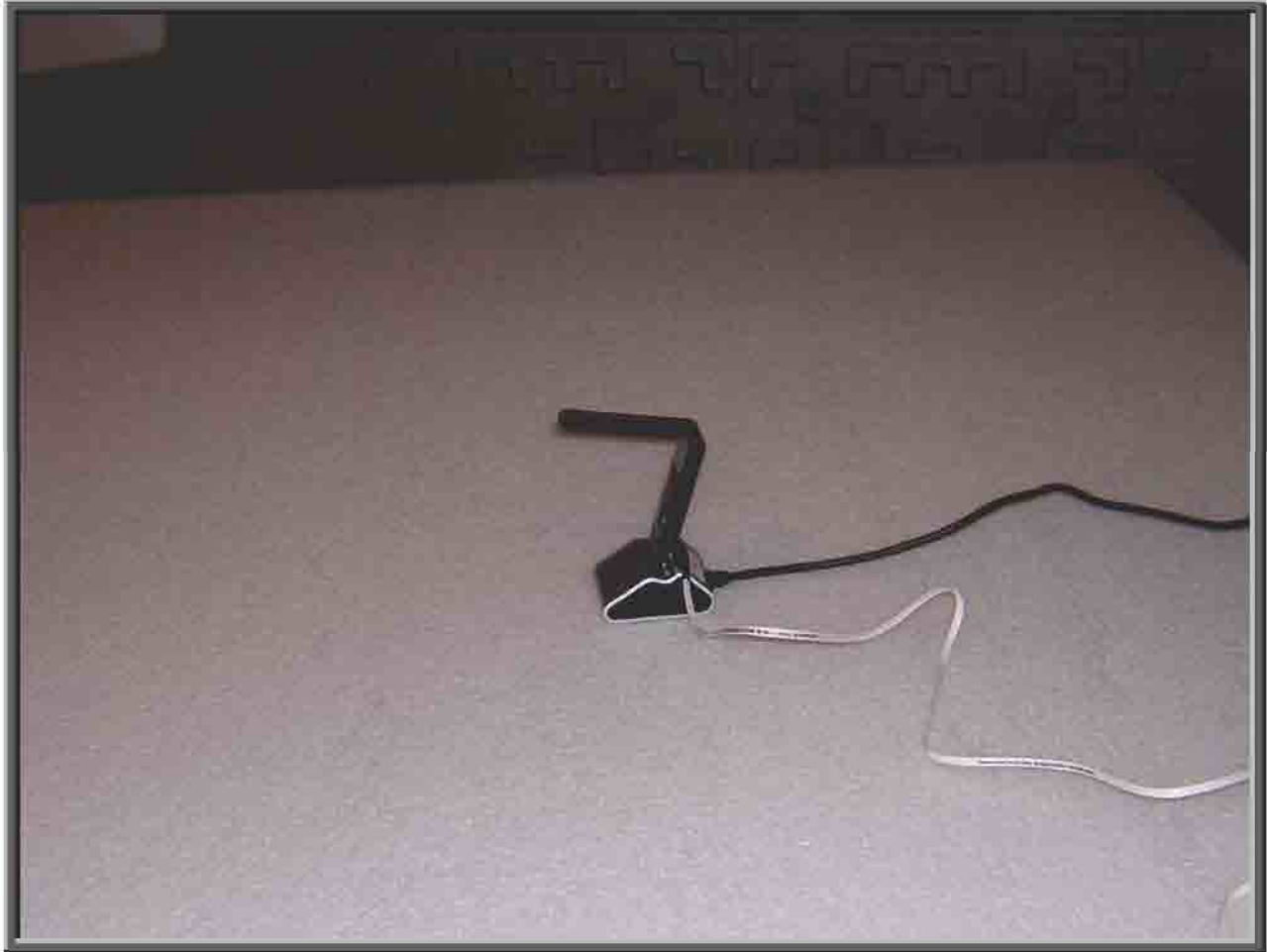


Freq (MHz)	Amplitude (dBUV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBUV/m	Spec. Limit dBUV/m	Compared to Spec. (dB)
12400.000	79.0	-6.4	53.0	1.0	0.0	0.0	V-Horn	PK	0.0	72.6	74.0	-1.4
12205.000	76.1	-6.1	15.0	1.0	0.0	0.0	V-Horn	PK	0.0	70.0	74.0	-4.0
7440.000	56.8	11.9	13.0	1.7	0.0	0.0	H-Horn	PK	0.0	68.7	74.0	-5.3
7323.000	55.7	11.5	359.0	1.0	0.0	0.0	H-Horn	PK	0.0	67.2	74.0	-6.8
7440.000	55.0	11.9	52.0	1.7	0.0	0.0	H-Horn	PK	0.0	66.9	74.0	-7.1
7440.000	54.7	11.9	11.0	2.1	0.0	0.0	V-Horn	PK	0.0	66.6	74.0	-7.4
7440.000	54.6	11.9	228.0	1.0	0.0	0.0	H-Horn	PK	0.0	66.5	74.0	-7.5
12010.000	71.9	-5.8	16.0	1.2	0.0	0.0	V-Horn	PK	0.0	66.1	74.0	-7.9
7440.000	53.9	11.9	193.0	1.0	0.0	0.0	V-Horn	PK	0.0	65.8	74.0	-8.2
7440.000	53.5	11.9	177.0	1.0	0.0	0.0	V-Horn	PK	0.0	65.4	74.0	-8.6
12400.000	71.6	-6.4	36.0	1.0	0.0	0.0	H-Horn	PK	0.0	65.2	74.0	-8.8
4960.000	58.1	6.6	19.0	1.5	0.0	0.0	H-Horn	PK	0.0	64.7	74.0	-9.3
4960.000	57.1	6.6	330.0	1.3	0.0	0.0	V-Horn	PK	0.0	63.7	74.0	-10.3
7440.000	51.0	11.9	352.0	1.0	0.0	0.0	H-Horn	PK	0.0	62.9	74.0	-11.1
12205.000	68.9	-6.1	32.0	1.0	0.0	0.0	H-Horn	PK	0.0	62.8	74.0	-11.2
7440.000	49.4	11.9	257.0	1.0	0.0	0.0	V-Horn	PK	0.0	61.3	74.0	-12.7
7323.000	49.3	11.5	201.0	1.0	0.0	0.0	V-Horn	PK	0.0	60.8	74.0	-13.2
12010.000	66.0	-5.8	36.0	1.0	0.0	0.0	H-Horn	PK	0.0	60.2	74.0	-13.8
4882.000	49.5	6.2	324.0	1.0	0.0	0.0	V-Horn	PK	0.0	55.7	74.0	-18.3
4804.000	48.0	6.1	335.0	1.0	0.0	0.0	V-Horn	PK	0.0	54.1	74.0	-19.9
4882.000	47.9	6.2	28.0	1.6	0.0	0.0	H-Horn	PK	0.0	54.1	74.0	-19.9

