

*Electromagnetic Emissions Test Report*

*Application for Grant of Equipment Authorization  
pursuant to  
FCC Part 15 Subpart C  
on the  
J-Link Co., Ltd.  
Transmitter  
Model: RoadTrip (P1067)*

FCC ID: TVT1067

GRANTEE: J-Link Co., Ltd.  
No. 28-12  
Gangkou, Gangnan Village  
Anding Township, Taiwan Country 745  
Taiwan, R.O.C.

TEST SITE(S): Elliott Laboratories  
41039 Boyce Road.  
Fremont, CA. 94538-2435

REPORT DATE: September 19, 2008

FINAL TEST DATE: May 30 and July 31, 2008

AUTHORIZED SIGNATORY:



Mark E. Hill  
Staff Engineer



Testing Cert #2016-01

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***REVISION HISTORY***

Rev #	Date	Comments	Modified By
1	11/4/08	First Release	-

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**SCOPE**

An electromagnetic emissions test has been performed on the J-Link model RoadTrip (P1067) pursuant to the following rules:

FCC Part 15 Subpart C

Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in the following reference standards and as outlined in Elliott Laboratories test procedures:

ANSI C63.4:2003

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

The test results recorded herein are based on a single type test of the J-Link model RoadTrip (P1067) and therefore apply only to the tested sample. The sample was selected and prepared by Jeff Altheide of Griffin Technology.

**OBJECTIVE**

The primary objective of the manufacturer is compliance with the regulations outlined in the previous section.

Certification is a procedure where the manufacturer submits test data and technical information to a certification body and receives a certificate or grant of equipment authorization upon successful completion of the certification body's review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units, which are subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

**STATEMENT OF COMPLIANCE**

The tested sample of J-Link model RoadTrip (P1067) complied with the requirements of the following regulations:

## FCC Part 15 Subpart C

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

**TEST RESULTS SUMMARY****DEVICES OPERATING IN THE 88-108 MHz FM BAND**

FCC Rule Part	RSS Rule Part	Description	Measured Value / Comments	Limit / Requirement	Result
15.239 (a)	RSS 210 A2.8	Bandwidth and operating range	186 kHz	Bandwidth less than 200kHz contained in the 88 – 108 MHz band	
15.239 (b)	RSS 210 A2.8 (1)	Fundamental Field Strength	47.4dBuV/m @ 107.9 MHz (-0.6dB)	250uV/m at 3m	Complies
15.239 (c) / 15.209	RSS 210 Table 2	Radiated Spurious Emissions, 30 – 1080 MHz	34.02dBuV/m @ 294.3MHz	Refer to table in limits section	Complies

**GENERAL REQUIREMENTS APPLICABLE TO ALL BANDS**

FCC Rule Part	RSS Rule part	Description	Measured Value / Comments	Limit / Requirement	Result (margin)
15.203	-	RF Connector	Antenna Integral to the EUT	Refer to standard	Complies
15.109	RSS GEN 7.2.3 Table 1	Receiver spurious emissions	34.02dBuV/m @ 294.3MHz (-12.0dB)	Refer to table in limits section	Complies -Note 2
15.207	RSS GEN Table 2	AC Conducted Emissions		-	N/A – note 1
15.247 (b) (5) 15.407 (f)	RSS 102	RF Exposure Requirements	Refer to RSS 102 declaration	Refer to OET 65, FCC Part 1 and RSS 102	Complies

Note 1 – The EUT is powered from a 12VDC automotive cigarette lighter adapter. The RoadTrip (P1067) does pass the power thru to the iPod for charging of the iPod.

Note 2 – Preliminary testing showed that emissions during receive operation were equal to or less than the emissions during the transmit operation.

**MEASUREMENT UNCERTAINTIES**

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with UKAS document LAB 34.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	$\pm 2.4$
Radiated Emissions	0.015 to 30	$\pm 3.0$
Radiated Emissions	30 to 1000	$\pm 3.6$
Radiated Emissions	1000 to 40000	$\pm 6.0$

**EQUIPMENT UNDER TEST (EUT) DETAILS****GENERAL**

The J-Link model RoadTrip (P1067) is a portable FM transmitter that is designed to transmit audio information from an iPod or a computer. For this testing, the EUT was placed on a tabletop. The EUT is powered via the USB port of a computer, or via the 12V automobile power outlet.

The sample was received on May 16, 2008 and tested on May 30 and July 31, 2008. The EUT consisted of the following component(s):

Manufacturer	Model	Description	Serial Number	FCC ID
Griffin	RoadTrip	FM Transmitter	N/A	Unknown

**ANTENNA SYSTEM**

The antenna is integral to the device.

**ENCLOSURE**

The EUT enclosure is primarily constructed of plastic . It measures approximately 6 cm wide by 2 cm deep by 3.5 cm high.

**MODIFICATIONS**

The EUT did not require modifications during testing in order to comply with emissions specifications.

**SUPPORT EQUIPMENT**

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
Apple	iPod Nano	MP3 Player	N/A	-
Power Designs	6150D	Power Supply	-	N/A

**EUT INTERFACE PORTS**

The I/O cabling configuration during emissions testing was as follows:

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Cigarette Lighter Adapter (DC Power Input)	DC Power Supply	2 Wire	Unshielded	1m

**EUT OPERATION**

During emissions testing the EUT was configured to play an audio file in a continuous loop.



**TEST SITE****GENERAL INFORMATION**

Final test measurements were taken on May 30 and July 31, 2008 at the test sites listed below. Pursuant to section 2.948 of the FCC's Rules and section 3.3 of RSP-100, construction, calibration, and equipment data has been filed with the Commission and with industry Canada.

