Logitech Inc.

F-0179A

July 20, 2003

Report No. LABT0059

Report Prepared By:

NORTHWEST EMC

1-888-EMI-CERT

Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: July 20, 2003
Logitech Inc.
Model : F-0179A

Emissions

Description	Pass	Fail
FCC 15.247, Spurious Radiated Emissions	☒	☐
FCC 15.247, Spurious Conducted Emissions	☒	☐
FCC 15.247, Band Edge Compliance	☒	☐
FCC 15.247, Power Spectral Density	☒	☐
FCC 15.247, Occupied Bandwidth	☒	☐
FCC 15.247, Output Power	☒	☐

The equipment was tested in the configuration and mode(s) of operation provided by the client. The specific tests and test levels were specified by the client. Any additional tests, or product configurations that should be tested are the responsibility of the client. Product compliance is the responsibility of the client.

Modifications made to the product
- See the modifications page of the report

Deviations to the test standard
- No deviations were made to the test standard

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

  Northwest EMC, Inc.; 22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
  Phone: (503) 844-4066   Fax: 844-3826

  This site has been fully described in a report filed with the FCC (Federal Communications Commission), and accepted by the FCC in a letter maintained in our files.

Approved By:

Don Facteau, IS Manager

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: The Open Area Test Sites, 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.

TCB: 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.

A2LA: Accreditation has been granted to Northwest EMC, Inc. to perform the Electromagnetic Compatibility (EMC) tests described in the Scope of Accreditation. Assessment performed to ISO/IEC 17025.
Certificate Number: 1936-01, Certificate Number: 1936-02, Certificate Number 1936-03

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. (A2LA)

TÜV Product Service: Included in TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0302C

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.

Industry Canada: Accredited by Industry Canada for performance of radiated measurements. Our open area test sites comply with RSP 100, Issue 7, section 3.3.

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 Nos. - Evergreen: C-1071 and R-1025, Trails End: C-694 and R-677, Sultan: C-905, R-871 and R-1172, North Sioux City C-1246, R-1185 and R-1217)*

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.

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

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

Northwest EMC

Scope of Accreditations

	FCC	NIST	TUV PS	TUV Rheinland	Nemko	Technology International	Industry Canada	BSMI	VCCI	GOST	NATA
IEC 1000-4-2			✓	✓	✓	✓					
IEC 1000-4-3			✓	✓	✓	✓					
IEC 1000-4-4			✓	✓	✓	✓					
IEC 1000-4-5			✓	✓	✓	✓					
IEC 1000-4-6			✓	✓	✓	✓					
IEC 1000-4-8			✓	✓	✓	✓					
IEC 1000-4-11			✓	✓	✓	✓					
IEC 1000-3-2			✓	✓	✓	✓					
IEC 1000-3-3			✓	✓	✓	✓					
AS/NZS 3548											✓
CNS 13438								✓			
ISO/IEC Guide 25			✓	✓	✓	✓		✓			
ISO/IEC17025			✓	✓	✓	✓					
Radiated Emissions			✓	✓	✓	✓	✓	✓	✓	✓	
Conducted Emissions			✓	✓	✓	✓	✓	✓	✓	✓	
OATS Sites	✓		✓	✓	✓	✓	✓	✓	✓	✓	
Hillsboro 5-Meter Chamber (EV01)	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TCB for Licensed Transmitters	✓										
TCB for un-Licensed Transmitters	✓										
Cab for R&TTE		✓									
CAB for EMC		✓									

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999

NORTHWEST EMC
Evergreen Facility
22975 NW Evergreen Pkwy #400
Hillsboro, OR 97124
David Tolman   Phone: 503 844 4066

ELECTRICAL (EMC)

Valid until: July 31, 2004   Certificate Number: 1936-01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following <u>Electromagnetic Compatibility (EMC) tests</u>:

<u>EMC Standards</u>	<u>Title</u>
Radiated & Conducted Emissions	
CFR 47, FCC Part 15 using ANSI C63.4	American National Standard for methods of measurement of radio-noise emissions for low-voltage electrical and electronic equipment in the range of 9 kHz to 40GHz.
CISPR 22	Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
CNS 13438	Limits and methods of measurement of radio interference characteristics of information technology equipment.
EN 55022	Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
Canada ICES-003	Digital apparatus
AS/NZS 3548	Australian/New Zealand Standard Limits and methods of measurement of radio disturbance characteristics of information technology equipment
Canada ICES-001	Industrial, scientific and medical radio frequency generators
CNS 13803	Industrial, Scientific and Medical Instrument

(A2LA Cert. No. 1936.01) 06/28/02

AS/NZS 2064	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
EN 61000-6-3	Electromagnetic capability – Generic emission standard. Part 1: Residential, commercial and light industry. (I.S.)
EN 61000-6-4	Electromagnetic compatibility – Generic emission standard. Part 2: Industrial environment
VCCI V-3/99.05	Technical Requirements
VCCI V-4/99.05	Instruction for Test Conditions for Requirement under Test
CISPR 11	Limits and methods of measurement of electromagnetic disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
EN 55011	Limits and methods of measurement of radio disturbance characteristics of industrial, scientific and medical (ISM) radio-frequency equipment.
EN 55103-1	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission
EN 61000-3-2	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limits for harmonic current emissions
EN 61000-3-3	Electromagnetic compatibility (EMC). Part 3: Limits Section 2: Limitation of voltage fluctuations and flicker in low-voltage supply systems.
GR-1089 Section 3 (excluding analog voice band)	Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.

Immunity

EN 61000-4-2 AS/NZS 61000-4-2	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2: Electrostatic discharge immunity test – Basic EMC Publication
EN 61000-4-3 AS/NZS 61000-4-3	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3: Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4 AS/NZS 61000-4-4	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4: Electrical fast transient/burst immunity test – Basic EMC publication

EN 61000-4-5 AS/NZS 61000-4-5	Electromagnetic compatibility (EMC) Part 4: Testing and measurement techniques. Section 5: Surge immunity test.
EN 61000-4-6 AS/NZS 61000-4-6	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 6: Immunity to conducted disturbances, induce by radio-frequency fields.
EN 61000-4-8	Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 8: Power frequency magnetic field immunity test.
EN 61000-4-11	Electromagnetic Compatibility (EMC) Part 4: Testing and measurement techniques. Section 11: Voltage dips, short interruptions and voltage. Variations immunity tests.
EN 61000-6-1	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 1: Immunity for residential, commercial and light-industrial environments
EN 61000-6-2	Electromagnetic Compatibility (EMC)- Part 6: Generic standards- Section 2: Immunity for industrial environments
IEEE/ANSI C62.41	IEEE recommended practice on surge voltages in low-voltage AC power circuits

Product Standards

GR-1089 Section 3 (excluding voice band)	Bellcore electromagnetic compatibility and electrical safety – Generic criteria for network telecommunications equipment.
EN 61326	Electrical equipment for measurement, control and laboratory use – EMC requirements
EN 60601-1-2	Medical electrical equipment Part 1: general requirements for safety Section 2: Collateral standard: Electromagnetic compatibility – requirements and tests
EN 50130-4	Alarm Systems. Part 4: Electromagnetic compatibility. Product family standard: Immunity requirements for components of fire, intruder and social alarm systems.
EN 55103-2	Electromagnetic Compatibility – Product family standard for audio, video, audio-visual and entertainment lighting control professional use. Part 2: Immunity
EN 55024	Immunity Requirements for Information Technology Equipment – ITE Immunity

(A2LA Cert. No. 1936.01) 06/28/02

Other Standards

ETS 300 220	Electromagnetic compatibility and Radio spectrum matters (ERM); Short range devices; Technical characteristics and test methods for radio equipment to be used in the 25 MHZ to 1000 MHZ frequency range with power levels ranging up to 500 mW; Part 1: Parameters intended for regulatory purposes; Part 2: Supplementary parameters not intended for regulatory Purposes
ETS 300 224	Electro Magnetic Compatability and Radio Spectrum Matters; Paging Services; Technical characteristics and test methods for on site paging service devices.
ETS 300 328	Radio Equipment and Systems (RES); Wideband transmission systems; Technical characteristics and test conditions for data transmission equipment operating in the 2,4 GHz ISM band and using spread spectrum modulation techniques
ETS 300 489-1	Electro Magnetic Compatability and Radio Spectrum Matters; Common Technical Requirements
ETS 300 489-2	Specific conditions for radio paging equipment
ETS 300 489-3	Specific conditions for Short Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz
Canadian RSS-102	Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields
Canadian RSS-119	Land Mobile and Fixed Radio Transmitters and Receivers, 27.41 to 960 MHz
Canadian RSS-123	Low Power Licensed Radiocommunication Devices
Canadian RSS-139	Licensed Radiocommunications Devices in the Band 2400- 2483.5 MHz
Canadian RSS-210	Industry Canada – Low power license-exempt radio communication devices
SAE J1113-41	Radiated and conducted emissions.
SAE J1113-21	Radiated immunity absorber lined chamber (200 MHz – 1 GHz)
SAE J1113-23	Radiated immunity stripline method (only 10 kHz – 200 MHz @ 80 V/m)

(A2LA Cert. No. 1936.01) 06/28/02

SAE J1113-4 (only substitution method)	Conducted immunity Bulk Current Injection
SAE J1113-13	ESD
FCC 47 Parts 22 (Cellular), 24, 25, 26 & 27	TCB Scope B1 (Excluding SAR testing)
FCC 47 Parts 22 (Non-Cellular), 73,74,90,95 & 97	TCB Scope B2 (Excluding SAR testing)
FCC 47 Parts 80 & 87	TCB Scope B3 (Excluding SAR testing)
FCC 47 Parts 21, 74, 101	TCB Scope B4 (Excluding SAR testing)

Onsite Testing

EN61000-6-2	Generic Immunity Standard for Industrial Applications
EN61000-6-4	Generic Emissions Standard for Industrial Applications

(A2LA Cert. No. 1936.01) 06/28/02

Northwest

EMC

Measurement Uncertainty

Revision 04/29/02

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.
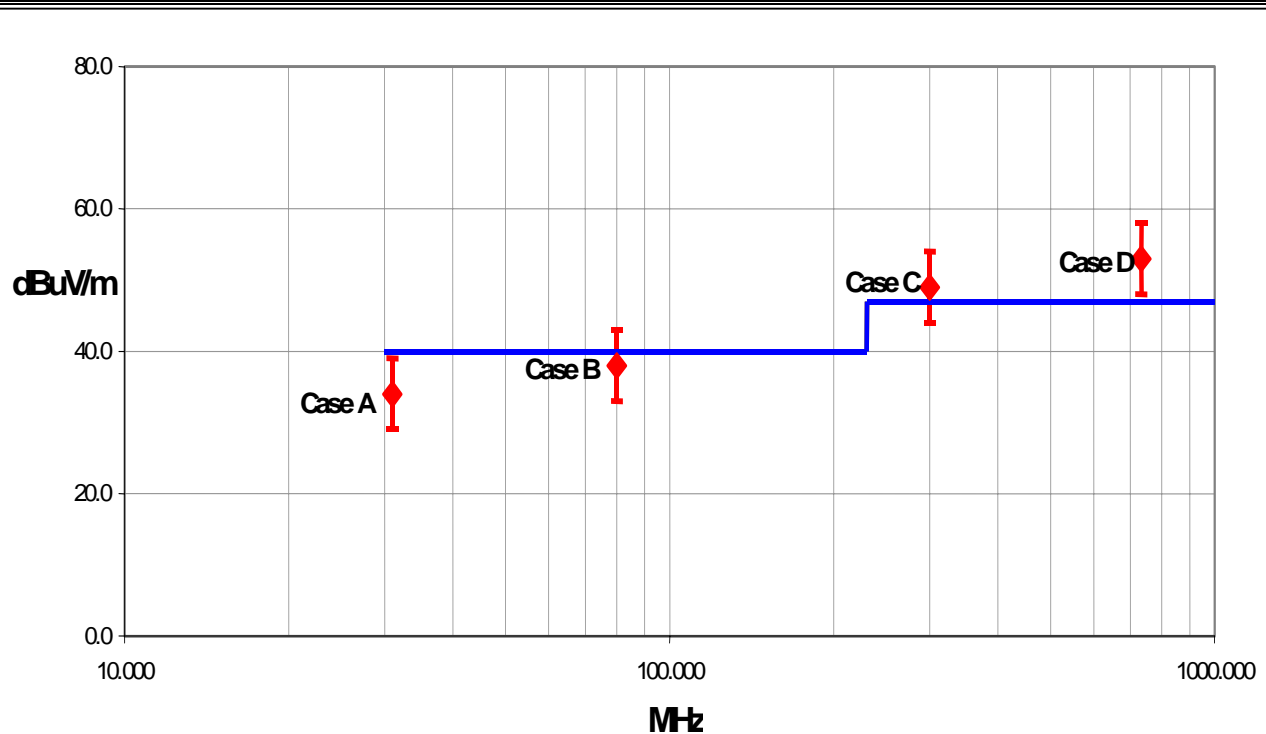
Test Result Scenarios:

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.

Measurement Uncertainty

Radiated Emissions ≤ 1 GHz		Value (dB)					
	Probability Distribution	Biconical Antenna		Log Periodic Antenna		Dipole Antenna	
Test Distance		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 ≈ 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)		
	Probability Distribution	Without High Pass Filter	With High Pass Filter
Combined standard uncertainty $u_c(y)$	normal	+ 1.29 - 1.25	+ 1.38 - 1.35
Expanded uncertainty U (level of confidence ≈ 95%)	normal (k=2)	+ 2.57 - 2.51	+ 2.76 - -2.70

Conducted Emissions		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $uc(y)$	normal	1.48
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.97

Radiated Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $uc(y)$	normal	1.05
Expanded uncertainty U (level of confidence ≈ 95 %)	normal (k = 2)	2.11

Conducted Immunity		
	Probability Distribution	Value (+/- dB)
Combined standard uncertainty $uc(y)$	normal	1.05
Expanded uncertainty U (level of confidence ≈ 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, uc(y) yields a confidence level of only 68%.