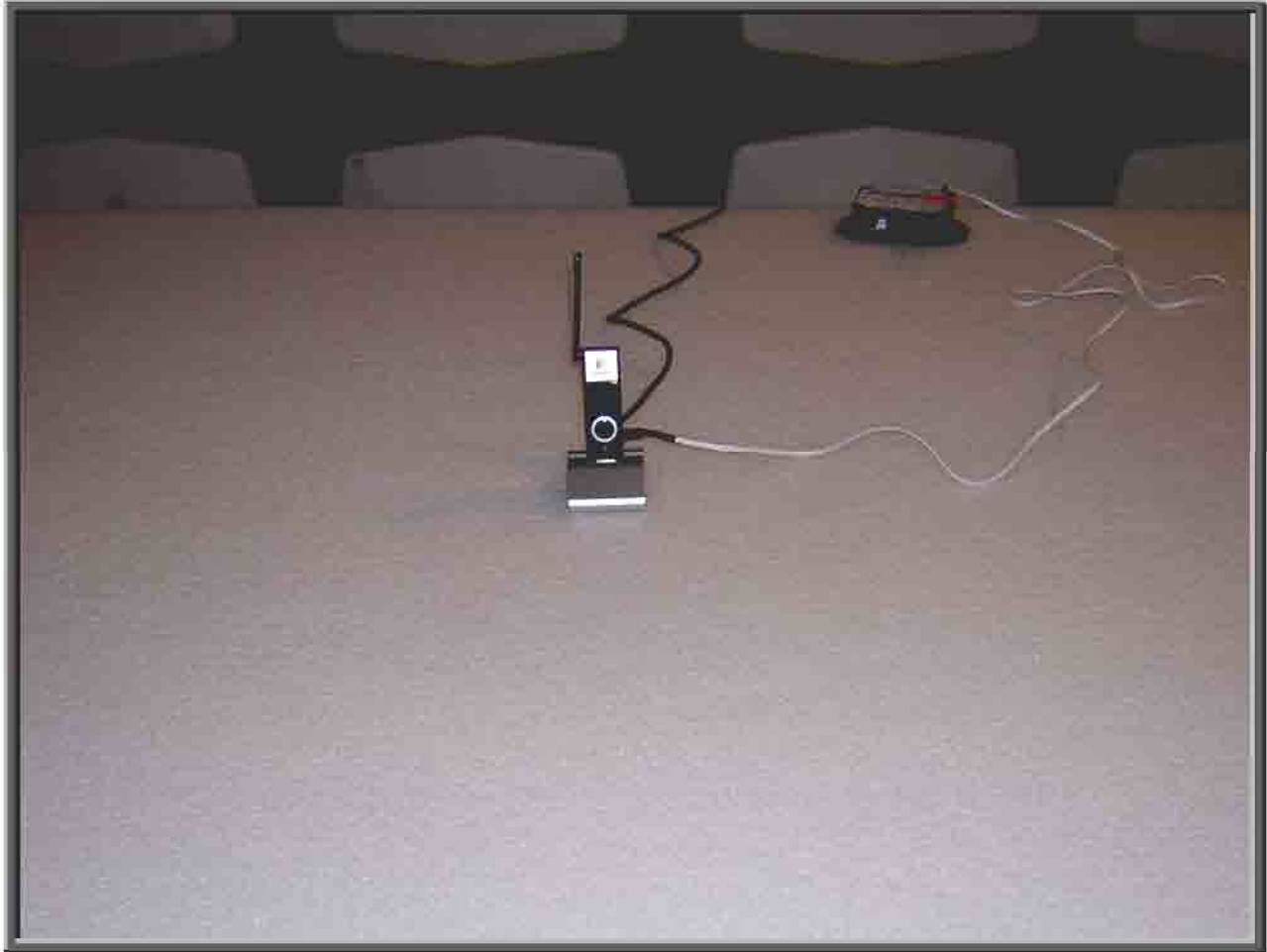
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
4804.000	45.7	6.1	55.0	1.7	0.0	0.0	H-Horn	PK	0.0	51.8	74.0	-22.2
2483.500	40.4	-0.2	165.0	1.0	0.0	0.0	H-Horn	PK	0.0	40.2	74.0	-33.8
7440.000	45.5	11.9	13.0	1.7	38.0	0.0	H-Horn	AV	0.0	19.4	54.0	-34.6
7440.000	45.2	11.9	228.0	1.0	38.0	0.0	H-Horn	AV	0.0	19.1	54.0	-34.9
2483.500	38.2	-0.2	96.0	1.0	0.0	0.0	V-Horn	PK	0.0	38.0	74.0	-36.0
7440.000	43.7	11.9	11.0	2.1	38.0	0.0	V-Horn	AV	0.0	17.6	54.0	-36.4
7440.000	43.1	11.9	177.0	1.0	38.0	0.0	V-Horn	AV	0.0	17.0	54.0	-37.0
7440.000	42.2	11.9	52.0	1.7	38.0	0.0	H-Horn	AV	0.0	16.1	54.0	-37.9
7440.000	42.1	11.9	352.0	1.0	38.0	0.0	H-Horn	AV	0.0	16.0	54.0	-38.0
7440.000	41.4	11.9	193.0	1.0	38.0	0.0	V-Horn	AV	0.0	15.3	54.0	-38.7
7323.000	39.5	11.5	359.0	1.0	38.0	0.0	H-Horn	AV	0.0	13.0	54.0	-41.0
4960.000	44.1	6.6	19.0	1.5	38.0	0.0	H-Horn	AV	0.0	12.7	54.0	-41.3
7440.000	37.5	11.9	257.0	1.0	38.0	0.0	V-Horn	AV	0.0	11.4	54.0	-42.6
12205.000	55.2	-6.1	15.0	1.0	38.0	0.0	V-Horn	AV	0.0	11.1	54.0	-42.9
12400.000	54.7	-6.4	53.0	1.0	38.0	0.0	V-Horn	AV	0.0	10.3	54.0	-43.7
4960.000	41.2	6.6	330.0	1.3	38.0	0.0	V-Horn	AV	0.0	9.8	54.0	-44.2
4882.000	39.9	6.2	324.0	1.0	38.0	0.0	V-Horn	AV	0.0	8.1	54.0	-45.9
7323.000	33.4	11.5	201.0	1.0	38.0	0.0	V-Horn	AV	0.0	6.9	54.0	-47.1
4882.000	38.3	6.2	28.0	1.6	38.0	0.0	H-Horn	AV	0.0	6.5	54.0	-47.5
4804.000	36.9	6.1	335.0	1.0	38.0	0.0	V-Horn	AV	0.0	5.0	54.0	-49.0
12010.000	47.5	-5.8	16.0	1.2	38.0	0.0	V-Horn	AV	0.0	3.7	54.0	-50.3
4804.000	35.2	6.1	55.0	1.7	38.0	0.0	H-Horn	AV	0.0	3.3	54.0	-50.7
12400.000	46.9	-6.4	36.0	1.0	38.0	0.0	H-Horn	AV	0.0	2.5	54.0	-51.5
12205.000	44.8	-6.1	32.0	1.0	38.0	0.0	H-Horn	AV	0.0	0.7	54.0	-53.3
2483.500	32.0	-0.2	96.0	1.0	38.0	0.0	V-Horn	AV	0.0	-6.2	54.0	-60.2
12010.000	37.6	-5.8	36.0	1.0	38.0	0.0	H-Horn	AV	0.0	-6.2	54.0	-60.2
2483.500	31.9	-0.2	165.0	1.0	38.0	0.0	H-Horn	AV	0.0	-6.3	54.0	-60.3