Site	Registration Numbers		Location
	FCC	Canada	
Chamber 4	211948	IC 4549-4	41039 Boyce Road Fremont, CA 94538-2435
Chamber 5	211948	IC 4549-5	

ANSI C63.4:2003 recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement. The test site(s) contain separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent requirements of ANSI C63.4:2003.

**CONDUCTED EMISSIONS CONSIDERATIONS**

Conducted emissions testing is performed in conformance with ANSI C63.4:2003. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

**RADIATED EMISSIONS CONSIDERATIONS**

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment or in a semi-anechoic chamber. The test sites are maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4:2003 guidelines and meet the Normalized Site Attenuation (NSA) requirements of ANSI C63.4:2003.

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**MEASUREMENT INSTRUMENTATION****RECEIVER SYSTEM**

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers used can measure over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the CISPR detector used during measurements. If the repetition frequency of the signal being measured is below 20Hz, peak measurements are made in lieu of Quasi-Peak measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz, unless the signal is pulsed in which case the average (or video) bandwidth of the measuring instrument is reduced to onset of pulse desensitization and then increased.

**INSTRUMENT CONTROL COMPUTER**

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

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***FILTERS/ATTENUATORS***

External filters and precision attenuators are often connected between the receiving antenna or LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transient events.

***ANTENNAS***

A loop antenna is used below 30 MHz. For the measurement range 30 MHz to 1000 MHz either a combination of a biconical antenna and a log periodic or a bi-log antenna is used. Above 1000 MHz, horn antennas are used. The antenna calibration factors to convert the received voltage to an electric field strength are included with appropriate cable loss and amplifier gain factors to determine an overall site factor, which is then programmed into the test receivers or incorporated into the test software.

***ANTENNA MAST AND EQUIPMENT TURNTABLE***

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor-drive to vary the antenna height. Measurements below 30 MHz are made with the loop antenna at a fixed height of 1m above the ground plane.

ANSI C63.4:2003 specifies that the test height above ground for table mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

***INSTRUMENT CALIBRATION***

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An exhibit of this report contains the list of test equipment used and calibration information.

## TEST PROCEDURES

### EUT AND CABLE PLACEMENT

The regulations require that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4:2003, and the worst-case orientation is used for final measurements.

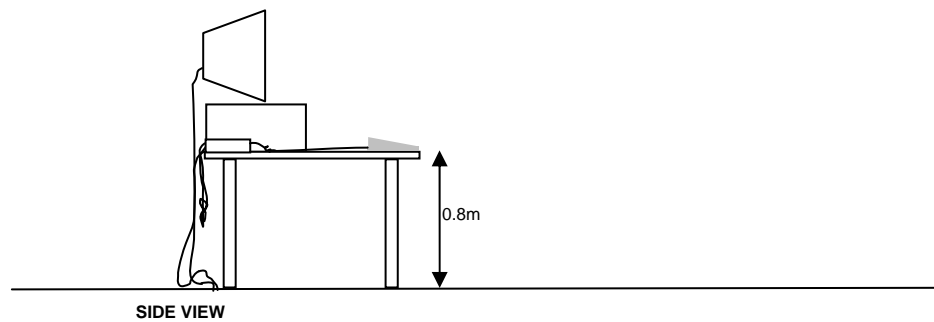
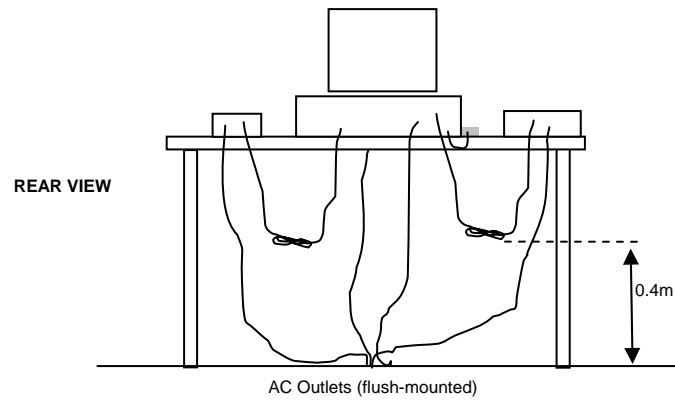
### RADIATED EMISSIONS

A preliminary scan of the radiated emissions is performed in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed, one scan for each antenna polarization (horizontal and vertical; loop parallel and perpendicular to the EUT). During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied (for measurements above 30 MHz) and cable positions are varied to determine the highest emission relative to the limit. Preliminary scans may be performed in a fully anechoic chamber for the purposes of identifying the frequencies of the highest emissions from the EUT.

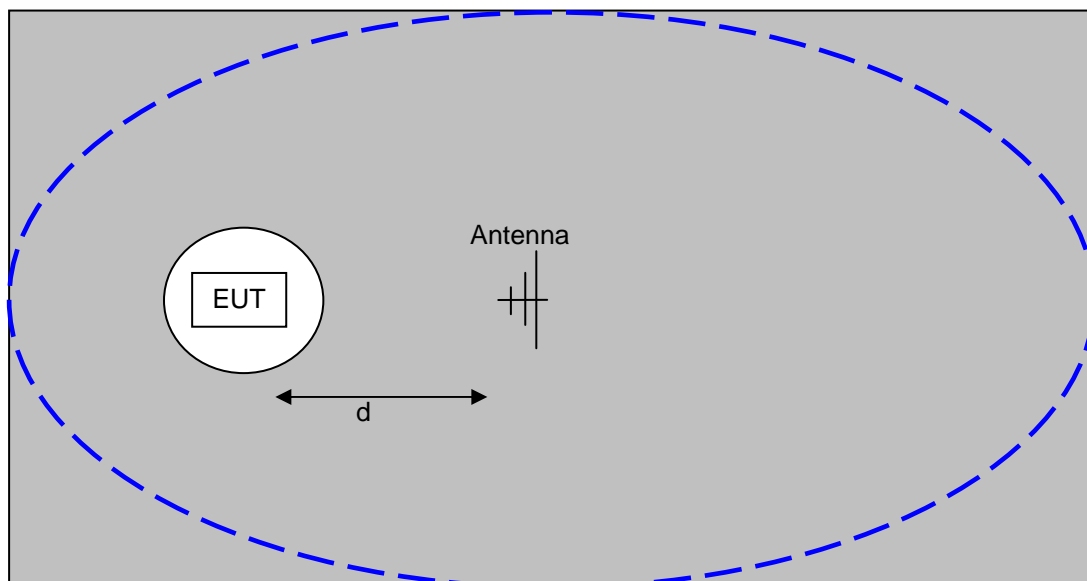
A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth, which results in the highest emission is then maintained while varying the antenna height from one to four meters (for measurements above 30 MHz, measurements below 30 MHz are made with the loop antenna at a fixed height of 1m). The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain.