California

Orange County Facility

41 Tesla Ave.
Irvine, CA 92618
(888) 364-2378
FAX (503) 844-3826

Oregon

Evergreen Facility

22975 NW Evergreen Pkwy.,
Suite 400
Hillsboro, OR 97124
(503) 844-4066
FAX (503) 844-3826

Oregon

Trails End Facility

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

South Dakota

North Sioux City Facility

745 N. Derby Lane
P.O. Box 217
North Sioux City, SD 57049
(605) 232-5267
FAX (605) 232-3873

Washington

Sultan Facility

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-0179A
First Date of Test:	06-23-2003
Last Date of Test:	07-03-2003
Receipt Date of Samples:	06-23-2003
Equipment Design Stage:	Pre-production
Equipment Condition:	Edge of headset was cut into, electrical tape holding unit together

Information Provided by the Party Requesting the Test

Clocks/Oscillators:	2402MHz, 2441MHz, 2480MHz
I/O Ports:	No I/O Ports

Functional Description of the EUT (Equipment Under Test):

Bluetooth™ enabled headset. Battery operated with no provision for transmitting while powered from the AC mains, or while recharging.

Client Justification for EUT Selection:

Not Provided

Client Justification for Test Selection

These tests satisfy the requirements for FCC 15.247 radios.

Equipment modifications				
Item #	Test	Date	Modification	Note
1	Spurious Radiated Emissions	06-23-2003, 06-26-2003	No EMI suppression devices were added or modified during this test.	Same configuration as delivered.
2	Spurious Conducted Emissions	06-27-2003, 7-03-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
3	Band Edge Compliance	06-27-2003, 7-03-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
4	Output Power	06-27-2003, 7-03-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
5	Occupied Bandwidth	06-27-2003, 7-03-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.
6	Power Spectral Density	06-27-2003, 7-03-2003	No EMI suppression devices were added or modified during this test.	Same configuration as in previous test.

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:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
Battery

Software\Firmware Applied During Test			
Exercise software	Special Test Software	Version	Unknown
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
Bluetooth Headset (low channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (mid channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (high channel)	Logitech Inc.	F-0179A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

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	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per an FCC Interpretation sent to TCBs on October 8, 2002, frequency hoppers in the 2.4 GHz band operating under 15.247 are required to use a minimum of 15 non-overlapping channels. The hopping channel bandwidth can be wider than 1 MHz as long as the channels do not overlap and all emissions stay within the 2400-2483.5 MHz band. For example, a system that uses the minimum 15 channels can have hopping channel bandwidth that are up to 5 MHz wide. The measurement is made with the spectrum analyzer's resolution bandwidth set to ≥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

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(a)(1)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4		**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The maximum 20dB bandwidth of the hopping channel is 1 MHz

RESULTS	BANDWIDTH
Pass	826 kHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

20dB Bandwidth - Low Channel


```
Mkr    △826kHz                        △0.20dB                      Tek

Ref Lvl*10.0dBm                    10dB/              Atten 10dB
 10.0

  0.0

-10.0

-20.0

-30.0

-40.0

-50.0

-60.0

-70.0

-80.0

-90.0

    Freq   2.402 000GHz                      Span 2.0MHz

    ResBW 10kHz              VidBW 30kHz              SWP 110mS

   [LEVEL]      [SPAN]      Freq   2.402 000GHz

    KNOB 2        KNOB 1       KEYPAD      Tektronix    2784
```

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(a)(1)	**Year:**	2003	**Method:** DA 00-705, ANSI C63.4	**Year:**	1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

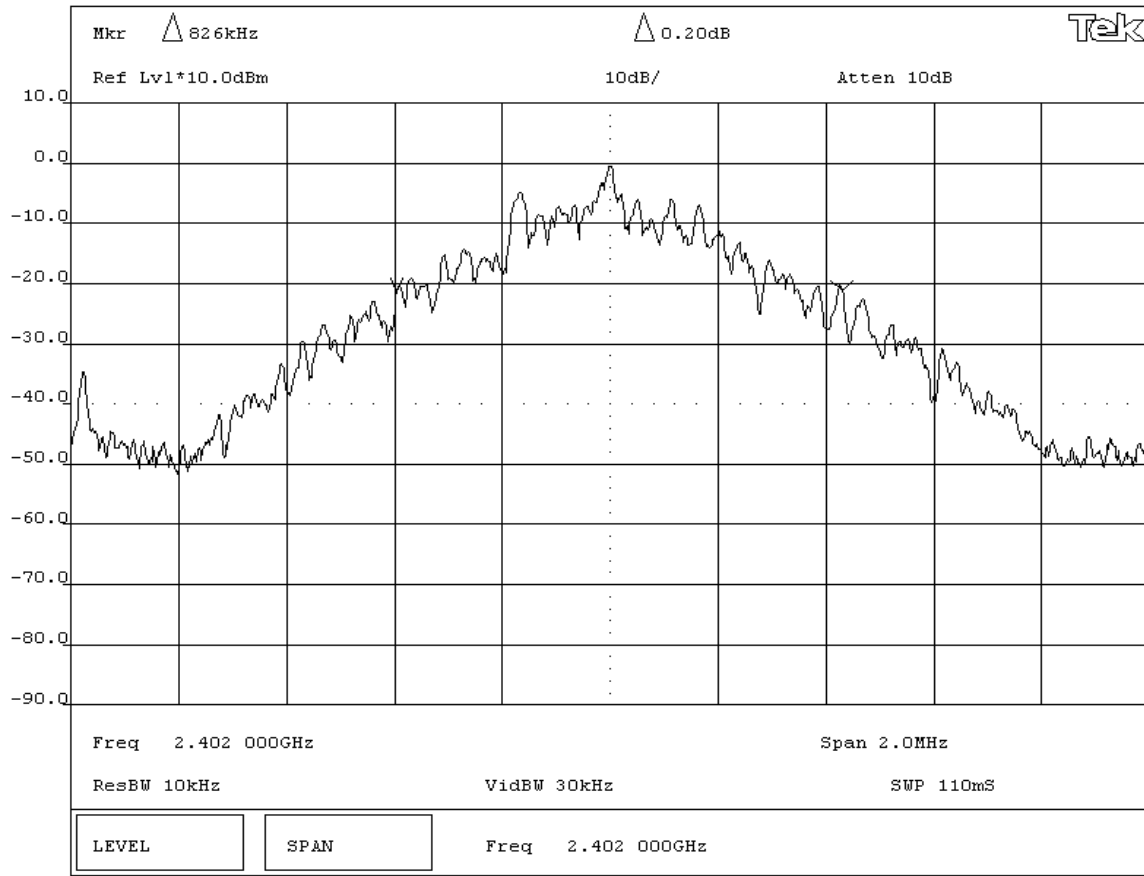The maximum 20dB bandwidth of the hopping channel is 1 MHz

RESULTS	**BANDWIDTH**
Pass	824 kHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

20dB Bandwidth - Mid Channel

Mkr △ 824kHz   △ −0.50dB   Tek

Ref Lvl *10.0dBm   10dB/   Atten 10dB

Freq   2.441 000GHz   Span 2.0MHz

ResBW 10kHz   VidBW 30kHz   SWP 110mS

LEVEL	SPAN	Freq 2.441 000GHz

KNOB 2   KNOB 1   KEYPAD   Tektronix   2784

NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		Work Order:	LABT0059
Serial Number:	none		Date:	07/03/03
Customer:	Logitech, Inc.		Temperature:	73 F
Attendees:	Mitch Phillipi	Tested by: Greg Kiemel	Humidity:	35% RH
Customer Ref. No.:	N/A	Power: Battery	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(a)(1)	Year:	2003	Method:	DA 00-705, ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate

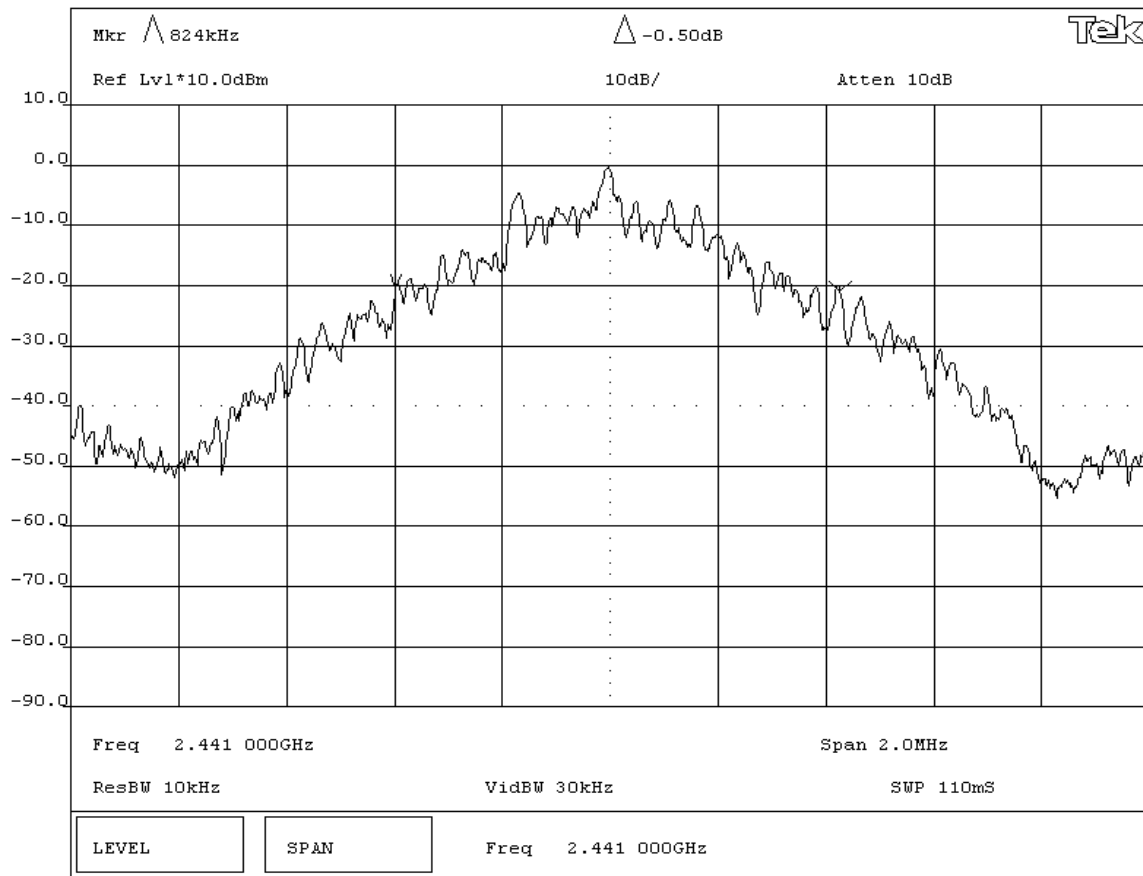### DEVIATIONS FROM TEST STANDARD

None

REQUIREMENTS

The maximum 20dB bandwidth of the hopping channel is 1 MHz

RESULTS	BANDWIDTH
Pass	826 kHz

SIGNATURE

Tested By: _A☐U.K.P_

DESCRIPTION OF TEST

20dB Bandwidth - High Channel


```
Mkr    △826kHz                       △0.00dB                    Tek

Ref Lvl*10.0dBm                  10dB/             Atten 10dB
  10.0
   0.0
 -10.0
 -20.0
 -30.0
 -40.0
 -50.0
 -60.0
 -70.0
 -80.0
 -90.0

   Freq   2.480 000GHz                        Span 2.0MHz

   ResBW 10kHz              VidBW 30kHz              SWP 110mS

   LEVEL        SPAN        VidBW 30kHz

   KNOB 2       KNOB 1       KEYPAD      Tektronix    2784
```

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:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
Battery

Software\Firmware Applied During Test			
Exercise software	Special Test Software	Version	Unknown
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
Bluetooth Headset (low channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (mid channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (high channel)	Logitech Inc.	F-0179A	N/A

Peak Transmit Power

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

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	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per 47 CFR 15.247(b)(1), the maximum peak output power must not exceed 1 Watt. 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:

_____

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT: F-0179A		**Work Order:** LABT0059	
Serial Number: none		**Date:** 07/03/03	
Customer: Logitech, Inc.		**Temperature:** 73 F	
Attendees: Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:** 35% RH	
Customer Ref. No.: N/A	**Power:** Battery	**Job Site:** EV06	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(b)(1)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992	