NORTHWEST EMC		RADIATED EMISSIONS DATA SHEET		ACQ 2005.8.22 EMI 2005.8.3								
EUT: F-0414A Dongle			Work Order: LABT0146									
Serial Number: Unknown			Date: 09/07/05									
Customer: Logitech, Inc.			Temperature: 22									
Attendees: None			Humidity: 52%									
Project: None			Barometric Pressure: 29.95									
Tested by: Dean Ghizzone		Power: 120VAC/60Hz		Job Site: OC10								
TEST SPECIFICATIONS			Test Method									
FCC 15.247(d) Spurious Radiated Emissions:2005-04			ANSI C63.4:2003									
TEST PARAMETERS												
Antenna Height(s) (m)		1m - 4m		Test Distance (m)								
COMMENTS												
See Comments, Data shows EUT in maximized positions (Typical use position unless otherwise noted)												
EUT OPERATING MODES												
Modulated, No-Hop												
DEVIATIONS FROM TEST STANDARD												
No deviations.												
Run #		1										
Configuration #												
Results		Pass										
<i>Dean Ghizzone</i> Signature												
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
14880.000	63.8	-1.8	303.0	1.0	0.0	0.0	V-Horn	PK	0.0	62.0	74.0	-12.0
14646.000	59.5	-1.7	305.0	1.0	0.0	0.0	V-Horn	PK	0.0	57.8	74.0	-16.2
14880.000	57.2	-1.8	195.0	1.0	0.0	0.0	H-Horn	PK	0.0	55.4	74.0	-18.6
14646.000	53.7	-1.7	310.0	1.0	0.0	0.0	H-Horn	PK	0.0	52.0	74.0	-22.0
14880.000	46.0	-1.8	303.0	1.0	38.0	0.0	V-Horn	AV	0.0	6.2	54.0	-47.8
14646.000	43.5	-1.7	305.0	1.0	38.0	0.0	V-Horn	AV	0.0	3.8	54.0	-50.2
14880.000	40.7	-1.8	195.0	1.0	38.0	0.0	H-Horn	AV	0.0	0.9	54.0	-53.1
14646.000	38.7	-1.7	310.0	1.0	38.0	0.0	H-Horn	AV	0.0	-1.0	54.0	-55.0