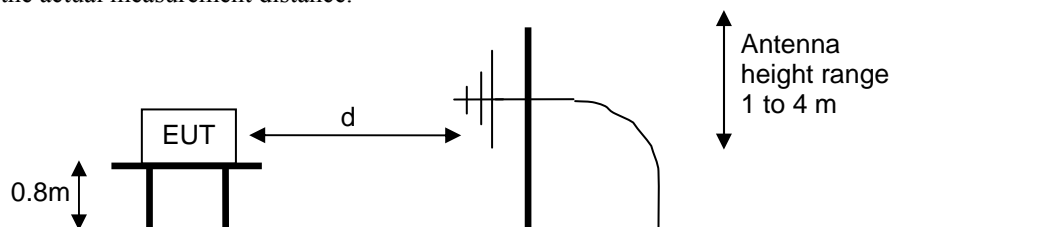
When testing above 18 GHz, the receive antenna is located at 1 meter from the EUT and the antenna height is restricted to a maximum of 2.5 meters.



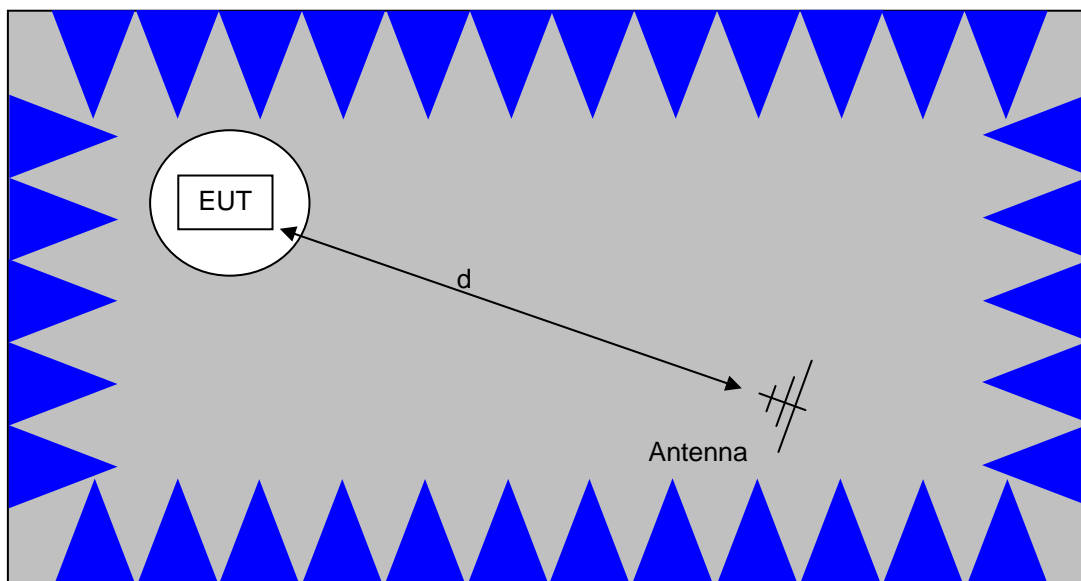
Typical Test Configuration for Radiated Field Strength Measurements



The ground plane extends beyond the ellipse defined in CISPR 16 / CISPR 22 / ANSI C63.4 and is large enough to accommodate test distances (d) of 3m and 10m. Refer to the test data tables for the actual measurement distance.

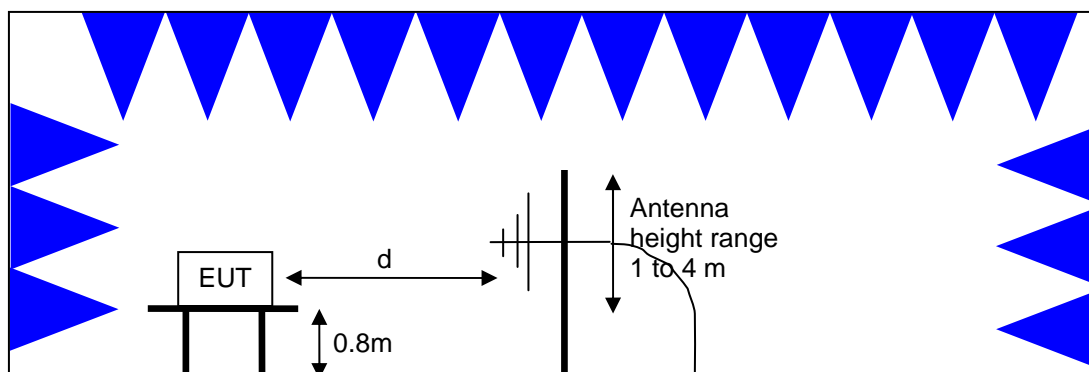


Test Configuration for Radiated Field Strength Measurements  
OATS- Plan and Side Views



The anechoic materials on the walls and ceiling ensure compliance with the normalized site attenuation requirements of CISPR 16 / CISPR 22 / ANSI C63.4 for an alternate test site at the measurement distances used.