SAMPLE CALCULATIONS

COMMENTS

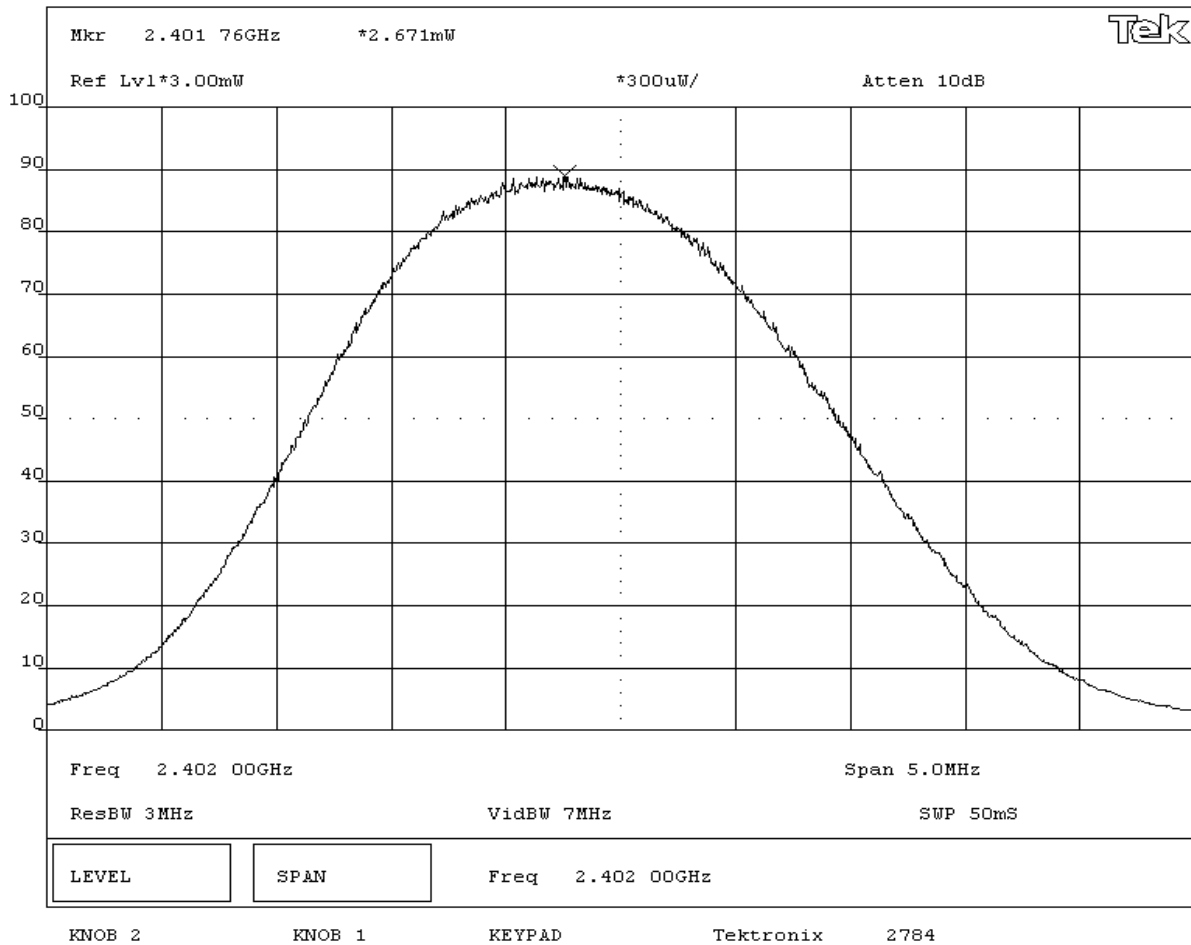**EUT OPERATING MODES**

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	2.67 mW

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Output Power - Low Channel


```
Mkr   2.401 76GHz      *2.671mW                          Tek

Ref Lvl*3.00mW                  *300uW/          Atten 10dB
100

 90

 80

 70

 60

 50

 40

 30

 20

 10

  0

Freq   2.402 00GHz                        Span 5.0MHz

ResBW 3MHz              VidBW 7MHz                 SWP 50mS

LEVEL      SPAN        Freq   2.402 00GHz

KNOB 2         KNOB 1         KEYPAD      Tektronix    2784
```

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A	**Work Order:**	LABT0059
Serial Number:	none	**Date:**	07/03/03
Customer:	Logitech, Inc.	**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:** 35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:** EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(b)(1)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
Modulated by PRBS at maximum data rate

DEVIATIONS FROM TEST STANDARD
None

REQUIREMENTS
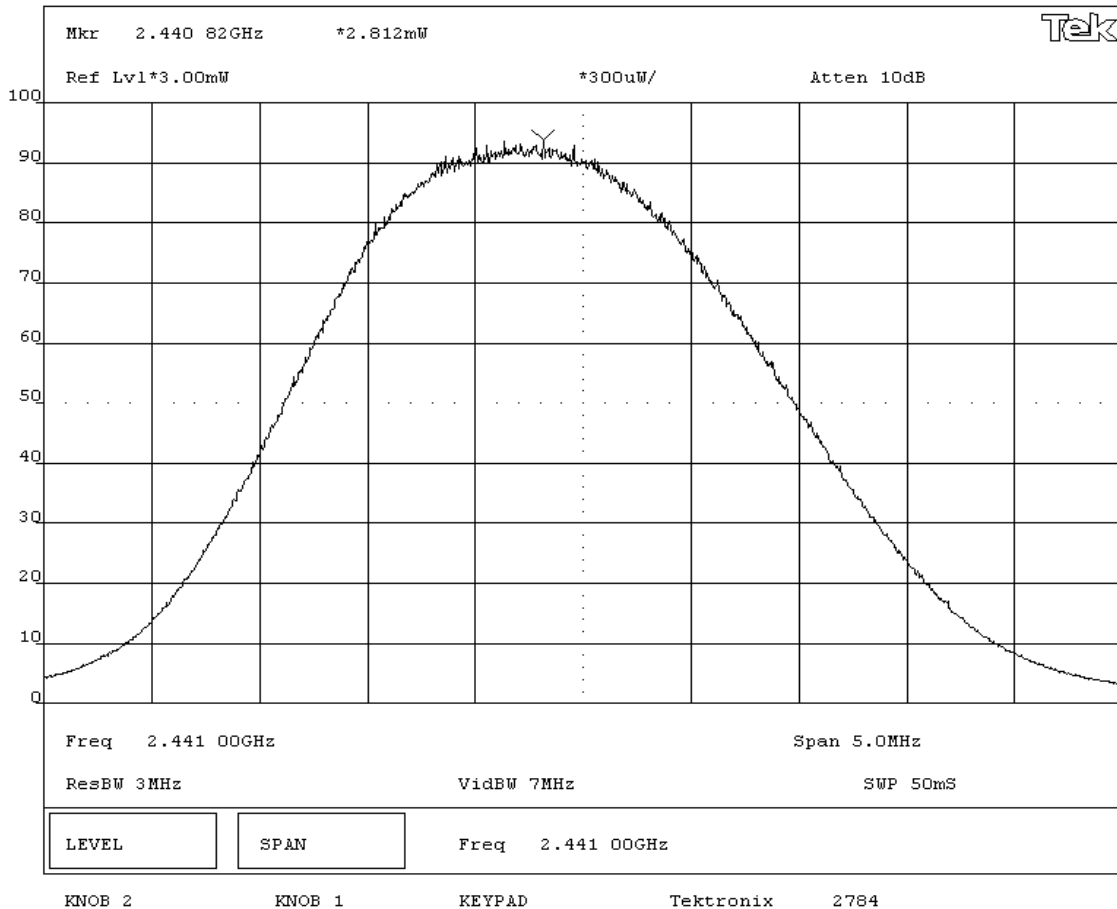Maximum peak conducted output power does not exceed 1 Watt

RESULTS	**AMPLITUDE**
Pass	2.81 mW

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Output Power - Mid Channel


```
Mkr   2.440 82GHz       *2.812mW

Ref Lvl*3.00mW              *300uW/        Atten 10dB
100
 90
 80
 70
 60
 50
 40
 30
 20
 10
  0

Freq   2.441 00GHz                    Span 5.0MHz

ResBW 3MHz           VidBW 7MHz        SWP 50mS

[LEVEL]    [SPAN]    Freq   2.441 00GHz

KNOB 2       KNOB 1       KEYPAD       Tektronix   2784
```

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(b)(1)	**Year:**	2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

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	2.31 mW

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Output Power - High Channel


```
Mkr    2.479 65GHz       *2.305mW                                        Tek

Ref Lvl*3.00mW                       *300uW/          Atten 10dB
100

 90

 80

 70

 60

 50

 40

 30

 20

 10

  0

Freq   2.480 00GHz                              Span 5.0MHz

ResBW 3MHz                  VidBW 7MHz                  SWP 50mS

  LEVEL        SPAN        Freq   2.480 00GHz

KNOB 2         KNOB 1       KEYPAD        Tektronix    2784
```

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:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
Battery

Software\Firmware Applied During Test			
Exercise software	Special Test Software	Version	Unknown
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
Bluetooth Headset (low channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (mid channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (high channel)	Logitech Inc.	F-0179A	N/A

Band Edge Compliance of RF Conducted Emissions

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

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	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per 47 CFR 15.247(c), 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:

_____

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

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 at the edge of the authorized band is 20 dB down from the fundamental
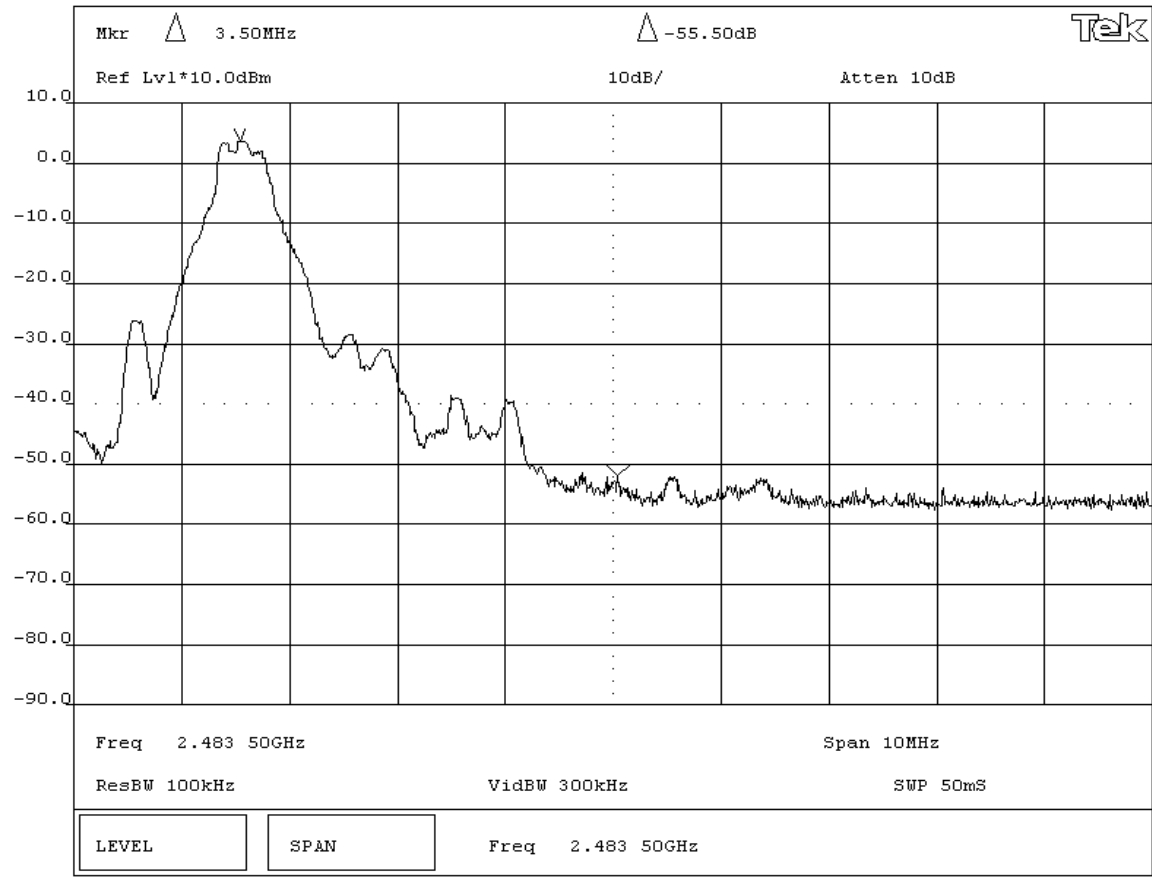
RESULTS	**AMPLITUDE**
Pass	-39.6 dBc

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Band Edge Compliance - Low Channel

NORTHWEST EMC

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		Work Order:	LABT0059
Serial Number:	none		Date:	07/03/03
Customer:	Logitech, Inc.		Temperature:	73 F
Attendees:	Mitch Phillipi	Tested by: Greg Kiemel	Humidity:	35% RH
Customer Ref. No.:	N/A	Power: Battery	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	Year:	2003	Method:	DA 00-705, ANSI C63.4	Year:	1992

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 at the edge of the authorized band is 20 dB down from the fundamental

RESULTS	AMPLITUDE
Pass	-55.5 dBc

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Band Edge Compliance - High Channel


```
Mkr    △  3.50MHz                    △ -55.50dB                    Tek

Ref Lvl*10.0dBm              10dB/           Atten 10dB

10.0
 0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0

Freq   2.483 50GHz                    Span 10MHz

ResBW 100kHz            VidBW 300kHz            SWP 50mS

[LEVEL]    [SPAN]    Freq  2.483 50GHz

KNOB 2        KNOB 1        KEYPAD      Tektronix    2784
```

Spurious RF Conducted Emissions

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:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
Battery

Frequency Range Investigated			
Start Frequency	0 MHz	Stop Frequency	25 GHz

Software\Firmware Applied During Test			
Exercise software	Special Test Software	Version	Unknown
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
Bluetooth Headset (low channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (mid channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (high channel)	Logitech Inc.	F-0179A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

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	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per 47 CFR 15.247(c), 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:

_____

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT: F-0179A		**Work Order:**	LABT0059
Serial Number: none		**Date:**	07/03/03
Customer: Logitech, Inc.		**Temperature:**	73 F
Attendees: Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.: N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
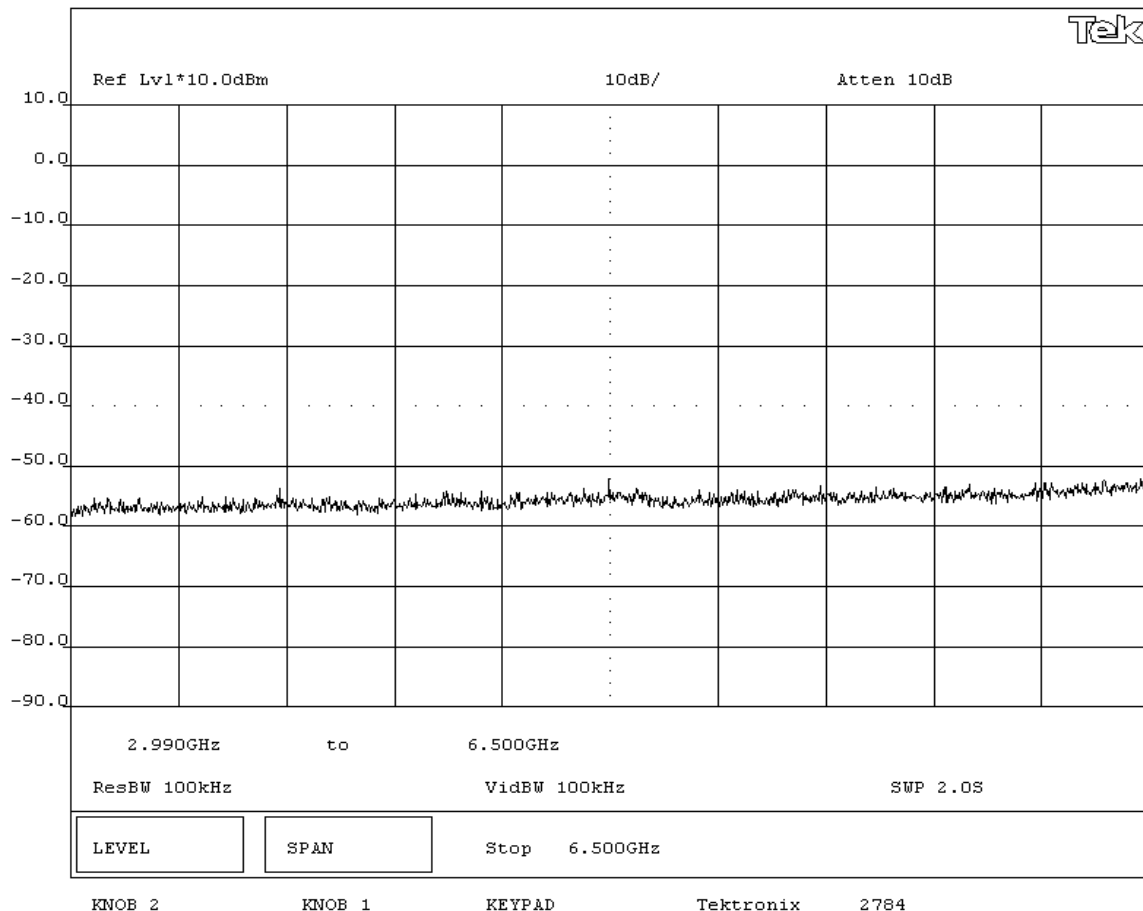
Modulated by PRBS at maximum data rate

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


```
Ref Lvl*10.0dBm              10dB/              Atten 10dB

  10.0
   0.0
 -10.0
 -20.0
 -30.0
 -40.0
 -50.0
 -60.0
 -70.0
 -80.0
 -90.0

     0MHz          to        3.000GHz

   ResBW 100kHz              VidBW 100kHz              SWP 1.7S

   LEVEL          SPAN          Ref Lvl*10.0dBm

   KNOB 2         KNOB 1        KEYPAD       Tektronix    2784
```

EMISSIONS DATA SHEET

EUT: F-0179A			**Work Order:**	LABT0059
Serial Number: none			**Date:**	07/03/03
Customer: Logitech, Inc.			**Temperature:**	73 F
Attendees: Mitch Phillipi		**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.: N/A		**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4		**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
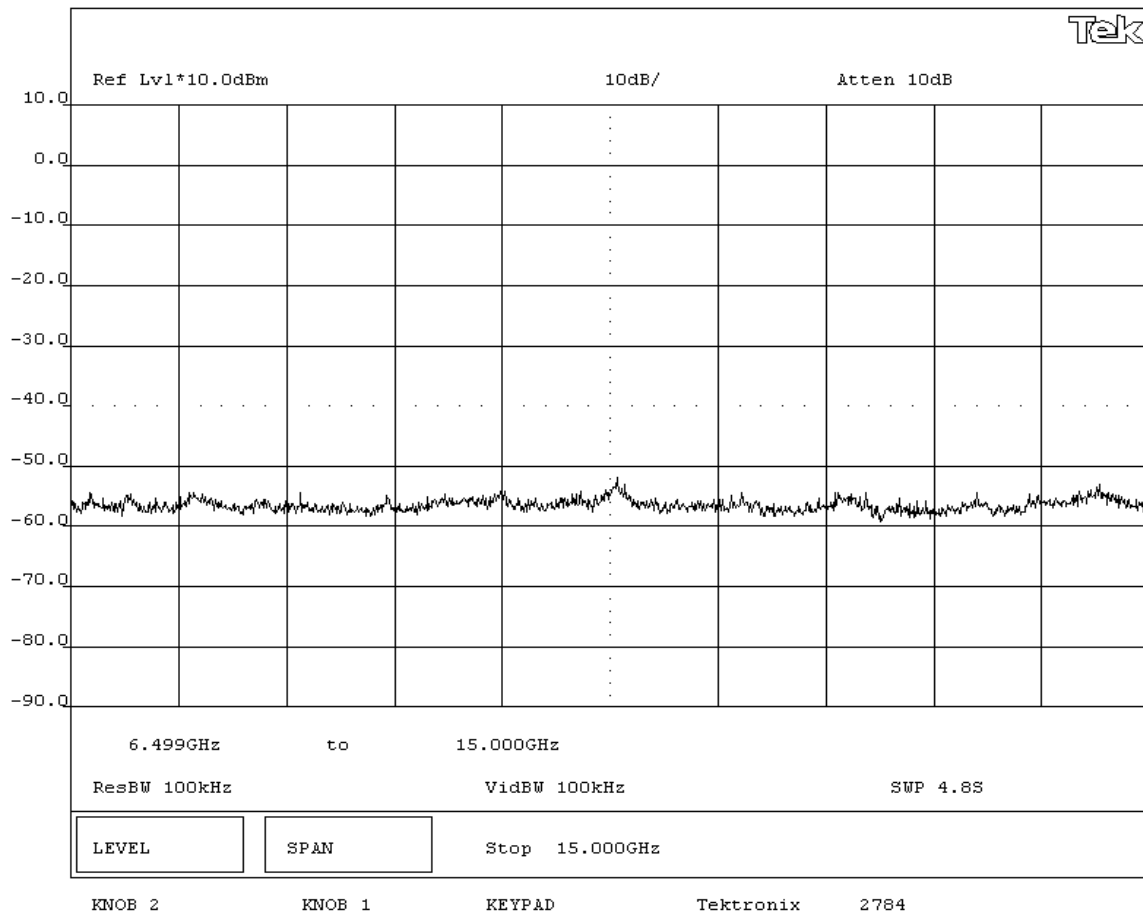Modulated by PRBS at maximum data rate

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

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT: F-0179A		**Work Order:**	LABT0059
Serial Number: none		**Date:**	07/03/03
Customer: Logitech, Inc.		**Temperature:**	73 F
Attendees: Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.: N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

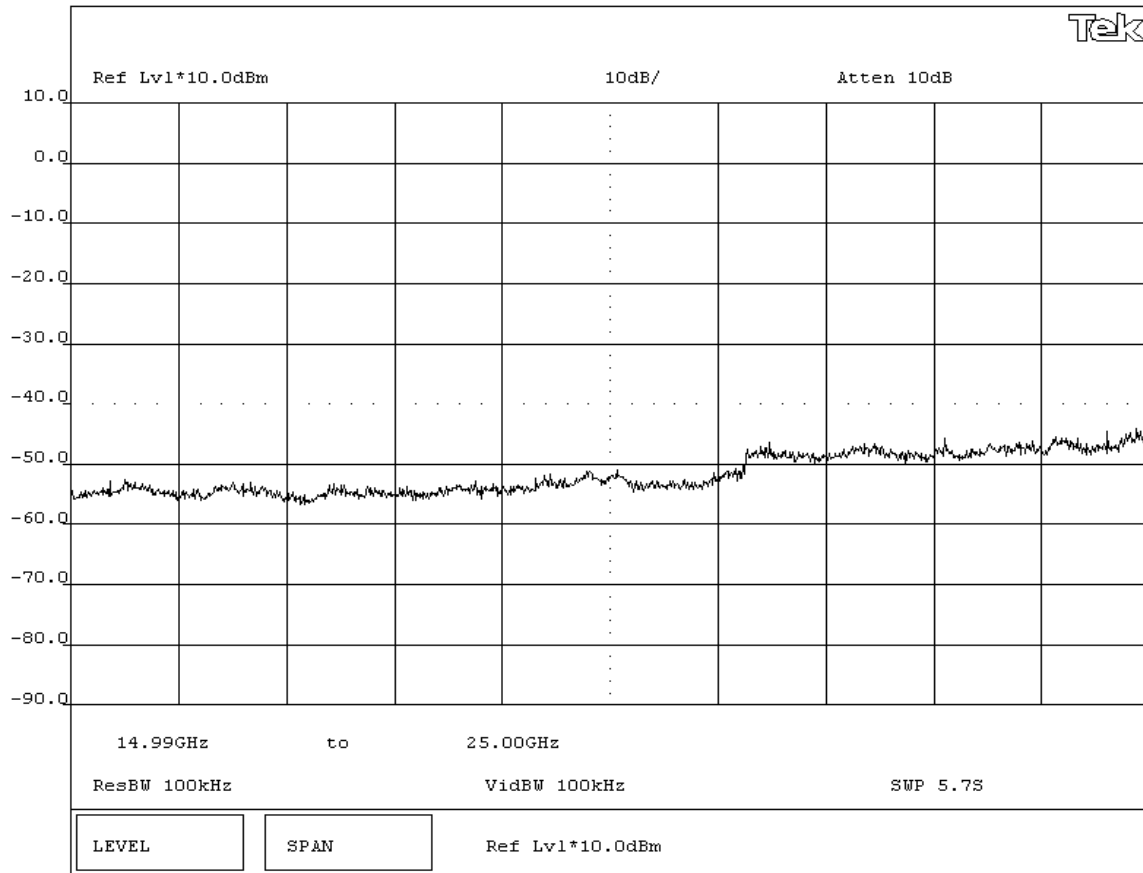Modulated by PRBS at maximum data rate

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


```
            Ref Lvl*10.0dBm                10dB/            Atten 10dB

    10.0

     0.0

   -10.0

   -20.0

   -30.0

   -40.0

   -50.0

   -60.0

   -70.0

   -80.0

   -90.0

        6.499GHz        to        15.000GHz

        ResBW 100kHz            VidBW 100kHz              SWP 4.8S

        LEVEL        SPAN        Stop  15.000GHz

        KNOB 2        KNOB 1        KEYPAD      Tektronix    2784
```

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

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
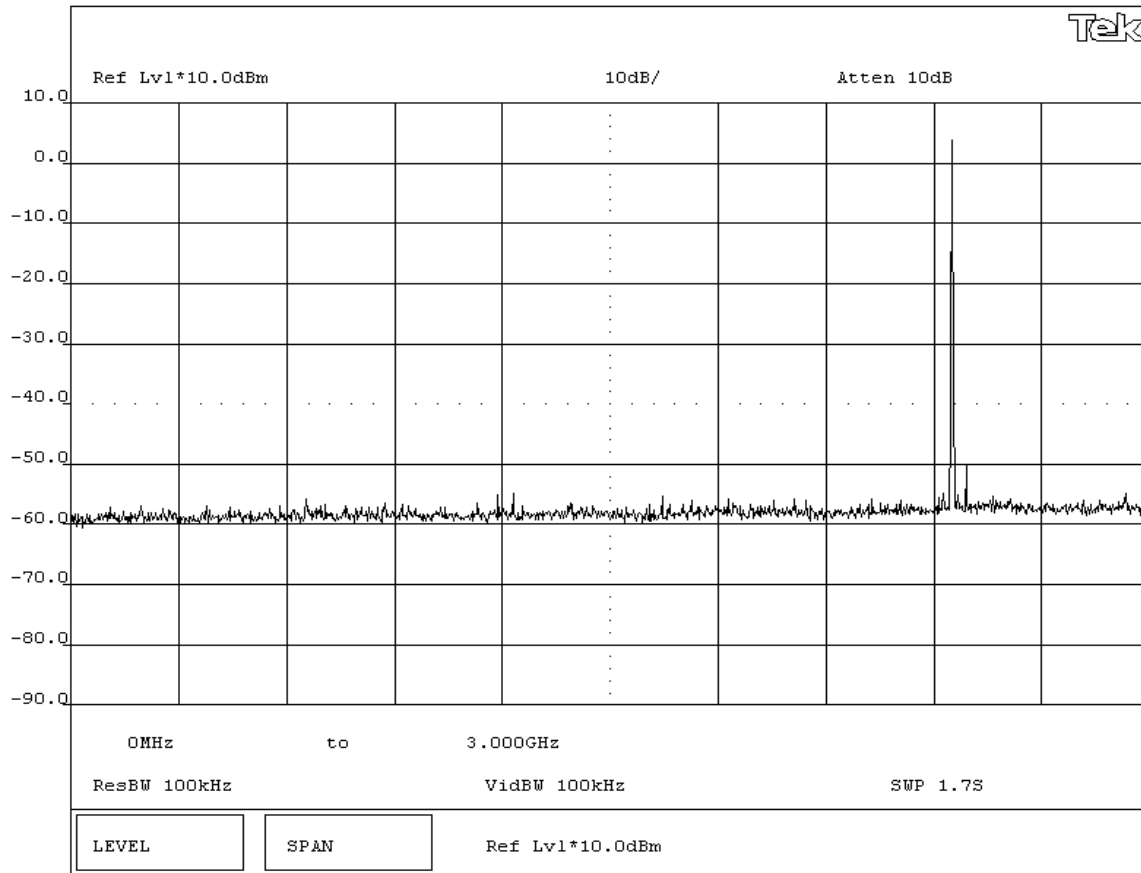
RESULTS