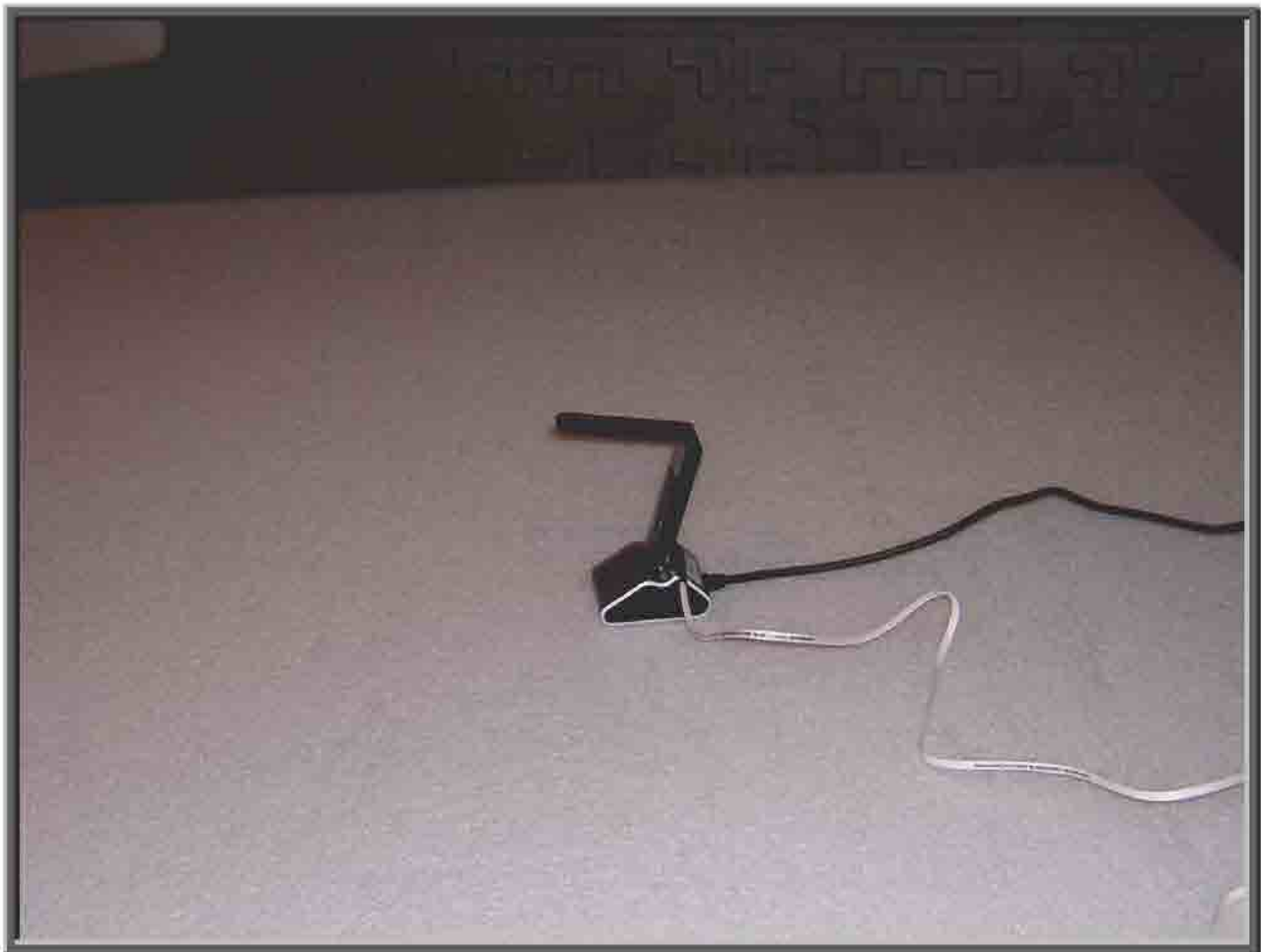


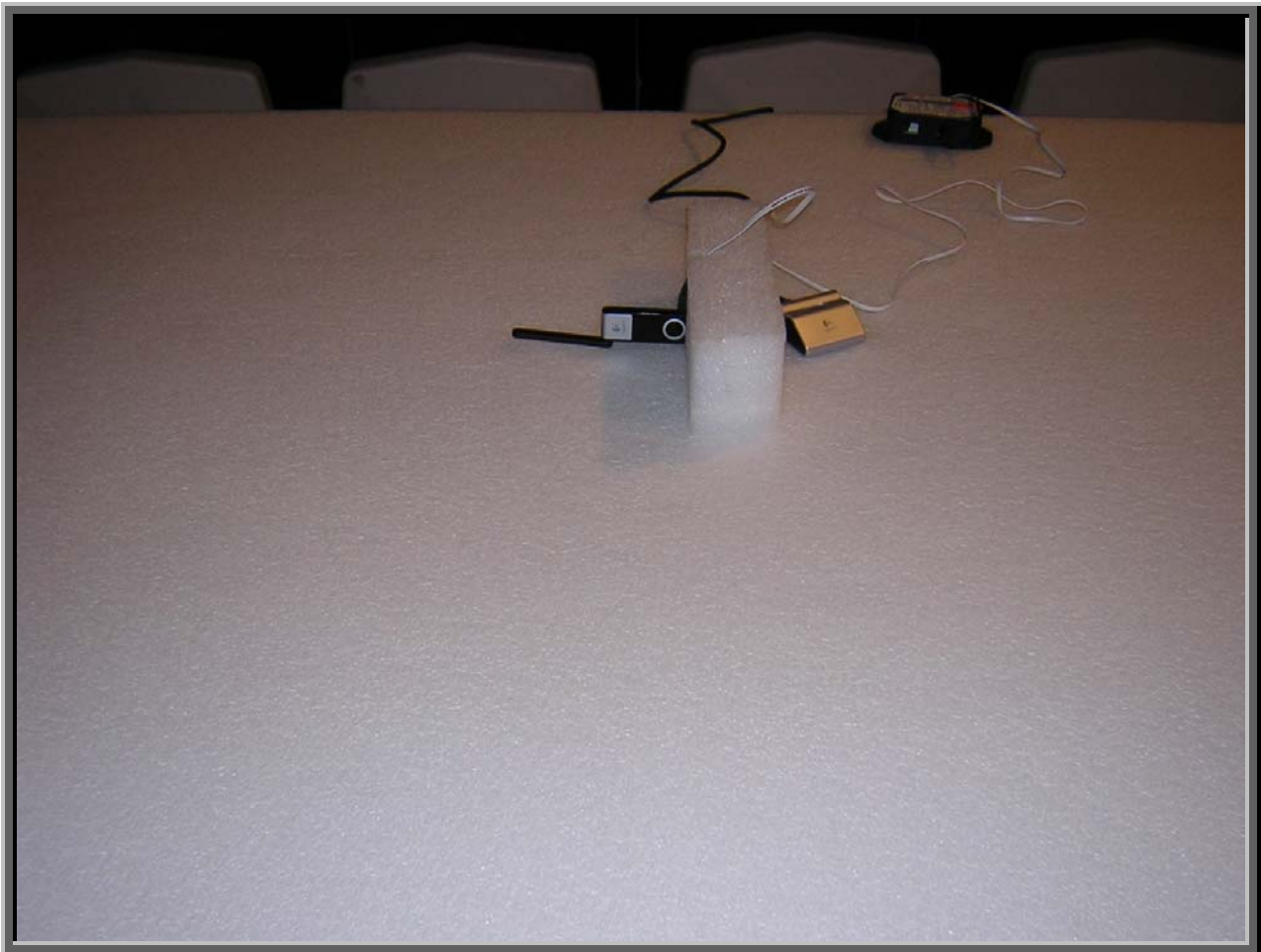












Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. All of the EUT parameters listed below were investigated. This includes, but may not be limited to, CPU speeds, video resolution settings, operational modes, and input voltages.

Channels in Specified Band Investigated:

2.402 GHz

2.441 GHz

2.480 GHz

Operating Modes Investigated:

Transmit Mode

Power Input Settings Investigated:

120 VAC, 60 Hz

Software\Firmware Applied During Test

Operating system	Windows	Version	XP
Exercise software	Simple Terminal	Version	Unknown

Description

The system was tested using special operating software to exercise the functions of the device during the testing. Modes include different transmit channels and modulation

EUT and Peripherals in Test Setup Boundary

Description	Manufacturer	Model/Part Number	Serial Number
EUT-USB Dongle/Docking Station	Logitech, Inc	F-0414A	Unknown
Serial/RS485	RE Smith	ASC24TS	Unknown
Laptop	Toshiba	Tecra 8100	41298161U

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Power	No	1.7	No	Serial/RS485	AC Adapter
RS485	No	1.2	No	Serial/RS485	EUT-USB Dongle/Docking Station
AC Power	PA	2.0	No	AC Adaptor	AC Mains
DC Power	PA	1.8	No	AC Adapters	Speakers
USB	No	4.2	No	Laptop	EUT-USB Dongle/Docking Station
RJ11	No	4.0	No	Serial/RS485	Laptop

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

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett Packard	8593E	AAP	12/07/2004	13 mo
Receiver	Schaffner	SCR 3101	ARC	05/04/2005	13 mo
LISN	Solar	9252-50-24-BNC	LIB	02/16/2005	13 mo

Test Description

Requirement: Per 47 15.207(c), in addition to devices which are powered directly from the AC power line, conducted emissions measurements shall also be made on battery operated devices that can transmit while charging, as well as on devices that are powered from AC adaptors, or devices that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines. All of these devices shall be tested to demonstrate compliance with the conducted limits of 15.207.

Configuration: 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 C63.4-2003.

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
<i>Measurements were made using the bandwidths and detectors specified. No video filter was used.</i>			

Completed by:

EMC

CONDUCTED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/09/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pressure:	29.95
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