Floor-standing equipment is placed on the floor with insulating supports between the unit and the ground plane.



Test Configuration for Radiated Field Strength Measurements  
Semi-Anechoic Chamber, Plan and Side Views

#### **BANDWIDTH MEASUREMENTS**

The 6dB, 20dB and/or 26dB signal bandwidth is measured in using the bandwidths recommended by ANSI C63.4. When required, the 99% bandwidth is measured using the methods detailed in RSS GEN.

**SPECIFICATION LIMITS AND SAMPLE CALCULATIONS**

The limits for conducted emissions are given in units of microvolts, and the limits for radiated emissions are given in units of microvolts per meter at a specified test distance. Data is measured in the logarithmic form of decibels relative to one microvolt, or dB microvolts (dBuV). For radiated emissions, the measured data is converted to the field strength at the antenna in dB microvolts per meter (dBuV/m). The results are then converted to the linear forms of uV and uV/m for comparison to published specifications.

For reference, converting the specification limits from linear to decibel form is accomplished by taking the base ten logarithm, then multiplying by 20. These limits in both linear and logarithmic form are as follows:

**GENERAL TRANSMITTER RADIATED EMISSIONS SPECIFICATION LIMITS**

The table below shows the limits for the spurious emissions from transmitters that fall in restricted bands<sup>1</sup> (with the exception of transmitters operating under FCC Part 15 Subpart D and RSS 210 Annex 9), the limits for all emissions from a low power device operating under the general rules of RSS 310 (tables 3 and 4), RSS 210 (table 2) and FCC Part 15 Subpart C section 15.209.

Frequency Range (MHz)	Limit (uV/m)	Limit (dBuV/m @ 3m)
0.009-0.490	2400/F <sub>KHz</sub> @ 300m	67.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 300m
0.490-1.705	24000/F <sub>KHz</sub> @ 30m	87.6-20*log <sub>10</sub> (F <sub>KHz</sub> ) @ 30m
1.705 to 30	30 @ 30m	29.5 @ 30m
30 to 88	100 @ 3m	40 @ 3m
88 to 216	150 @ 3m	43.5 @ 3m
216 to 960	200 @ 3m	46.0 @ 3m
Above 960	500 @ 3m	54.0 @ 3m

**RADIATED FUNDAMENTAL & SPURIOUS EMISSIONS SPECIFICATION LIMITS – 15.239 and RSS 210 A2.9**

Frequency Range (MHz)	Limit for Fundamental @ 3m	Limit for all signals outside of the occupied bandwidth @ 3m
88 - 108	250 uV/m 48 dBuV/m	General limits apply
The occupied bandwidth is limited to 200kHz. RSS 210 allows the fundamental field strength to be 1000uV/m at 30m at these specific frequencies 88.1; 88.3; 88.5; 107.7; 107.9 MHz is 1000uV/m at 30m for FM devices.		

<sup>1</sup> The restricted bands are detailed in FCC 15.203, RSS 210 Table 1 and RSS 310 Table 2



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**SAMPLE CALCULATIONS - RADIATED EMISSIONS**

Receiver readings are compared directly to the specification limit (decibel form). The receiver internally corrects for cable loss, preamplifier gain, and antenna factor. The calculations are in the reverse direction of the actual signal flow, thus cable loss is added and the amplifier gain is subtracted. The Antenna Factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

A distance factor, when used for electric field measurements above 30MHz, is calculated by using the following formula:

$$F_d = 20 * \text{LOG}_{10} (D_m/D_s)$$

where:

$F_d$  = Distance Factor in dB

$D_m$  = Measurement Distance in meters

$D_s$  = Specification Distance in meters

For electric field measurements below 30MHz the extrapolation factor is either determined by making measurements at multiple distances or a theoretical value is calculated using the formula:

$$F_d = 40 * \text{LOG}_{10} (D_m/D_s)$$

Measurement Distance is the distance at which the measurements were taken and Specification Distance is the distance at which the specification limits are based. The antenna factor converts the voltage at the antenna coaxial connector to the field strength at the antenna elements.

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The margin of a given emission peak relative to the limit is calculated as follows:

$$R_c = R_r + F_d$$

and

$$M = R_c - L_s$$

where:

$$R_r = \text{Receiver Reading in dBuV/m}$$

$$F_d = \text{Distance Factor in dB}$$

$$R_c = \text{Corrected Reading in dBuV/m}$$

$$L_s = \text{Specification Limit in dBuV/m}$$

$$M = \text{Margin in dB Relative to Spec}$$

#### *SAMPLE CALCULATIONS - FIELD STRENGTH TO EIRP CONVERSION*

Where the radiated electric field strength is expressed in terms of the equivalent isotropic radiated power (eirp), or where a field strength measurement of output power is made in lieu of a direct measurement, the following formula is used to convert between eirp and field strength at a distance of 3m from the equipment under test:

$$E = \frac{1000000 \sqrt{30 P}}{3} \quad \text{microvolts per meter}$$

where P is the eirp (Watts)

***EXHIBIT 1: Test Equipment Calibration Data***

1 Page

**Radiated Emissions, 30 - 1,000 MHz, 17-May-08**

**Engineer: rvarelas**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Asset #</u>	<u>Cal Due</u>
Rohde & Schwarz	EMI Test Receiver, 20 Hz-7 GHz	ESIB7	1538	25-Aug-08
Sunol Sciences	Biconilog, 30-3000 MHz	JB3	1549	23-May-09
Hewlett Packard	Preamplifier, 100 kHz - 1.3 GHz	8447E	1606	07-Jun-08