Pass

SIGNATURE

Tested By:

DESCRIPTION OF TEST

Antenna Conducted Spurious Emissions - Low Channel 15GHz - 25GHz

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	**Year:**	2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

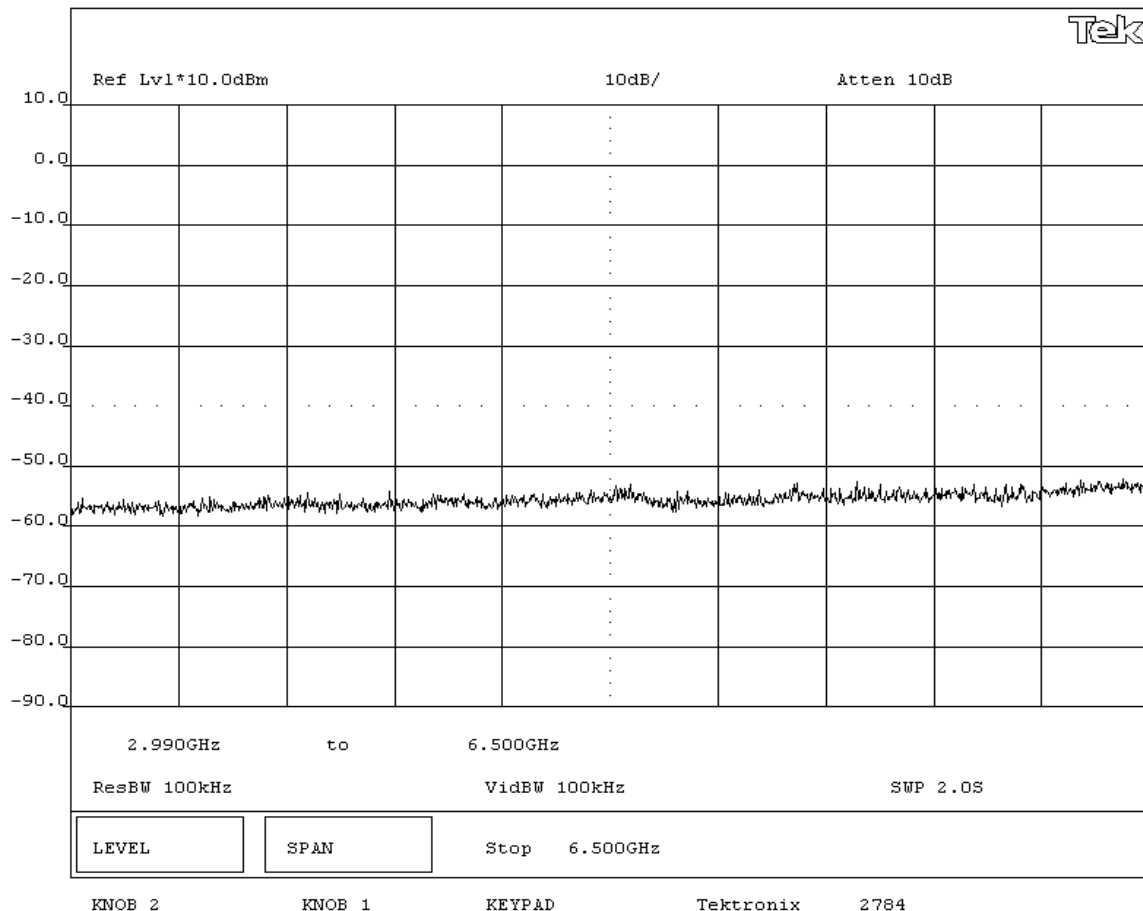**EUT OPERATING MODES**

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

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	**Year:**	2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
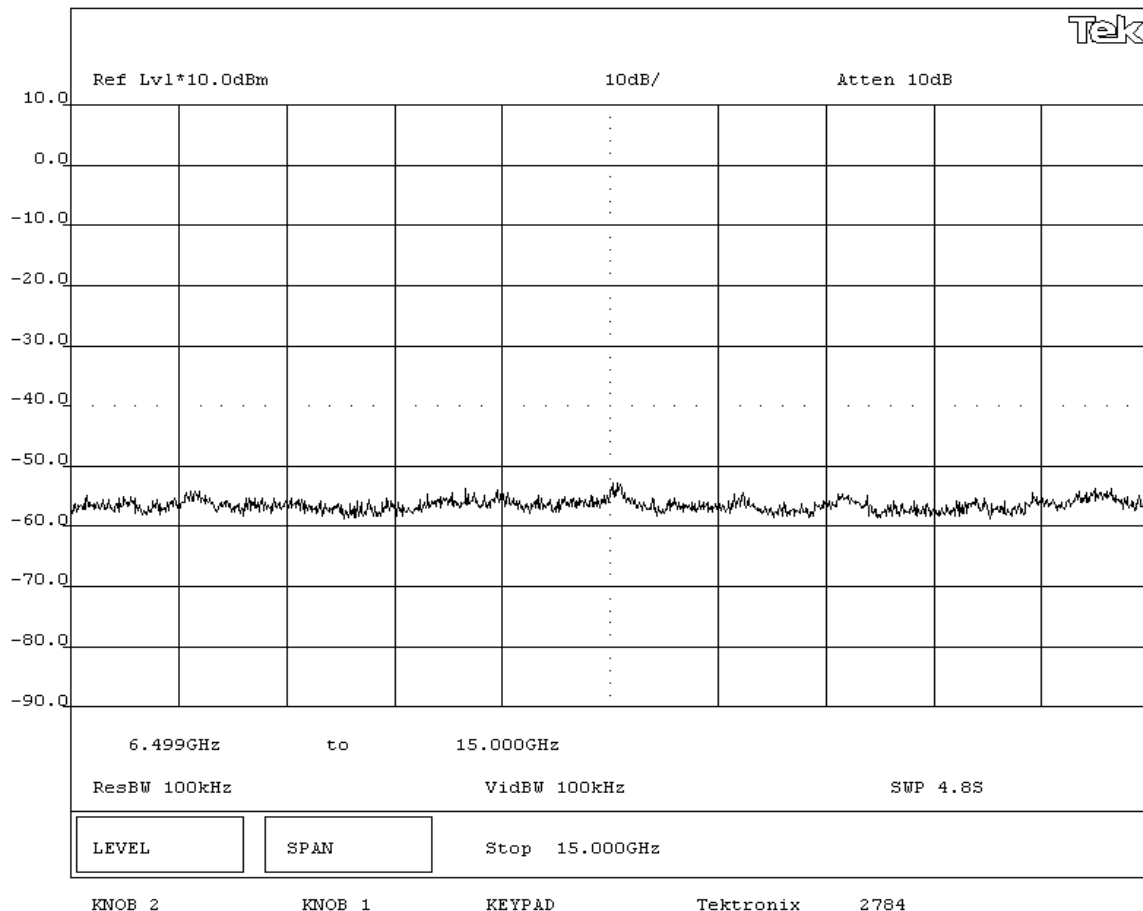
Modulated by PRBS at maximum data rate

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 3GHz-6.5GHz

EUT:	F-0179A			Work Order:	LABT0059
Serial Number:	none			Date:	07/03/03
Customer:	Logitech, Inc.			Temperature:	73 F
Attendees:	Mitch Phillipi	Tested by:	Greg Kiemel	Humidity:	35% RH
Customer Ref. No.:	N/A	Power:	Battery	Job Site:	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	Year:	2003	Method:	DA 00-705, ANSI C63.4	Year:	1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate
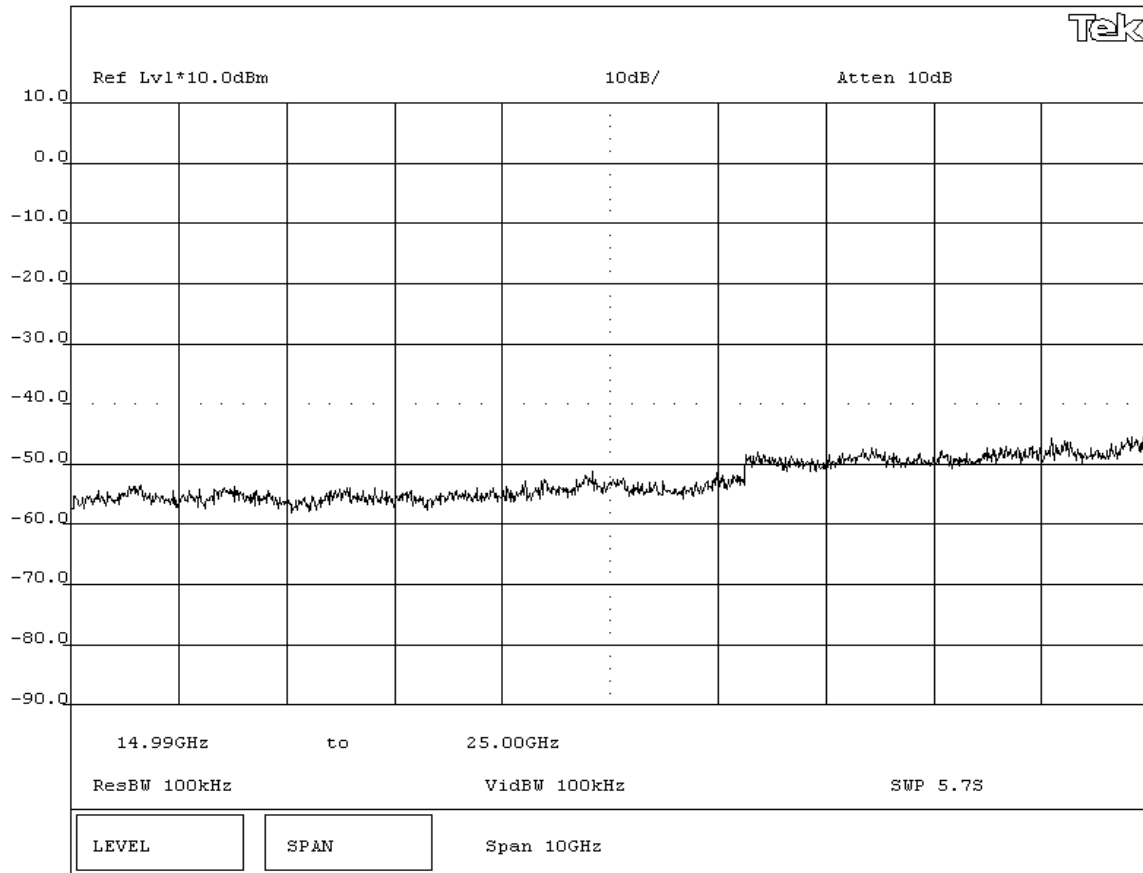
DEVIATIONS FROM TEST STANDARD

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

Ref Lvl*10.0dBm   10dB/   Atten 10dB

```
 10.0
  0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
```

6.499GHz   to   15.000GHz

ResBW 100kHz   VidBW 100kHz   SWP 4.8S

LEVEL   SPAN   Stop 15.000GHz

KNOB 2   KNOB 1   KEYPAD   Tektronix   2784

EMISSIONS DATA SHEET

EUT: F-0179A		**Work Order:** LABT0059	
Serial Number: none		**Date:** 07/03/03	
Customer: Logitech, Inc.		**Temperature:** 73 F	
Attendees: Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:** 35% RH	
Customer Ref. No.: N/A	**Power:** Battery	**Job Site:** EV06	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