Test Method

FCC 15.207 AC Powerline Conducted Emissions:2005-04

ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested

L1

COMMENTS

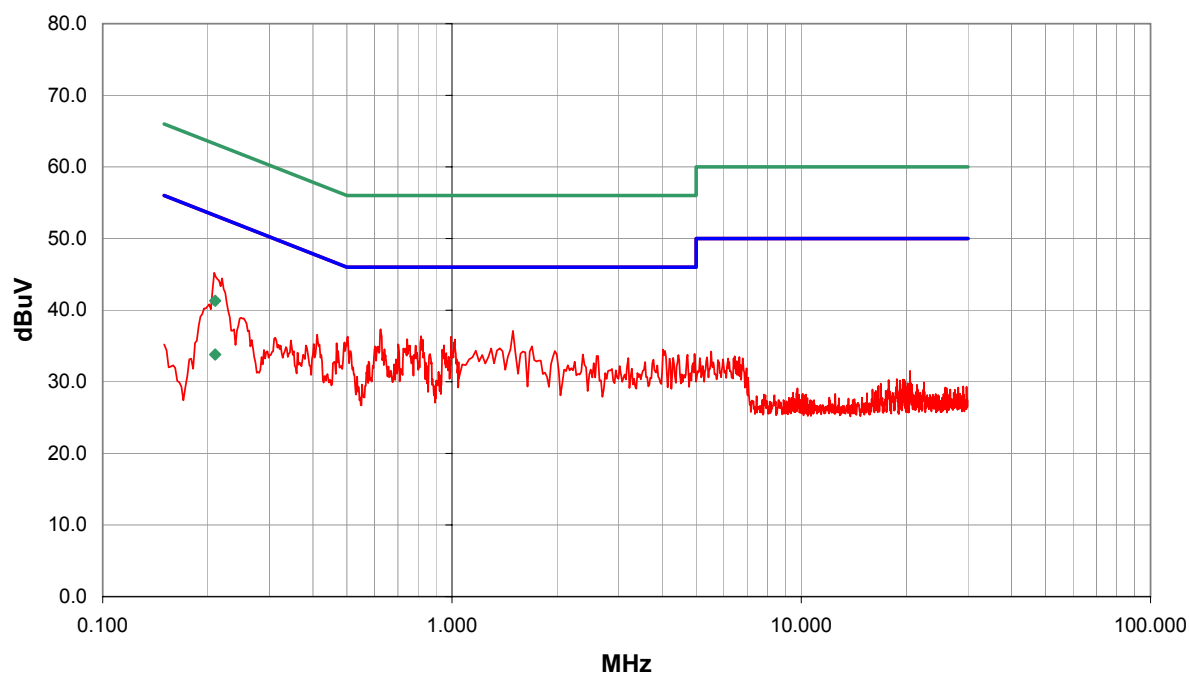
EUT OPERATING MODES

Low 2402MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	27	Signature 
Configuration #		
Results	Pass	



Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.210	13.8		0.0	0.0	20.0		AV		33.8	53.2	-19.4
0.210	21.3		0.0	0.0	20.0		QP		41.3	63.2	-21.9
0.209	25.1		0.0	0.1	20.0				45.2	53.3	-8.0
0.625	17.1		0.0	0.2	20.0				37.3	46.0	-8.7
1.495	16.7		0.0	0.4	20.0				37.1	46.0	-8.9
0.816	16.1		0.0	0.3	20.0				36.4	46.0	-9.6
0.503	16.1		0.0	0.2	20.0				36.3	46.0	-9.7
0.995	16.0		0.0	0.3	20.0				36.3	46.0	-9.7
0.744	15.7		0.0	0.2	20.0				35.9	46.0	-10.1
1.020	15.6		0.0	0.3	20.0				35.9	46.0	-10.1
0.701	15.0		0.0	0.2	20.0				35.2	46.0	-10.8
0.949	14.8		0.0	0.3	20.0				35.1	46.0	-10.9
0.787	14.8		0.0	0.3	20.0				35.1	46.0	-10.9
0.411	16.4		0.0	0.2	20.0				36.6	47.6	-11.1
1.695	14.5		0.0	0.4	20.0				34.9	46.0	-11.1
0.467	15.2		0.0	0.2	20.0				35.4	46.6	-11.2
1.370	14.3		0.0	0.4	20.0				34.7	46.0	-11.3
1.295	14.3		0.0	0.4	20.0				34.7	46.0	-11.3
0.640	14.3		0.0	0.2	20.0				34.5	46.0	-11.5

CONDUCTED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/09/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pressure:	29.95
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

Test Method

FCC 15.207 AC Powerline Conducted Emissions:2005-04

ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested

N

COMMENTS

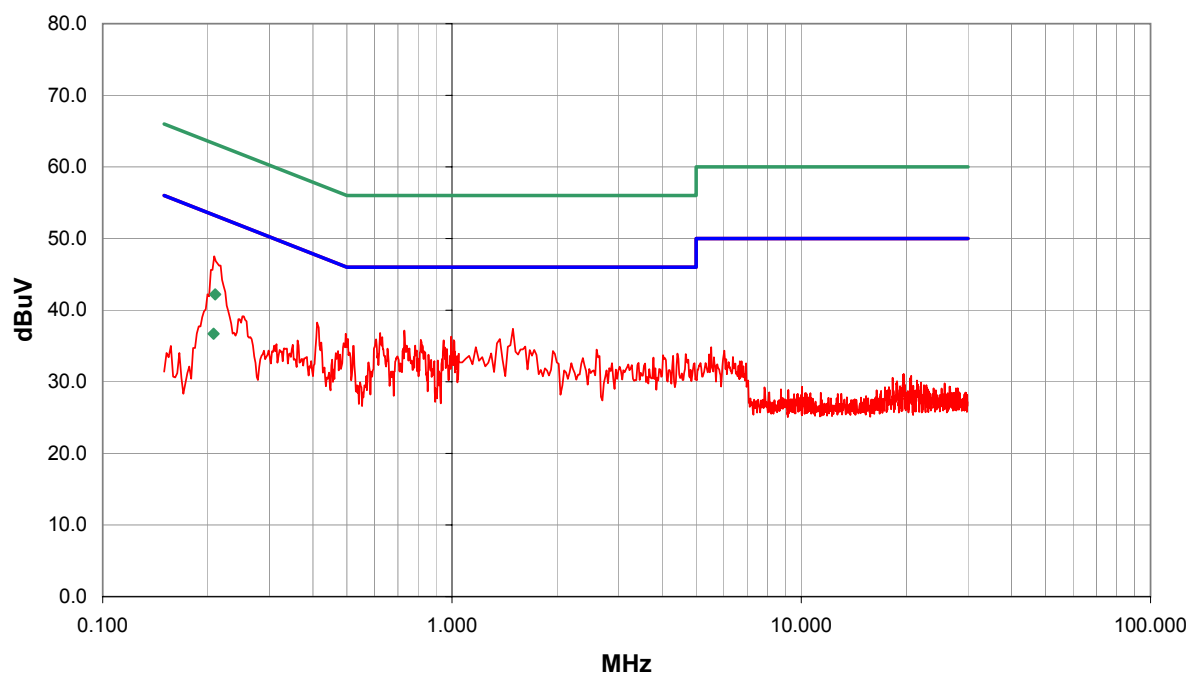
EUT OPERATING MODES

Low 2402MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	28	Signature 
Configuration #		
Results	Pass	



Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.208	16.7		0.0	0.0	20.0		AV		36.7	53.3	-16.6
0.210	22.2		0.0	0.0	20.0		QP		42.2	63.2	-21.0
0.209	27.4		0.0	0.1	20.0				47.5	53.3	-5.7
1.495	17.0		0.0	0.4	20.0				37.4	46.0	-8.6
0.731	16.9		0.0	0.2	20.0				37.1	46.0	-8.9
0.622	16.6		0.0	0.2	20.0				36.8	46.0	-9.2
0.411	18.1		0.0	0.2	20.0				38.3	47.6	-9.4
0.496	16.5		0.0	0.2	20.0				36.7	46.1	-9.4
0.995	16.0		0.0	0.3	20.0				36.3	46.0	-9.7
1.370	15.6		0.0	0.4	20.0				36.0	46.0	-10.0
0.607	15.7		0.0	0.2	20.0				35.9	46.0	-10.1
0.814	15.6		0.0	0.3	20.0				35.9	46.0	-10.1
1.012	15.5		0.0	0.3	20.0				35.8	46.0	-10.2
0.947	15.5		0.0	0.3	20.0				35.8	46.0	-10.2
0.785	14.8		0.0	0.3	20.0				35.1	46.0	-10.9
0.523	14.8		0.0	0.2	20.0				35.0	46.0	-11.0
1.170	14.5		0.0	0.3	20.0				34.8	46.0	-11.2
0.654	14.4		0.0	0.2	20.0				34.6	46.0	-11.4
0.967	14.3		0.0	0.3	20.0				34.6	46.0	-11.4

EMC

CONDUCTED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/09/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pressure:	29.95
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

Test Method

FCC 15.207 AC Powerline Conducted Emissions:2005-04

ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested

L1

COMMENTS

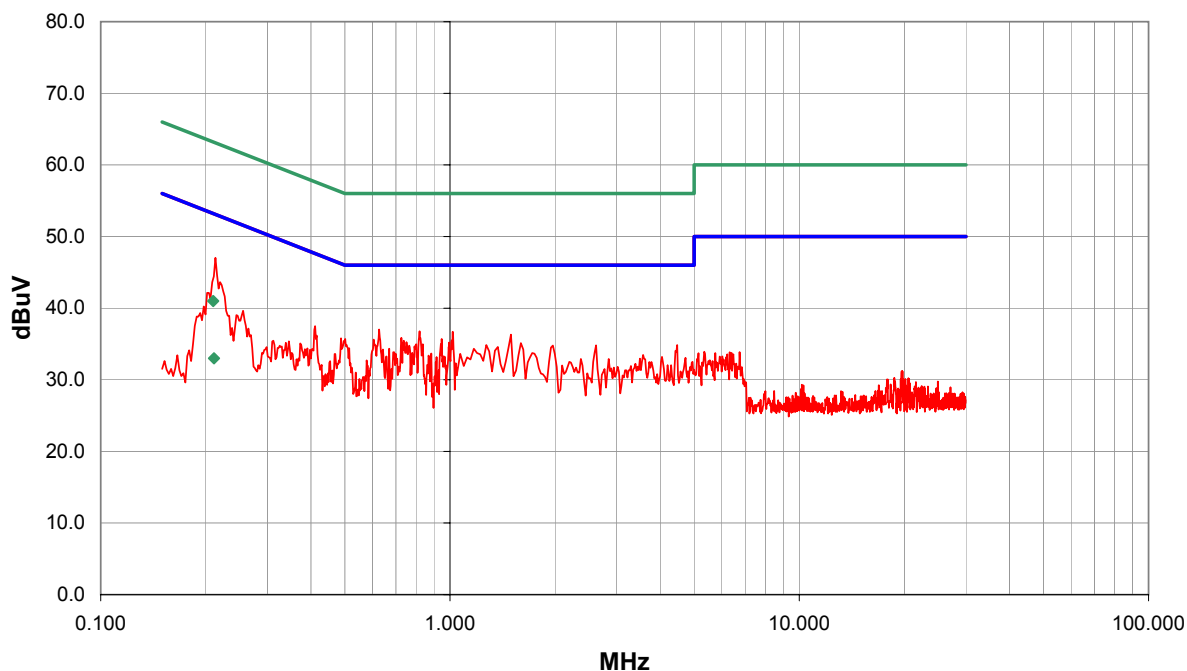
EUT OPERATING MODES

Mid 2441MHz

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	29	Signature 
Configuration #		
Results	Pass	



Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.211	13.0		0.0	0.0	20.0		AV		33.0	53.2	-20.2
0.210	21.0		0.0	0.0	20.0		QP		41.0	63.2	-22.2
0.213	26.9		0.0	0.1	20.0				47.0	53.1	-6.1
0.627	16.8		0.0	0.2	20.0				37.0	46.0	-9.0
0.818	16.5		0.0	0.3	20.0				36.8	46.0	-9.2
1.019	16.4		0.0	0.3	20.0				36.7	46.0	-9.3
1.021	16.2		0.0	0.3	20.0				36.5	46.0	-9.5
1.495	15.9		0.0	0.4	20.0				36.3	46.0	-9.7
0.411	17.3		0.0	0.2	20.0				37.5	47.6	-10.2
0.726	15.6		0.0	0.2	20.0				35.8	46.0	-10.2
0.947	15.4		0.0	0.3	20.0				35.7	46.0	-10.3
0.604	15.4		0.0	0.2	20.0				35.6	46.0	-10.4
0.487	15.6		0.0	0.2	20.0				35.8	46.2	-10.4
0.737	15.2		0.0	0.2	20.0				35.4	46.0	-10.6
0.995	14.9		0.0	0.3	20.0				35.2	46.0	-10.8
1.595	14.7		0.0	0.4	20.0				35.1	46.0	-10.9
0.800	14.7		0.0	0.3	20.0				35.0	46.0	-11.0
1.270	14.5		0.0	0.4	20.0				34.9	46.0	-11.1
4.472	14.2		0.0	0.6	20.0				34.8	46.0	-11.2

CONDUCTED EMISSIONS DATA SHEET

EUT:	F-0414A Dongle	Work Order:	LABT0146
Serial Number:	Unknown	Date:	09/09/05
Customer:	Logitech, Inc.	Temperature:	22
Attendees:	None	Humidity:	44%
Project:	None	Barometric Pressure:	29.95
Tested by:	Jeremiah Darden	Power:	120VAC/60Hz
		Job Site:	OC10