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***EXHIBIT 2: Test Measurement Data***

11 Pages



## EMC Test Data

Client:	J-Link Co	Job Number:	J71744
Model:	RoadTrip	Test-Log Number:	T71748
		Project Manager:	Sheareen
Contact:	Jeff Altheide		
Emissions Spec:	FCC Part 15.239	Class:	N/A
Immunity Spec:	-	Environment:	-

## EMC Test Data

For The

**J-Link Co**

Model

**RoadTrip**

Date of Last Test: 8/30/2008



## EMC Test Data

Client:	J-Link Co	Job Number:	J71744
Model:	RoadTrip	Test-Log Number:	T71748
		Project Manager:	Sheareen
Contact:	Jeff Altheide		
Emissions Spec:	FCC Part 15.239	Class:	N/A
Immunity Spec:	-	Environment:	-

### EUT INFORMATION

*The following information was collected during the test sessions(s).*

#### General Description

The EUT is a portable FM transmitter that is designed to transmit audio information from an iPod or a computer. For this testing, the EUT was placed on a table-top. The EUT is powered via the USB port of a computer, or via the 12V automobile power outlet.

#### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
J-Link Co	RoadTrip	FM Transmitter	N/A	TVT1067

#### EUT Antenna (Intentional Radiators Only)

The antenna is integral to the device.

#### EUT Enclosure

The EUT enclosure is primarily constructed of plastic. It measures approximately 6 cm wide by 2 cm deep by 3.5 cm high.

#### Modification History

Mod. #	Test	Date	Modification
1			
2			
3			

Modifications applied are assumed to be used on subsequent tests unless otherwise stated as a further modification.



## EMC Test Data

Client:	J-Link Co	Job Number:	J71744
Model:	RoadTrip	T-Log Number:	T71748
		Project Manager:	Sheareen
Contact:	Jeff Altheide		
Emissions Spec:	FCC Part 15.239	Class:	N/A
Immunity Spec:	-	Environment:	-

### Test Configuration #1

*The following information was collected during the test sessions(s).*

#### Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Apple	iPod Nano	MP3 Player	N/A	-
Power Designs	6150D	Power Supply	-	N/A

#### Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
-	-	-	-	-

#### Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
Cigarette Lighter Adapter (DC Power Input)	DC Power Supply	2 Wire	Unshielded	1m

#### EUT Operation During Emissions Tests

During emissions testing the EUT was configured to play an audio file in a continuous loop. The audio file was comprised of a contemporary music and vocal track.



Client:	J-Link Co	Job Number:	J71744
Model:	RoadTrip	T-Log Number:	T71748
Contact:	Jeff Altheide	Account Manager:	Sheareen
Standard:	FCC Part 15.239	Class:	N/A

## Radiated Emissions

(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)

### Test standard(s) ifics

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 5/30/2008  
 Test Engineer: Rafael Varelas  
 Test Location: Fremont Chamber #4

Config. Used: 1  
 Config Change: None  
 EUT Voltage: 12Vdc

### General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

**Ambient Conditions:**

Temperature: 19.7 °C  
 Rel. Humidity: 39 %

### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Fundamental Measurements	FCC 15.239(b)	Pass	47.4dBuV/m @ 107.9 MHz (-0.6dB)
2	RE, 30 - 1000 MHz	FCC 15.239	Pass	34.02dBuV/m @ 294.3MHz (-12.0dB)

### Modifications Made During Testing

No modifications were made to the EUT during testing

### Deviations From The Standard

No deviations were made from the requirements of the standard.

Frequency Range	Test Distance	Limit Distance	Extrapolation Factor
30 - 1000 MHz	3	3	0.0



## EMC Test Data

Client:	J-Link Co	Job Number:	J71744
Model:	RoadTrip	T-Log Number:	T71748
Contact:	Jeff Altheide	Account Manager:	Sheareen
Standard:	FCC Part 15.239	Class:	N/A

### Run #1a: Fundamental Radiated Emissions.

EUT Configuration: EUT (Elliott Asst # 2008-1880 RoadTrip Unit )  
iPod was playing a Song with Volume set to high

Frequency	Level	Pol	FCC 15.239(b)		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	

#### EUT Flat

88.100	45.4	V	48.0	-2.6	AVG	24	1.0	Setting 8
88.100	31.9	H	48.0	-16.1	AVG	297	1.0	Setting 8
98.100	46.6	V	48.0	-1.4	AVG	3	1.0	Setting 0
98.100	27.1	H	48.0	-20.9	AVG	0	1.0	Setting 0
107.900	47.4	V	48.0	-0.6	AVG	133	1.0	Setting 10
107.900	37.2	H	48.0	-10.8	AVG	266	2.1	Setting 10

#### EUT Upright

88.100	45.7	V	48.0	-2.3	AVG	0	1.0	Setting 8
88.100	29.8	H	48.0	-18.2	AVG	289	1.0	Setting 8
98.100	47.6	V	48.0	-0.4	AVG	360	1.0	Setting 0
98.100	29.2	H	48.0	-18.8	AVG	93	1.0	Setting 0
107.900	44.1	V	48.0	-3.9	AVG	99	1.0	Setting 12
107.900	28.7	H	48.0	-19.3	AVG	301	1.0	Setting 12

#### EUT Side

88.100	47.2	V	48.0	-0.8	AVG	42	1.0	Setting 8
88.100	31.1	H	48.0	-16.9	AVG	274	1.0	Setting 8
98.100	47.1	V	48.0	-0.9	AVG	360	1.0	Setting 3
98.100	32.2	H	48.0	-15.8	AVG	360	1.0	Setting 3
107.900	47.4	V	48.0	-0.6	AVG	19	1.0	Setting 12
107.900	37.2	H	48.0	-10.8	AVG	0	2.9	Setting 12