Modulated by PRBS at maximum data rate
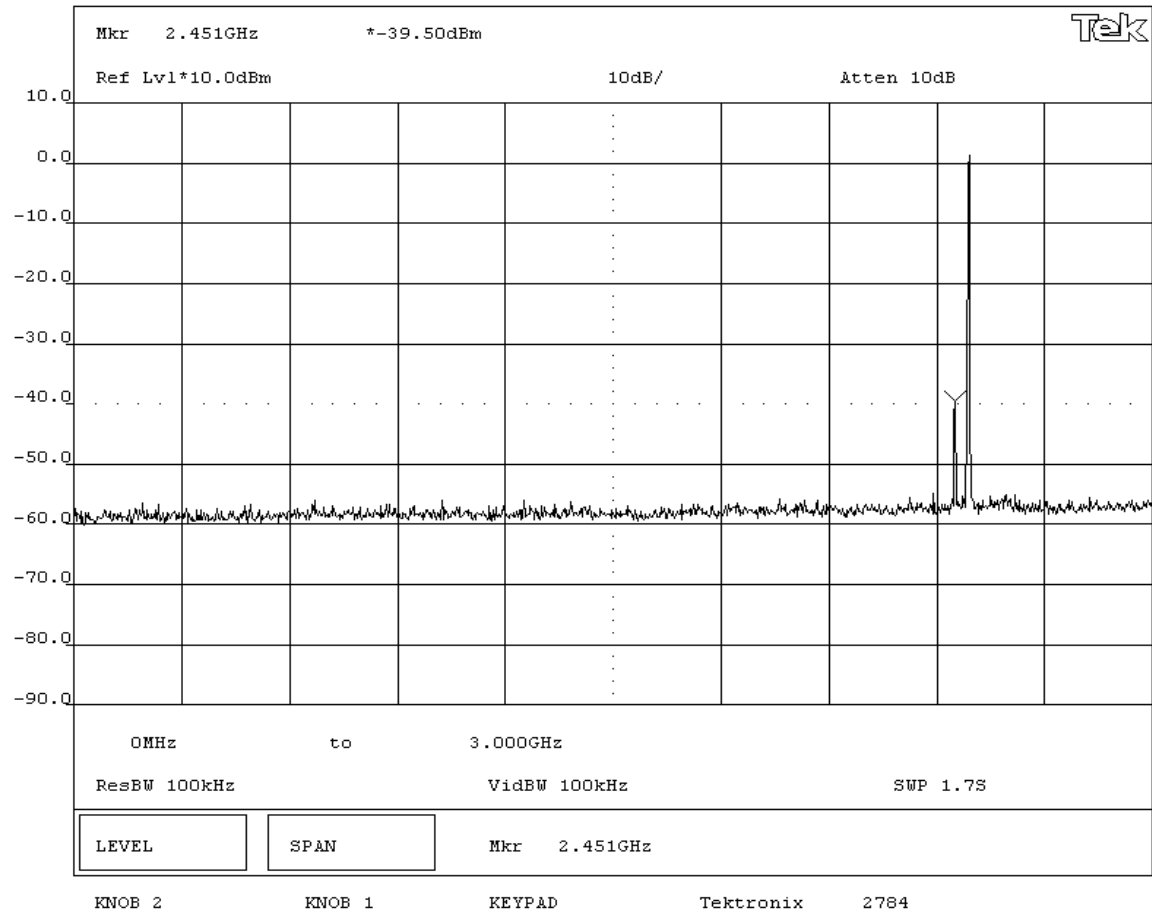
DEVIATIONS FROM TEST STANDARD

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

Ref Lvl*10.0dBm   10dB/   Atten 10dB

14.99GHz   to   25.00GHz

ResBW 100kHz   VidBW 100kHz   SWP 5.7S

| LEVEL | SPAN | Span 10GHz |

KNOB 2   KNOB 1   KEYPAD   Tektronix   2784

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

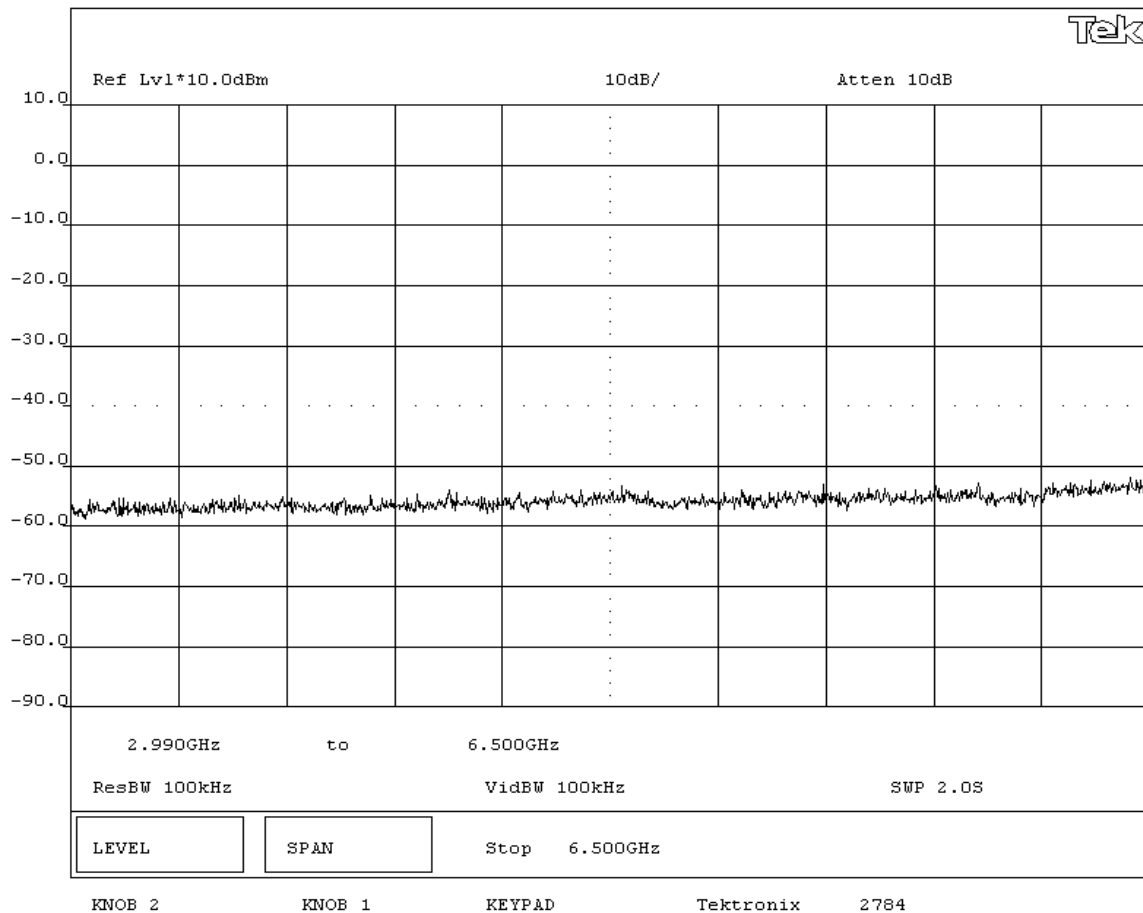**EUT OPERATING MODES**

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

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	**Year:**	2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES
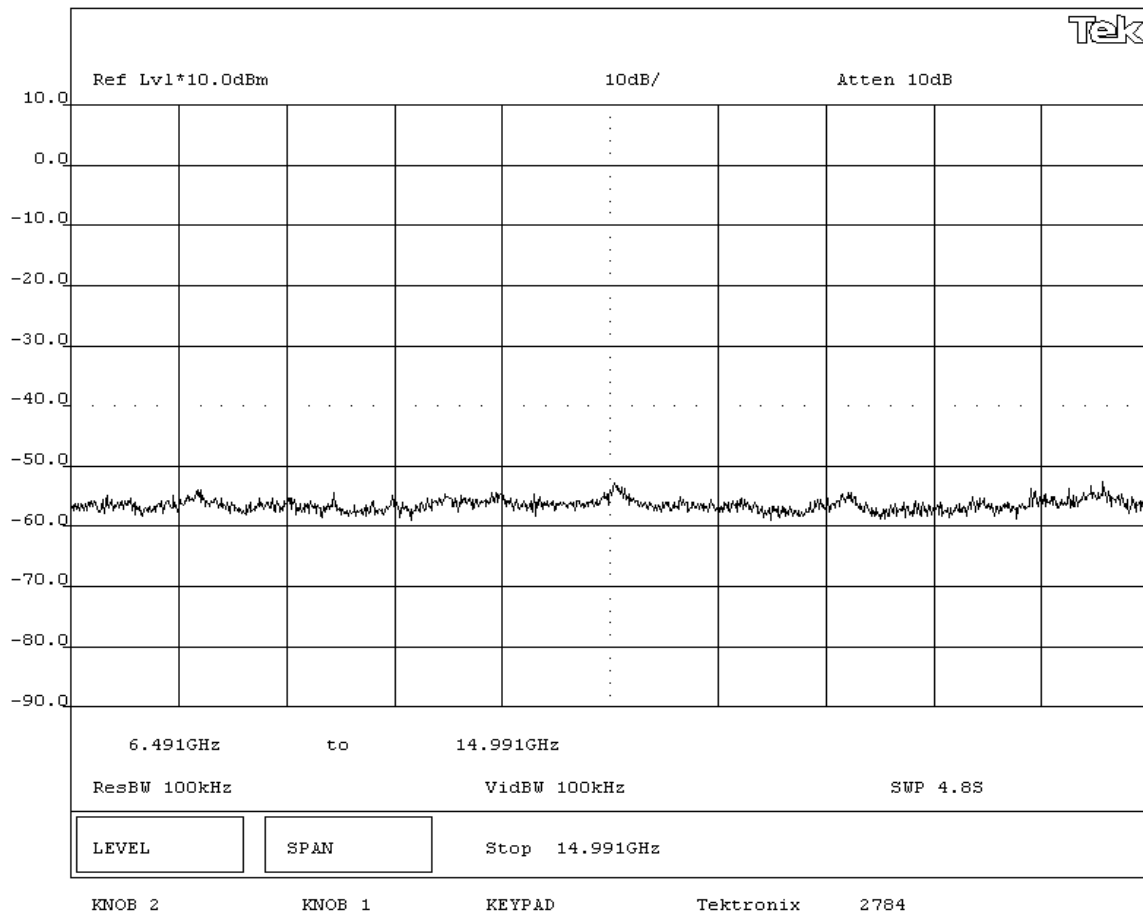
Modulated by PRBS at maximum data rate

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

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT:	F-0179A	**Work Order:**	LABT0059
Serial Number:	none	**Date:**	07/03/03
Customer:	Logitech, Inc.	**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:** 35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:** EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	**Year:** 2003	**Method:** DA 00-705, ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

COMMENTS

EUT OPERATING MODES

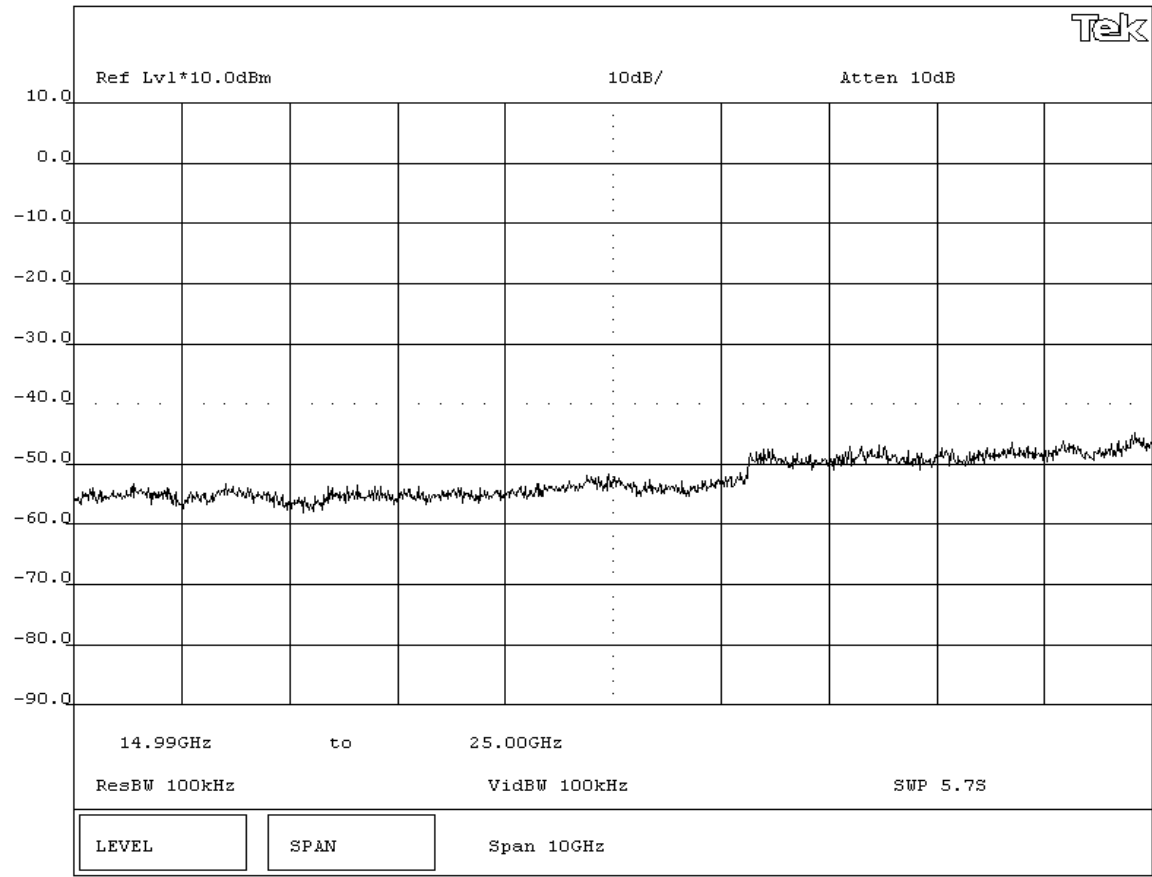Modulated by PRBS at maximum data rate

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


```
Ref Lvl*10.0dBm              10dB/            Atten 10dB

 10.0

  0.0

-10.0

-20.0

-30.0

-40.0

-50.0

-60.0

-70.0

-80.0

-90.0

      6.491GHz       to      14.991GHz

   ResBW 100kHz            VidBW 100kHz            SWP 4.8S

   LEVEL        SPAN        Stop  14.991GHz

    KNOB 2       KNOB 1       KEYPAD       Tektronix    2784
```