TEST SPECIFICATIONS

Test Method

FCC 15.207 AC Powerline Conducted Emissions:2005-04

ANSI C63.4:2003

TEST PARAMETERS

Cable or Line Tested

N

COMMENTS

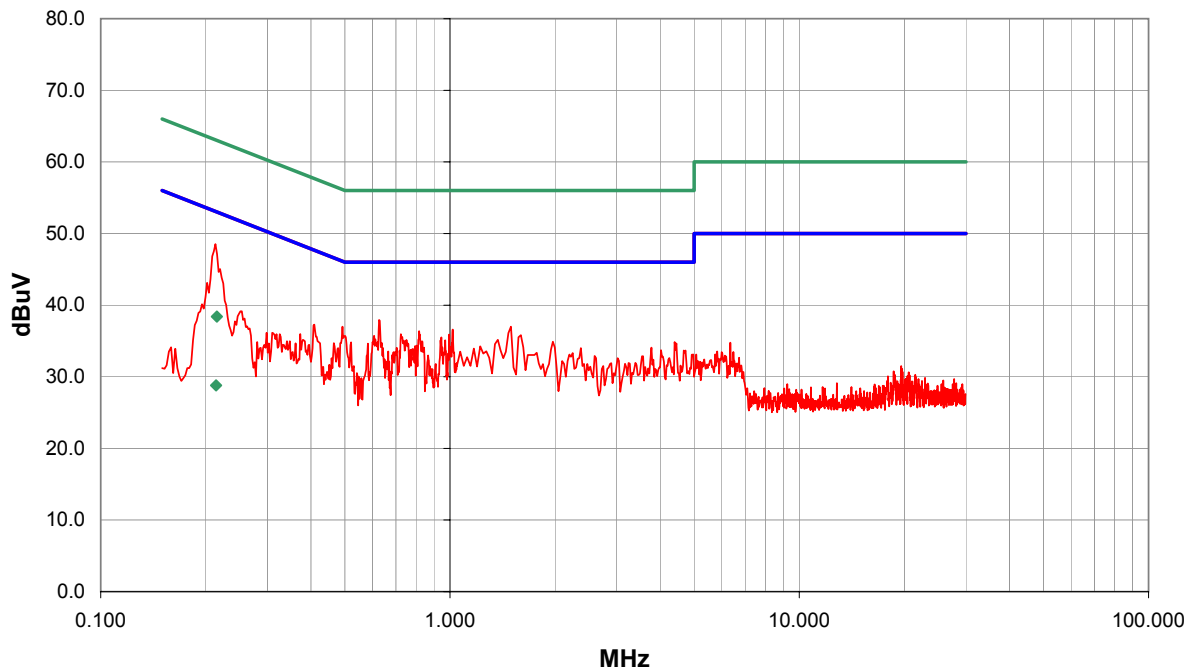
EUT OPERATING MODES

Mid 2441MHz

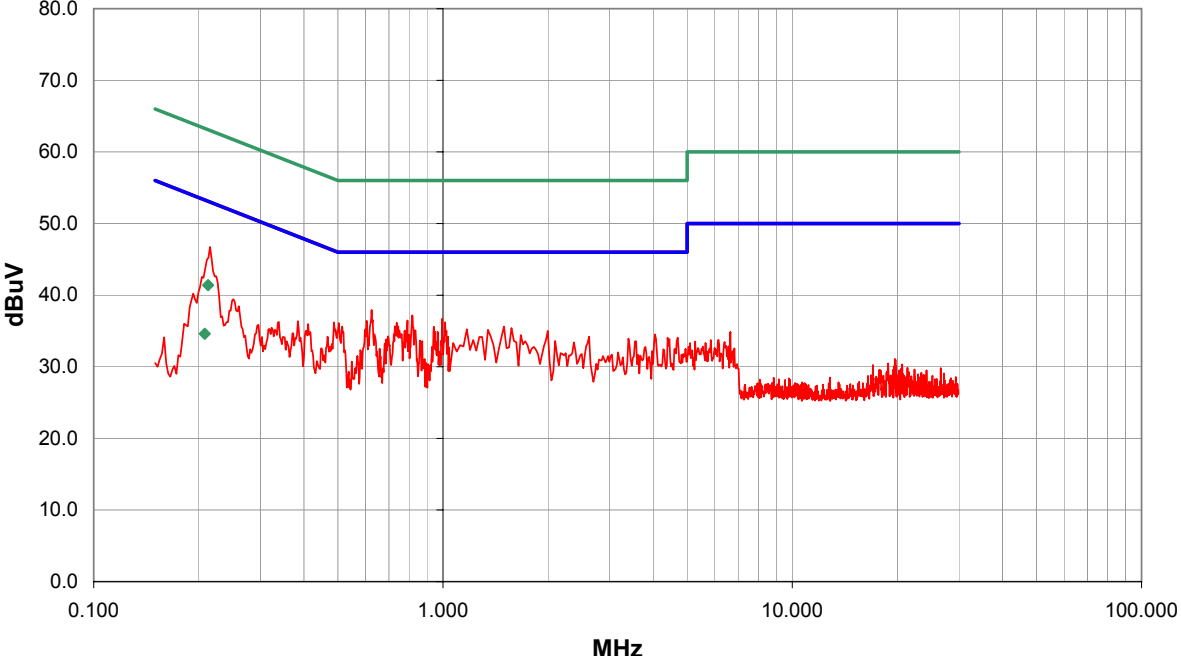
DEVIATIONS FROM TEST STANDARD

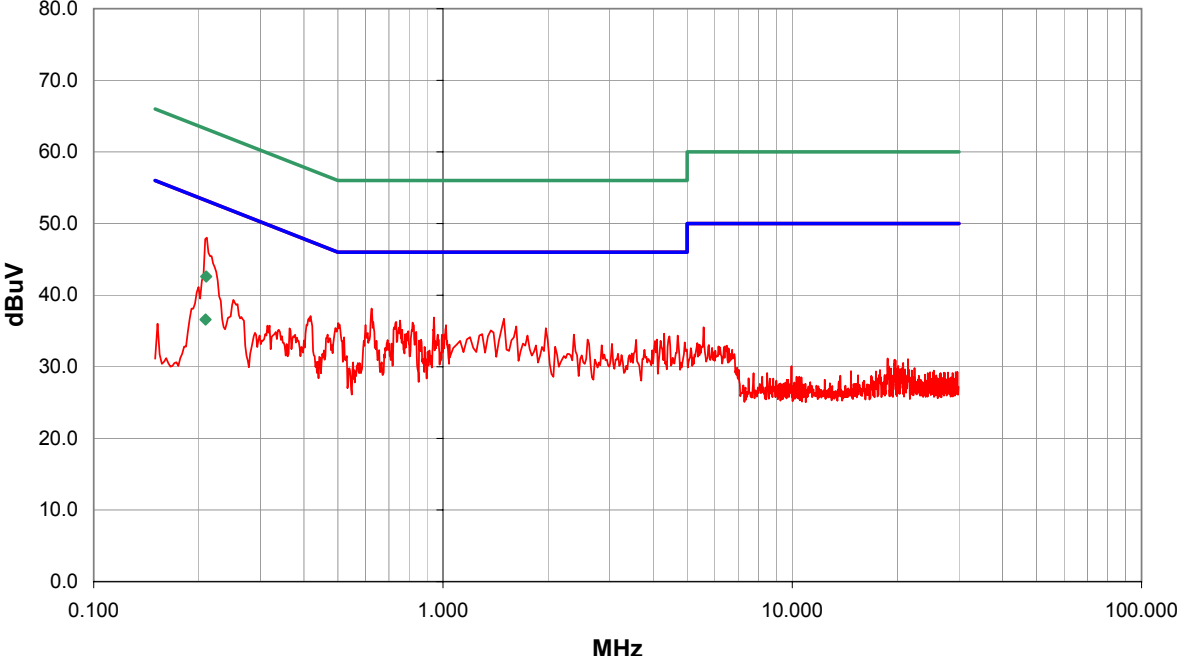
No deviations.