### Summary of Worse Case for Fundamental Emissions

Frequency	Level	Pol	FCC 15.239(b)		Detector	Azimuth	Height	Comments
MHz	dB $\mu$ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	

#### EUT Side

88.100	47.2	V	48.0	-0.8	AVG	42	1.0	Setting 8
88.100	48.0	V	68.0	-20.0	PK	321	1.0	Setting 8
98.100	47.1	V	48.0	-0.9	AVG	360	1.0	Setting 3
107.900	47.4	V	48.0	-0.6	AVG	19	1.0	Setting 12
107.900	48.2	V	68.0	-19.8	PK	332	1.0	Setting 12

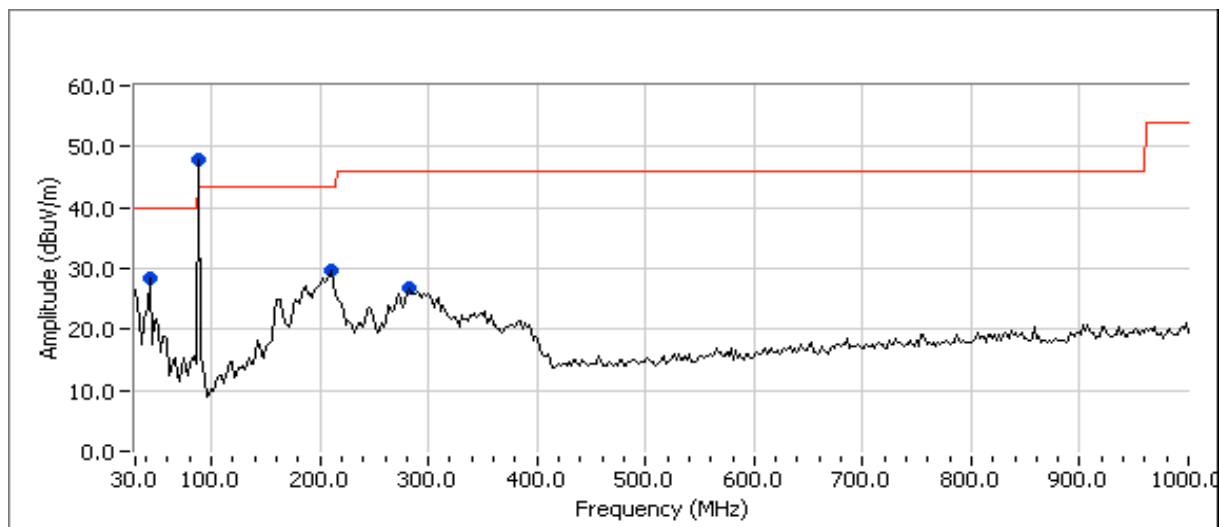
Client: J-Link Co	Job Number: J71744
Model: RoadTrip	T-Log Number: T71748
Contact: Jeff Altheide	Account Manager: Sheareen
Standard: FCC Part 15.239	Class: N/A

## Run #2a: Radiated Emissions, 30 - 1000 MHz, EUT Side

Low Channel at 88.1 MHz

EUT Configuration: EUT (Elliott Asst # 2008-1880 RoadTrip Unit )  
iPod was playing a Song with Volume set to high

EUT Setting 8



Frequency	Level	Pol	FCC 15.239		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
43.607	28.3	V	40.0	-11.7	Peak	48	1.0	
88.100	47.9	V	-	-	Peak	329	1.0	Fundamental
210.782	29.6	H	43.5	-13.9	Peak	289	1.5	
282.705	26.8	H	46.0	-19.2	Peak	284	1.0	

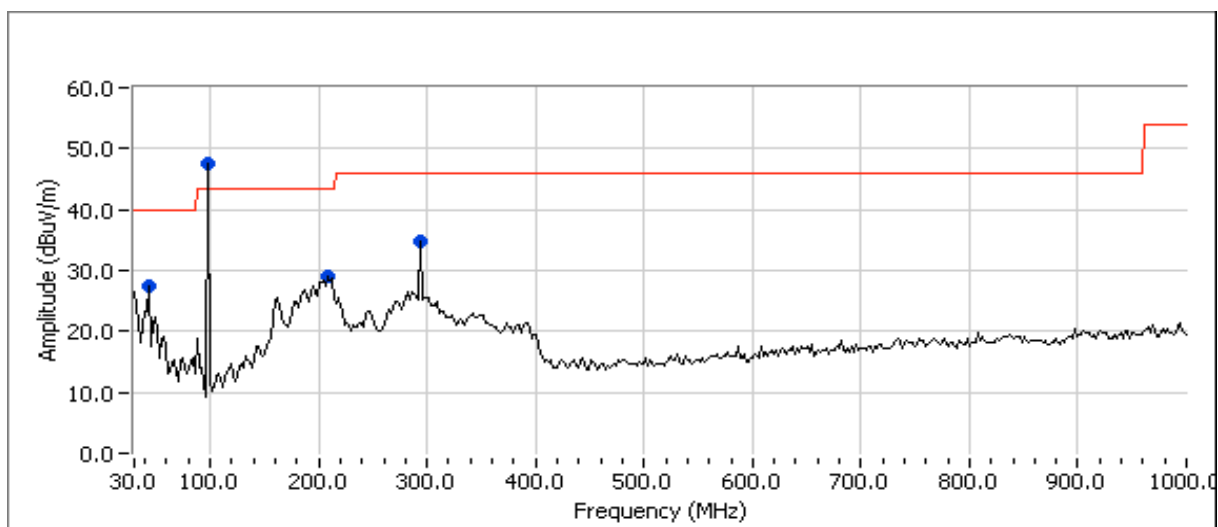
Client: J-Link Co	Job Number: J71744
Model: RoadTrip	T-Log Number: T71748
Contact: Jeff Altheide	Account Manager: Sheareen
Standard: FCC Part 15.239	Class: N/A