EMISSIONS DATA SHEET

EUT:	F-0179A		**Work Order:**	LABT0059
Serial Number:	none		**Date:**	07/03/03
Customer:	Logitech, Inc.		**Temperature:**	73 F
Attendees:	Mitch Phillipi	**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.:	N/A	**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification:	47 CFR 15.247(c)	**Year:**	2003	**Method:** DA 00-705, ANSI C63.4	**Year:**	1992

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 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:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
Battery

Software\Firmware Applied During Test

Exercise software	Special Test Software	Version	Unknown
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
Bluetooth Headset (low channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (mid channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (high channel)	Logitech Inc.	F-0179A	N/A

Cables

Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
N/A	N/A	N/A	N/A	N/A	N/A

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	Tektronix	2784	AAO	02/26/2003	24 mo

Test Description

Requirement: Per 47 CFR 15.247(d), 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 = (SPAN/3 kHz)). For example, given a span of 1.5 MHz, the sweep should be 1.5 x 106 ÷ 3 x 103 = 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:

_____

EMISSIONS DATA SHEET

EUT: F-0179A			**Work Order:** LABT0059	
Serial Number: none			**Date:** 07/03/03	
Customer: Logitech, Inc.			**Temperature:** 73 F	
Attendees: Mitch Phillipi		**Tested by:** Greg Kiemel	**Humidity:** 35% RH	
Customer Ref. No.: N/A		**Power:** Battery	**Job Site:** EV06	

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)	**Year:** 2003	**Method:** FCC 97-114, ANSI C63.4	**Year:** 1992

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*log(3kHz/1Hz)

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 DSSS transmitter does not exceed 8 dBm in any 3 kHz band
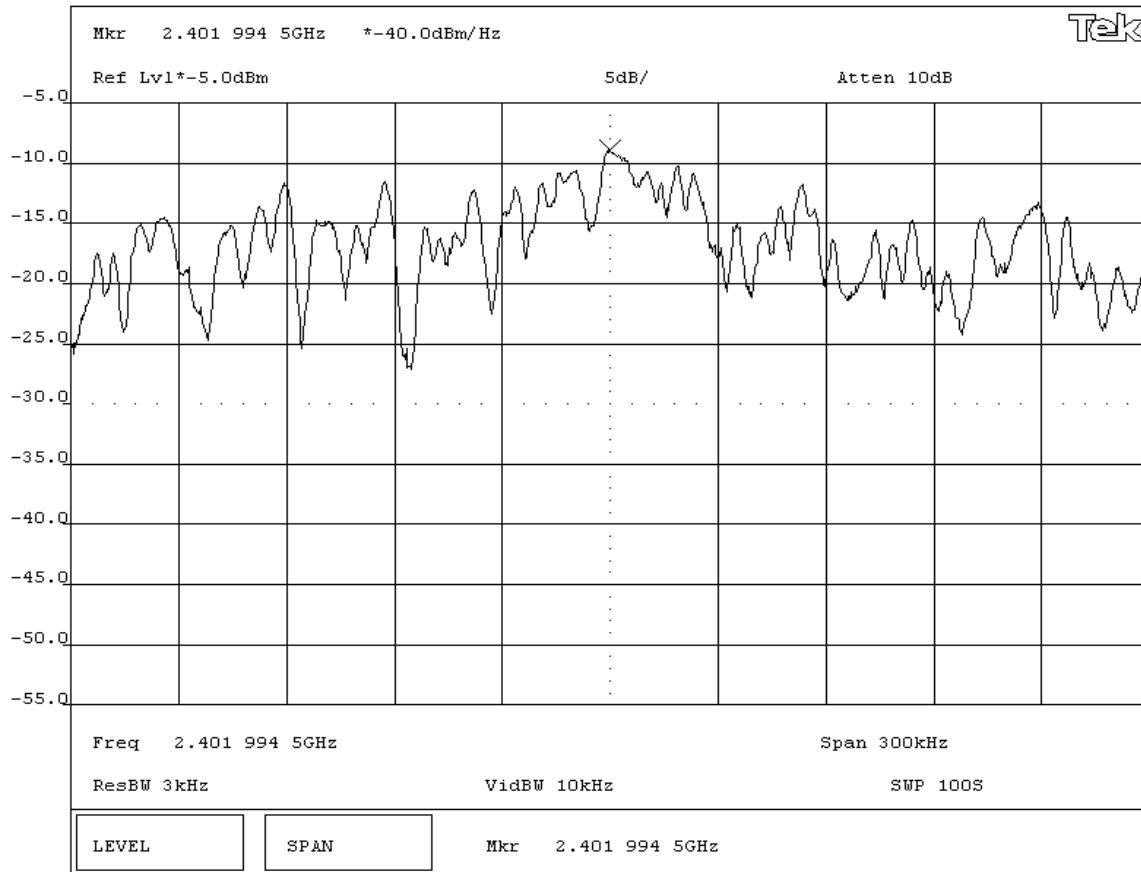
RESULTS	**AMPLITUDE**
Pass	Power Spectral Density = --5.2 dBm / 3kHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Power Spectral Density - Low Channel

EMISSIONS DATA SHEET

EUT:	F-0179A	**Work Order:**	LABT0059
Serial Number:	none	**Date:**	07/03/03
Customer:	Logitech, Inc.	**Temperature:**	73 F
Attendees: Mitch Phillipi		**Tested by:** Greg Kiemel	**Humidity:** 35% RH
Customer Ref. No.: N/A		**Power:** Battery	**Job Site:** EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)		**Year:** 2003		**Method:** FCC 97-114, ANSI C63.4	**Year:** 1992

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*log(3kHz/1Hz)

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 DSSS transmitter does not exceed 8 dBm in any 3 kHz band
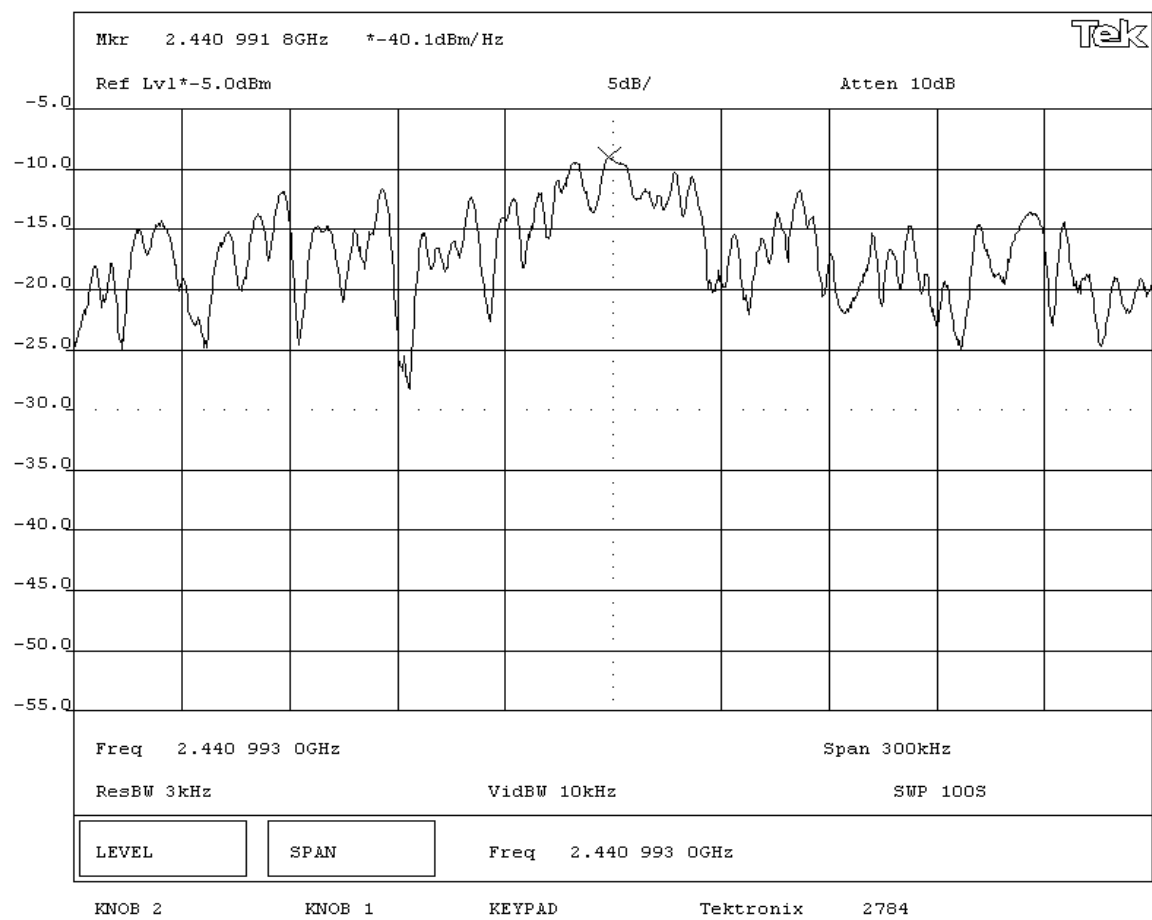
RESULTS	**AMPLITUDE**
Pass	Power Spectral Density = -5.3 dBm / 3kHz

SIGNATURE

Tested By: _____

DESCRIPTION OF TEST

Power Spectral Density - Mid Channel

EMISSIONS DATA SHEET

Rev BETA
01/30/01

EUT: F-0179A			**Work Order:**	LABT0059
Serial Number: none			**Date:**	07/03/03
Customer: Logitech, Inc.			**Temperature:**	73 F
Attendees: Mitch Phillipi		**Tested by:** Greg Kiemel	**Humidity:**	35% RH
Customer Ref. No.: N/A		**Power:** Battery	**Job Site:**	EV06

TEST SPECIFICATIONS

Specification: 47 CFR 15.247(d)	Year: 2003	Method: FCC 97-114, ANSI C63.4	Year: 1992

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*log(3kHz/1Hz)

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 DSSS transmitter does not exceed 8 dBm in any 3 kHz band
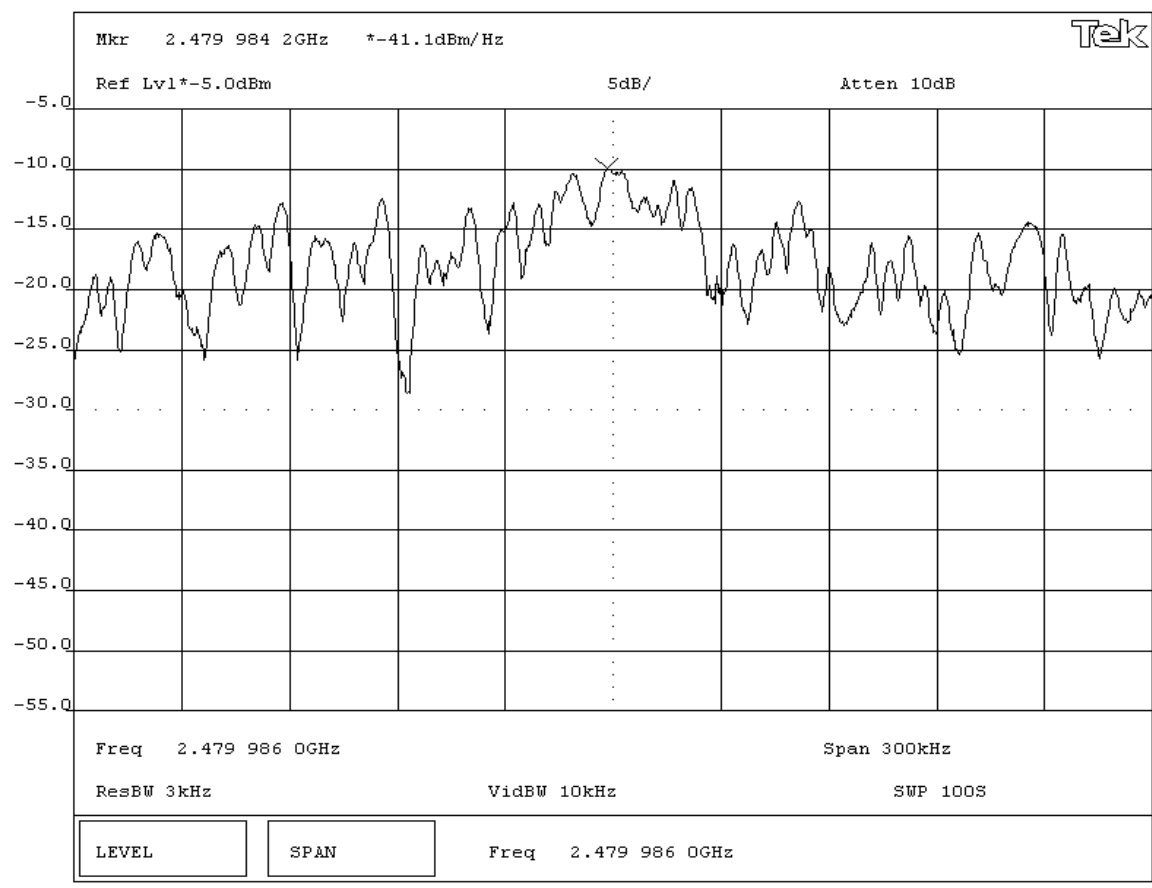
RESULTS	**AMPLITUDE**
Pass	Power Spectral Density = -6.3 dBm / 3kHz

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. 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:
High
Mid
Low

Operating Modes Investigated:
No Hop

Data Rates Investigated:
Maximum

Output Power Setting(s) Investigated:
Maximum

Power Input Settings Investigated:
Battery

Frequency Range Investigated			
Start Frequency	30 MHz	Stop Frequency	25 GHz

Software\Firmware Applied During Test

Exercise software	N/A	Version	N/A

Description

The system was tested using standard operating modes that do not require software. The unit was set to transmit at low, mid, and high channels.