Run #	30	Signature 
Configuration #		
Results	Pass	



Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.214	8.8		0.0	0.0	20.0		AV		28.8	53.0	-24.2
0.215	18.4		0.0	0.0	20.0		QP		38.4	63.0	-24.6
0.213	28.4		0.0	0.1	20.0				48.5	53.1	-4.6
0.627	17.7		0.0	0.2	20.0				37.9	46.0	-8.1
1.495	16.6		0.0	0.4	20.0				37.0	46.0	-9.0
0.492	16.8		0.0	0.2	20.0				37.0	46.1	-9.1
1.019	16.3		0.0	0.3	20.0				36.6	46.0	-9.4
0.816	16.1		0.0	0.3	20.0				36.4	46.0	-9.6
0.724	15.7		0.0	0.2	20.0				35.9	46.0	-10.1
0.995	15.6		0.0	0.3	20.0				35.9	46.0	-10.1
1.595	15.4		0.0	0.4	20.0				35.8	46.0	-10.2
0.409	17.1		0.0	0.2	20.0				37.3	47.7	-10.4
0.944	15.2		0.0	0.3	20.0				35.5	46.0	-10.5
1.370	14.8		0.0	0.4	20.0				35.2	46.0	-10.8
0.969	14.8		0.0	0.3	20.0				35.1	46.0	-10.9
1.970	14.4		0.0	0.5	20.0				34.9	46.0	-11.1
4.397	14.2		0.0	0.6	20.0				34.8	46.0	-11.2
0.521	14.6		0.0	0.2	20.0				34.8	46.0	-11.2
0.582	14.4		0.0	0.2	20.0				34.6	46.0	-11.4

NORTHWEST EMC		CONDUCTED EMISSIONS DATA SHEET		ACQ 2005.8.22 EMI 2005.8.3					
EUT: F-0414A Dongle			Work Order: LABT0146						
Serial Number: Unknown			Date: 09/09/05						
Customer: Logitech, Inc.			Temperature: 22						
Attendees: None			Humidity: 44%						
Project: None			Barometric Pressure: 29.95						
Tested by: Jeremiah Darden		Power: 120VAC/60Hz		Job Site: OC10					
TEST SPECIFICATIONS			Test Method						
FCC 15.207 AC Powerline Conducted Emissions:2005-04			ANSI C63.4:2003						
TEST PARAMETERS									
Cable or Line Tested			L1						
COMMENTS									
EUT OPERATING MODES									
High 2480MHz									
DEVIATIONS FROM TEST STANDARD									
No deviations.									
Run #	31	Signature 							
Configuration #									
Results	Pass								
									
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)	Detector (blank equal peaks [PK] from scan)	Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.208	14.6		0.0	0.0	20.0	AV	34.6	53.3	-18.7
0.213	21.4		0.0	0.0	20.0	QP	41.4	63.1	-21.7
0.215	26.6		0.0	0.1	20.0		46.7	53.0	-6.3
0.625	17.7		0.0	0.2	20.0		37.9	46.0	-8.1
0.816	16.9		0.0	0.3	20.0		37.2	46.0	-8.8
0.995	16.4		0.0	0.3	20.0		36.7	46.0	-9.3
0.791	16.2		0.0	0.3	20.0		36.5	46.0	-9.5
0.604	16.2		0.0	0.2	20.0		36.4	46.0	-9.6
1.014	15.9		0.0	0.3	20.0		36.2	46.0	-9.8
0.737	15.9		0.0	0.2	20.0		36.1	46.0	-9.9
0.503	15.9		0.0	0.2	20.0		36.1	46.0	-9.9
0.487	16.0		0.0	0.2	20.0		36.2	46.2	-10.0
0.514	15.4		0.0	0.2	20.0		35.6	46.0	-10.4
1.495	15.2		0.0	0.4	20.0		35.6	46.0	-10.4
0.942	15.3		0.0	0.3	20.0		35.6	46.0	-10.4
1.570	15.0		0.0	0.4	20.0		35.4	46.0	-10.6
1.170	14.9		0.0	0.3	20.0		35.2	46.0	-10.8
1.345	14.8		0.0	0.4	20.0		35.2	46.0	-10.8
0.834	14.8		0.0	0.3	20.0		35.1	46.0	-10.9

NORTHWEST		CONDUCTED EMISSIONS DATA SHEET		ACQ 2005.8.22							
EMI 2005.8.3											
EMC											
EUT: F-0414A Dongle		Work Order: LABT0146									
Serial Number: Unknown		Date: 09/09/05									
Customer: Logitech, Inc.		Temperature: 22									
Attendees: None		Humidity: 44%									
Project: None		Barometric Pressure: 29.95									
Tested by: Jeremiah Darden		Power: 120VAC/60Hz		Job Site: OC10							
TEST SPECIFICATIONS		Test Method									
FCC 15.207 AC Powerline Conducted Emissions:2005-04		ANSI C63.4:2003									
TEST PARAMETERS											
Cable or Line Tested		N									
COMMENTS											
EUT OPERATING MODES											
High 2480MHz											
DEVIATIONS FROM TEST STANDARD											
No deviations.											
Run #	32	Signature 									
Configuration #											
Results	Pass										
											
Freq (MHz)	Amplitude (dBuV)		Transducer (dB)	Cable (dB)	External Attenuation (dB)		Detector (blank equal peaks [PK] from scan)		Adjusted dBuV	Spec. Limit dBuV	Compared to Spec. (dB)
0.209	16.6		0.0	0.0	20.0		AV		36.6	53.2	-16.6
0.210	22.6		0.0	0.0	20.0		QP		42.6	63.2	-20.6
0.211	27.9		0.0	0.1	20.0				48.0	53.2	-5.1
0.625	17.9		0.0	0.2	20.0				38.1	46.0	-7.9
0.942	16.6		0.0	0.3	20.0				36.9	46.0	-9.1
1.495	16.3		0.0	0.4	20.0				36.7	46.0	-9.3
0.753	16.2		0.0	0.3	20.0				36.5	46.0	-9.5
0.735	16.0		0.0	0.2	20.0				36.2	46.0	-9.8
0.818	15.9		0.0	0.3	20.0				36.2	46.0	-9.8
0.501	15.9		0.0	0.2	20.0				36.1	46.0	-9.9
0.600	15.6		0.0	0.2	20.0				35.8	46.0	-10.2
1.020	15.5		0.0	0.3	20.0				35.8	46.0	-10.2
1.620	15.2		0.0	0.4	20.0				35.6	46.0	-10.4
0.418	16.9		0.0	0.2	20.0				37.1	47.5	-10.4
1.970	14.9		0.0	0.5	20.0				35.4	46.0	-10.6
1.370	14.7		0.0	0.4	20.0				35.1	46.0	-10.9
0.796	14.7		0.0	0.3	20.0				35.0	46.0	-11.0
4.297	14.0		0.0	0.6	20.0				34.6	46.0	-11.4
1.295	14.2		0.0	0.4	20.0				34.6	46.0	-11.4