## Run #2b: Radiated Emissions, 30 - 1000 MHz, EUT Side

Middle Channel at 98.1 MHz

EUT Configuration: EUT (Elliott Asst # 2008-1880 RoadTrip Unit )  
iPod was playing a Song with Volume set to high

EUT Setting 3



Frequency	Level	Pol	FCC 15.239		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
43.607	27.6	V	40.0	-12.4	Peak	125	1.0	
98.100	47.4	V	-	-	Peak	5	1.0	Fundamental
208.838	29.2	H	43.5	-14.3	Peak	288	1.0	
294.301	34.0	H	46.0	-12.0	QP	91	1.0	

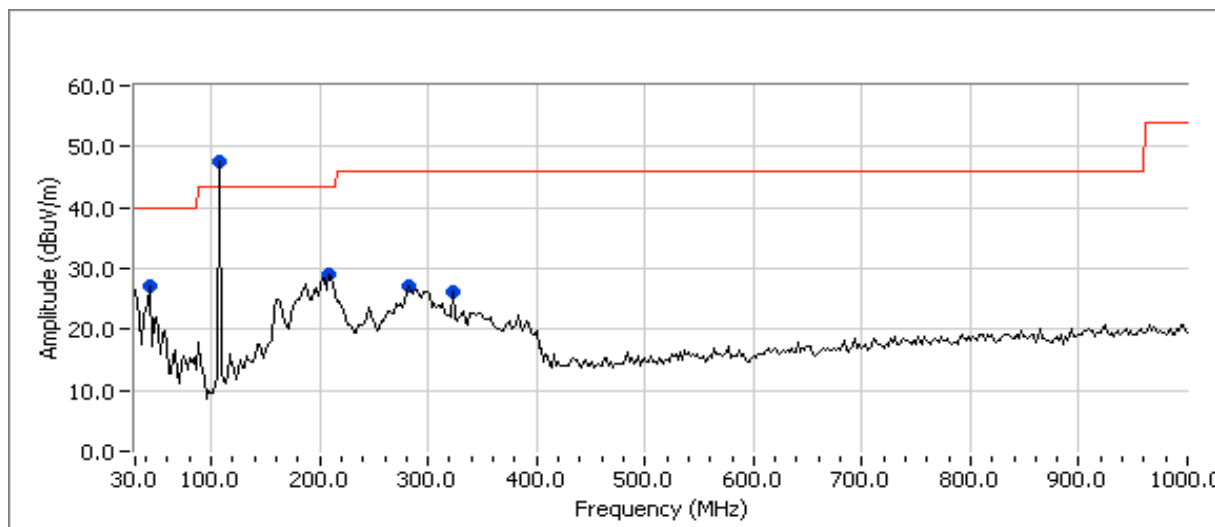
Client: J-Link Co	Job Number: J71744
Model: RoadTrip	T-Log Number: T71748
Contact: Jeff Altheide	Account Manager: Sheareen
Standard: FCC Part 15.239	Class: N/A

## Run #2c: Radiated Emissions, 30 - 1000 MHz, EUT Side

High Channel at 107.9 MHz

EUT Configuration: EUT (Elliott Asst # 2008-1880 RoadTrip Unit )  
iPod was playing a Song with Volume set to high

EUT Setting 12



Frequency	Level	Pol	FCC 15.239		Detector	Azimuth	Height	Comments
MHz	dBuV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
43.607	27.1	V	40.0	-12.9	Peak	306	1.0	
107.900	47.7	V	-	-	Peak	333	1.0	Fundamental
208.838	28.9	H	43.5	-14.6	Peak	284	1.5	
282.705	27.1	H	46.0	-18.9	Peak	293	1.0	
323.527	26.1	H	46.0	-19.9	Peak	269	1.0	



## EMC Test Data

Client:	J-Link Co	Job Number:	J71744
Model:	RoadTrip	T-Log Number:	T71748
Contact:	Jeff Altheide	Account Manager:	Sheareen
Standard:	FCC Part 15.239	Class:	N/A

### Radiated Emissions

*(Elliott Laboratories Fremont Facility, Semi-Anechoic Chamber)*

#### Test standard(s)ifics

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT with respect to the specification listed above.

Date of Test: 7/31/2008  
Test Engineer: Rafael Varelas  
Test Location: Fremont Chamber #5

Config. Used: 1  
Config Change: None  
EUT Voltage: 12Vdc

#### General Test Configuration

The EUT and any local support equipment were located on the turntable for radiated emissions testing.

The test distance and extrapolation factor (if applicable) are detailed under each run description.

Note, **preliminary** testing indicates that the emissions were maximized by orientation of the EUT and elevation of the measurement antenna. **Maximized** testing indicated that the emissions were maximized by orientation of the EUT, elevation of the measurement antenna, and manipulation of the EUT's interface cables.

**Ambient Conditions:**  
Temperature: 20.1 °C  
Rel. Humidity: 40 %

#### Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	20dB Bandwidth	FCC 15.239	Pass	186 kHz

#### Modifications Made During Testing

No modifications were made to the EUT during testing

#### Deviations From The Standard

No deviations were made from the requirements of the standard.