EUT and Peripherals

Description	Manufacturer	Model/Part Number	Serial Number
Bluetooth Headset (low channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (mid channel)	Logitech Inc.	F-0179A	N/A
Bluetooth Headset (high channel)	Logitech Inc.	F-0179A	N/A

Measurement Equipment

Description	Manufacturer	Model	Identifier	Last Cal	Interval
Spectrum Analyzer	Hewlett-Packard	8566B	AAL	01/07/2003	12 mo
Quasi-Peak Adapter	Hewlett-Packard	85650A	AQF	01/07/2003	12 mo
Antenna, Horn	EMCO	3115	AHC	08/12/2002	12 mo
Antenna, Biconilog	EMCO	3141	AXE	12/31/2001	36 mo
Pre-Amplifier	Amplifier Research	LN1000A	APS	01/06/2003	12 mo
Pre-Amplifier	Miteq	AMF-4D-005180-24-10P	APJ	01/06/2003	12 mo
High Pass Filter	RLC Electronics	F-100-4000-5-R (HPF>4GHz up to	HFF	05/01/2003	12 mo
Antenna, Horn	EMCO	3160-09	AHG	01/15/2003	12 mo
Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	01/15/2003	12 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 only antenna to be used with the EUT was tested. The EUT was configured for low, mid, and high band transmit frequencies. The EUT was transmitting at its maximum data rate in a no hop mode. For each configuration, the spectrum was scanned from 30 MHz to 25 GHz. In addition, measurements were made in the restricted band of 2.4835 to 2.5 GHz to verify compliance. While scanning, emissions from the EUT were maximized by rotating the EUT, adjusting the measurement antenna height and polarization, and manipulating the EUT in 3 orthogonal planes (per ANSI C63.4:1992). A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

Bandwidths Used for Measurements

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:

_____

OATS DATA SHEET

EUT: F-0179A		**Work Order:** LABT0059	
Serial Number: none		**Date:** 06/26/03	
Customer: Logitech Inc.		**Temperature:** 77	
Attendees:		**Humidity:** 41%	
Cust. Ref. No.:		**Barometric Pressure** 30.11	
Tested by: Holly Ashkannejhad	**Power:** Battery	**Job Site:** EV01	

TEST SPECIFICATIONS

Specification: FCC Part 15.247(c)	**Year:** 2003
Method: ANSI C63.4	**Year:** 1992

SAMPLE CALCULATIONS

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

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator
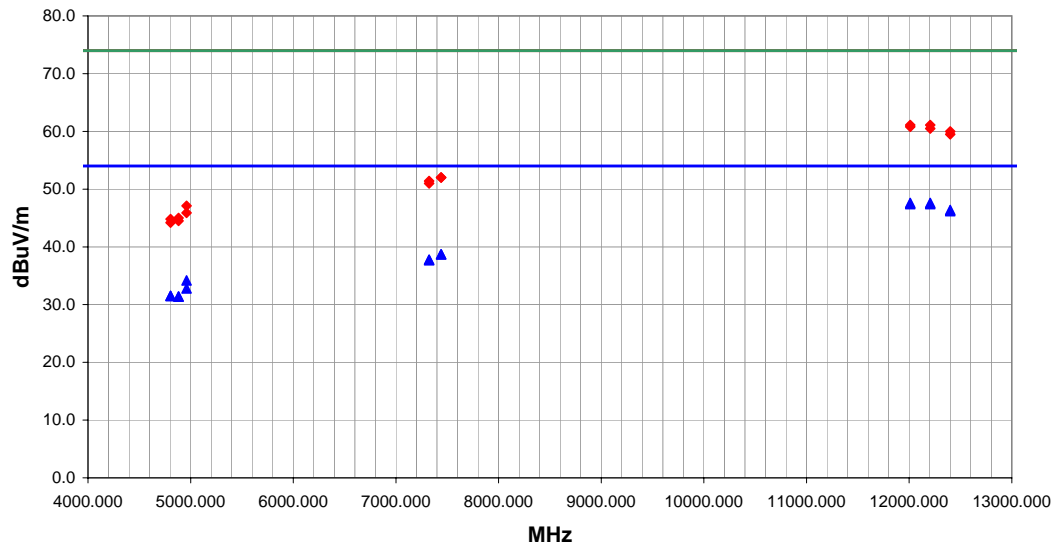
COMMENTS

EUT OPERATING MODES

low, mid, and high channel, no hop, modulated at maximum output power

DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS | **Run #**

Pass | 6

Other

Tested By: _Holly Ashkannejhad_

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
12010.000	26.4	21.2	341.0	3.1	3.0	0.0	H-Horn	AV	0.0	47.6	54.0	-6.4	Low channel unit
12205.000	26.3	21.3	189.0	1.6	3.0	0.0	H-Horn	AV	0.0	47.6	54.0	-6.4	Transmitting mid channel
12010.000	26.2	21.2	111.0	1.2	3.0	0.0	V-Horn	AV	0.0	47.4	54.0	-6.6	Low channel unit
12205.000	26.1	21.3	55.0	3.1	3.0	0.0	V-Horn	AV	0.0	47.4	54.0	-6.6	Transmitting mid channel
12400.000	25.0	21.4	338.0	1.3	3.0	0.0	H-Horn	AV	0.0	46.4	54.0	-7.6	Transmitting high channel
12399.250	24.8	21.4	166.0	1.2	3.0	0.0	V-Horn	AV	0.0	46.2	54.0	-7.8	Transmitting high channel
7440.000	27.3	11.4	252.0	2.5	3.0	0.0	H-Horn	AV	0.0	38.7	54.0	-15.3	Transmitting high channel
7440.000	27.3	11.4	21.0	2.9	3.0	0.0	V-Horn	AV	0.0	38.7	54.0	-15.3	Transmitting high channel
7323.000	26.8	11.0	111.0	1.2	3.0	0.0	V-Horn	AV	0.0	37.8	54.0	-16.2	Transmitting mid channel
7323.000	26.7	11.0	169.0	1.3	3.0	0.0	H-Horn	AV	0.0	37.7	54.0	-16.3	Transmitting mid channel
4960.000	27.8	6.4	154.0	1.3	3.0	0.0	H-Horn	AV	0.0	34.2	54.0	-19.8	Transmitting high channel
4960.000	26.4	6.4	86.0	1.2	3.0	0.0	V-Horn	AV	0.0	32.8	54.0	-21.2	Transmitting high channel
4804.000	25.6	5.9	313.0	1.2	3.0	0.0	V-Horn	AV	0.0	31.5	54.0	-22.5	Low channel unit
4804.000	25.6	5.9	197.0	1.3	3.0	0.0	H-Horn	AV	0.0	31.5	54.0	-22.5	Low channel unit
4882.000	25.2	6.2	145.0	1.3	3.0	0.0	H-Horn	AV	0.0	31.4	54.0	-22.6	Transmitting mid channel
4882.000	25.2	6.2	49.0	1.2	3.0	0.0	V-Horn	AV	0.0	31.4	54.0	-22.6	Transmitting mid channel
12010.000	39.9	21.2	341.0	3.1	3.0	0.0	H-Horn	PK	0.0	61.1	74.0	-12.9	Low channel unit
12205.000	39.8	21.3	189.0	1.6	3.0	0.0	H-Horn	PK	0.0	61.1	74.0	-12.9	Transmitting mid channel
12010.000	39.6	21.2	111.0	1.2	3.0	0.0	V-Horn	PK	0.0	60.8	74.0	-13.2	Low channel unit
12205.000	39.2	21.3	55.0	3.1	3.0	0.0	V-Horn	PK	0.0	60.5	74.0	-13.5	Transmitting mid channel
12400.000	38.6	21.4	166.0	1.2	3.0	0.0	V-Horn	PK	0.0	60.0	74.0	-14.0	Transmitting high channel
12400.000	38.1	21.4	338.0	1.3	3.0	0.0	H-Horn	PK	0.0	59.5	74.0	-14.5	Transmitting high channel
7440.000	40.6	11.4	252.0	2.5	3.0	0.0	H-Horn	PK	0.0	52.0	74.0	-22.0	Transmitting high channel
7440.000	40.6	11.4	21.0	2.9	3.0	0.0	V-Horn	PK	0.0	52.0	74.0	-22.0	Transmitting high channel
7323.000	40.4	11.0	111.0	1.2	3.0	0.0	V-Horn	PK	0.0	51.4	74.0	-22.6	Transmitting mid channel
7323.000	40.0	11.0	169.0	1.3	3.0	0.0	H-Horn	PK	0.0	51.0	74.0	-23.0	Transmitting mid channel
4960.000	40.7	6.4	154.0	1.3	3.0	0.0	H-Horn	PK	0.0	47.1	74.0	-26.9	Transmitting high channel
4960.000	39.5	6.4	86.0	1.2	3.0	0.0	V-Horn	PK	0.0	45.9	74.0	-28.1	Transmitting high channel
4882.000	38.8	6.2	49.0	1.2	3.0	0.0	V-Horn	PK	0.0	45.0	74.0	-29.0	Transmitting mid channel
4804.000	38.9	5.9	197.0	1.3	3.0	0.0	H-Horn	PK	0.0	44.8	74.0	-29.2	Low channel unit
4882.000	38.3	6.2	145.0	1.3	3.0	0.0	H-Horn	PK	0.0	44.5	74.0	-29.5	Transmitting mid channel
4804.000	38.3	5.9	313.0	1.2	3.0	0.0	V-Horn	PK	0.0	44.2	74.0	-29.8	Low channel unit

OATS DATA SHEET

EUT:	F-0179A	**Work Order:**	LABT0059
Serial Number:	none	**Date:**	06/26/03
Customer:	Logitech Inc.	**Temperature:**	77
Attendees:		**Humidity:**	41%
Cust. Ref. No.:		**Barometric Pressure**	30.11
Tested by:	Holly Ashkannejhad	**Power:** Battery	**Job Site:** EV01

TEST SPECIFICATIONS

Specification:	FCC Part 15.247(c)	**Year:**	2003
Method:	ANSI C63.4	**Year:**	1992

SAMPLE CALCULATIONS

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

Conducted Emissions: Adjusted Level = Measured Level + Transducer Factor + Cable Attenuation Factor + External Attenuator
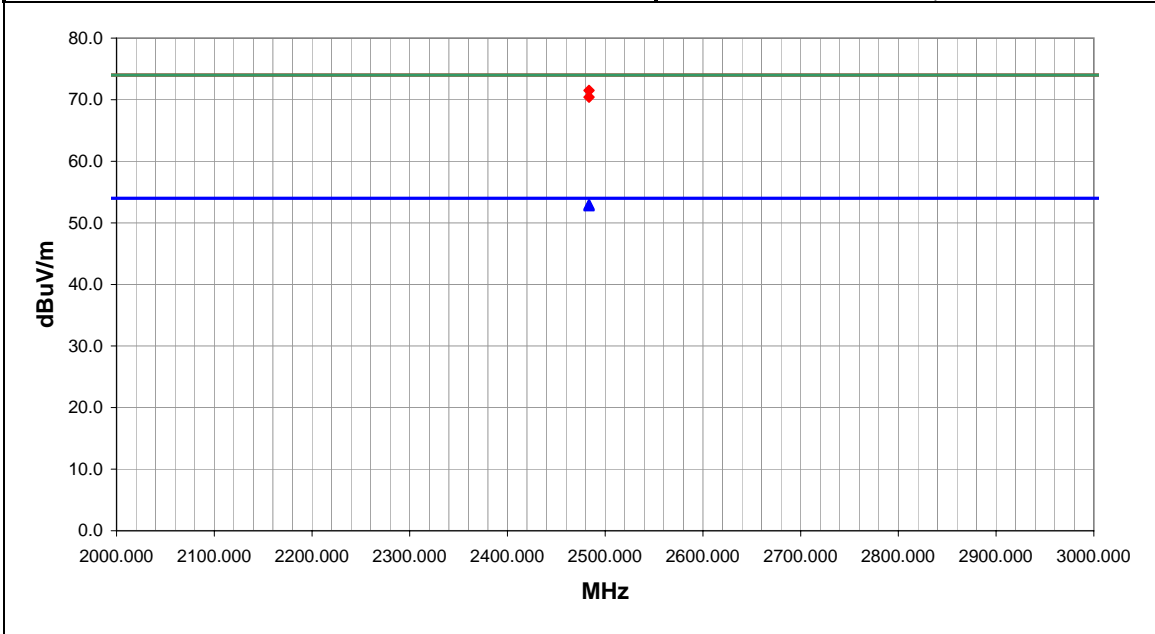
COMMENTS

EUT OPERATING MODES

high channel, no hop, modulated at maximum output power

DEVIATIONS FROM TEST STANDARD

No deviations.

RESULTS **Run #**

Pass **8**

Other

Holly Ashkannejhad

Tested By:

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)	Comments
2483.500	32.0	1.0	187.0	1.2	3.0	20.0	V-Horn	AV	0.0	53.0	54.0	-1.0	Transmitting high channel
2483.500	31.8	1.0	189.0	1.4	3.0	20.0	H-Horn	AV	0.0	52.8	54.0	-1.2	Transmitting high channel
2483.500	50.5	1.0	187.0	1.2	3.0	20.0	V-Horn	PK	0.0	71.5	74.0	-2.5	Transmitting high channel
2483.500	49.4	1.0	189.0	1.4	3.0	20.0	H-Horn	PK	0.0	70.4	74.0	-3.6	Transmitting high channel