Client: J-Link Co	Job Number: J71744
Model: RoadTrip	T-Log Number: T71748
Contact: Jeff Altheide	Account Manager: Sheareen
Standard: FCC Part 15.239	Class: N/A

## Run #1: Bandwidth Measurements



### Analyzer Settings

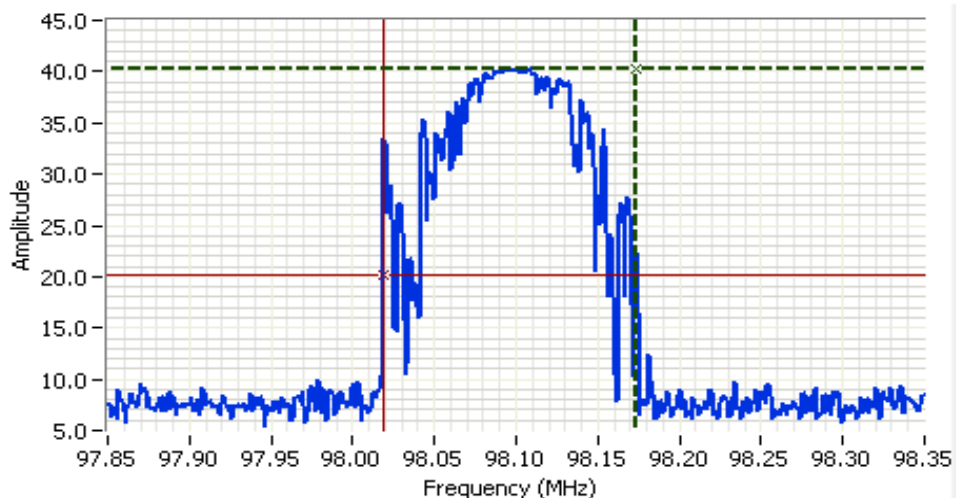
Rohde&Schwarz, ESI 7  
 CF: 88.100 MHz  
 SPAN: 500 kHz  
 RB 10.00 kHz  
 VB 30.0 kHz  
 Detector POS  
 Att 10  
 RL Offset 0.00  
 Sweep Time 15.0ms  
 Ref Lvl: 69.00DBUV

### Comments

20dB BW: 186 kHz  
 88.1 MHz

Cursor 1 88.1636 42.22  
 Cursor 2 87.9773 22.22

Delta Freq. 186 kHz  
 Delta Amplitude 20.00



### Analyzer Settings

Rohde&Schwarz, ESI 7  
 CF: 98.100 MHz  
 SPAN: 500 kHz  
 RB 10.00 kHz  
 VB 30.0 kHz  
 Detector POS  
 Att 10  
 RL Offset 0.00  
 Sweep Time 15.0ms  
 Ref Lvl: 69.00DBUV

### Comments

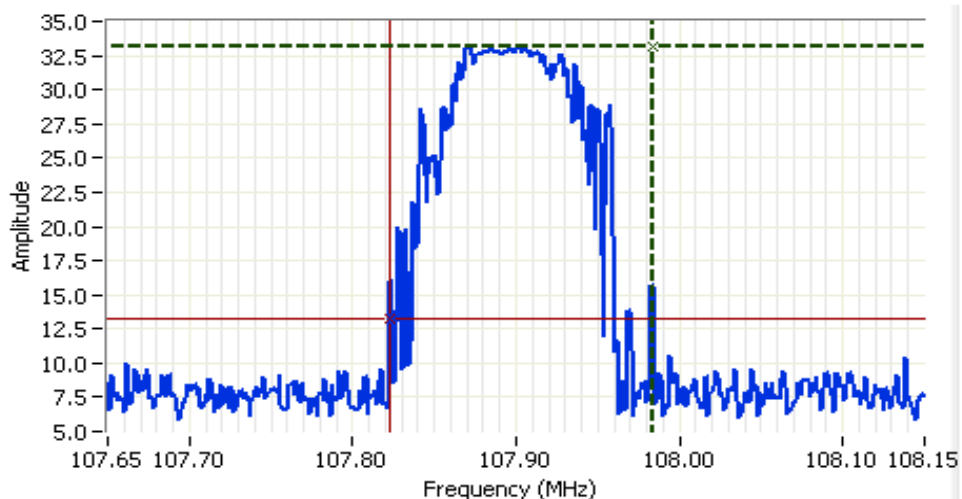
20dB BW: 155 kHz  
 98.1 MHz

Cursor 1 98.1736 40.26  
 Cursor 2 98.0183 20.26

Delta Freq. 155 kHz  
 Delta Amplitude 20.00



Client: J-Link Co	Job Number: J71744
Model: RoadTrip	T-Log Number: T71748
Contact: Jeff Altheide	Account Manager: Sheareen
Standard: FCC Part 15.239	Class: N/A



**Analyzer Settings**  
 Rohde&Schwarz, ESI 7  
 CF: 107.900 MHz  
 SPAN: 500 kHz  
 RB 10.00 kHz  
 VB 30.0 kHz  
 Detector POS  
 Att 10  
 RL Offset 0.00  
 Sweep Time 15.0ms  
 Ref Lvl: 69.00 DBUV

**Comments**  
 20dB BW: 161 kHz  
 107.9 MHz

Cursor 1 107.9837 33.20  
 Cursor 2 107.8223 13.20

Delta Freq. 161 kHz  
 Delta Amplitude 20.00



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***EXHIBIT 3: Photographs of Test Configurations***

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***EXHIBIT 4: Proposed FCC ID Label & Label Location***

*EXHIBIT 5: Detailed Photographs  
of J-Link Model RoadTrip (P1067) Construction*

*EXHIBIT 6: Operator's Manual  
for J-Link Model RoadTrip (P1067)*

*EXHIBIT 7: Block Diagram  
of J-Link Model RoadTrip (P1067)*

***EXHIBIT 8: Schematic Diagrams  
for J-Link Model RoadTrip (P1067)***

*EXHIBIT 9: Theory of Operation  
for J-Link Model RoadTrip (P1067)*