TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test Of: Ash Communications Ltd.
Radiolite RS001-A1

To: FCC Part 15 Subpart C: 2002
(Intentional Radiators)
Sections 15.109 and 15.209(a)

Test Report Serial No:
RFI/MPTB1/RP45129JD02A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	**Checked By:** 
Tested By: pp 	**Release Version No: PDF01**
Issue Date: 29 July 2003	**Test Dates: 17 July 2003**

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The results in this report apply only to the sample(s) tested.

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Radiolite RS001-A1
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators)
Sections 15.109 and 15.209(a)

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1. Client Information

Company Name:	Ash Communications Ltd
Address:	5 Shaftesbury Avenue Highfield Southampton Hampshire SO17 1SB United Kingdom
Contact Name:	Mr Steve Braithwaite

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Radiolite
Model Name or Number:	RS001-A1
Serial Number:	Tx Sample: CKE010 Rx Sample: CKE040
Country of Manufacture:	UK
Date of Receipt:	11 July 2003
FCC ID:	Q52-13EAQ52

2.2. Description Of EUT

The equipment under test is a Radiolite Emergency Lighting Transceiver Module.

2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Name and Number stated above.

2.4. Additional Information Related To Testing

Power Supply Requirement:	9 V DC Supply
Intended Operating Environment:	Inside a plastic enclosure in the passenger cabin of commercial aircraft
Equipment Category:	Short Range (Low Power)
Weight:	Less than 100g
Dimensions:	70 mm x 51 mm x 7 mm
Interface Ports:	Battery Connection LED light connection via 10-way FFC Incandescent lamp connection via 2-pole connector
Transmit Frequency Range	Fixed 315 MHz
Receive Frequency Range	Fixed 315 MHz
Occupied Bandwidth	10.2765 MHz
Highest Oscillator Frequency	304.3 MHz

2.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 15 Subpart C: 2002 (Sections 15.109 and 15.209(a)
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by a 9 V DC supply.

5.2. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

- Transmit Mode
- Receive Mode

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Standalone on a host test jig.

6. Summary Of Test Results

Range Of Measurements	Specification Reference	Port Type	Compliancy Status
Receiver Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.109	Antenna	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.209(a)	Antenna	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

7.2. Receiver Radiated Emissions: Section 15.109

7.2.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

7.2.1.1. The EUT was configured as for radiated emissions testing as described in Appendix 2 of this report.

7.2.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
150.506	Horiz.	29.8	43.5	13.7	Complied

7.3. Receiver Radiated Emissions: Section 15.109

7.3.1. Electric Field Strength Measurements (Frequency Range: 1.0 to 2.0 GHz)

7.3.1.1. The EUT was configured as for radiated emissions testing as described in Appendix 2 of this report.

7.3.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

7.3.1.3. No emissions were detected above the noise floor of the test receiver.

7.4. Transmitter Radiated Emissions: Section 15.209(a)

7.4.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

7.4.1.1. The EUT was configured as for radiated emissions testing as described in Appendix 2 of this report.

7.4.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

Results:

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
316.296	Horiz.	44.8	46.0	1.2	Complied

7.5. Transmitter Radiated Emissions

7.5.1. Electric Field Strength Measurements (Frequency Range: 1.0 to 3.2 GHz)

7.5.1.1. The EUT was configured as for transmitter radiated emissions testing as described in Appendix 2 of this report.

7.5.1.2. Tests were performed to identify the maximum transmitter radiated spurious emission levels.

7.5.1.3. No emissions were detected above the noise floor of the test receiver.

8. Measurement Uncertainty

8.1. No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

8.2. The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

8.3. The uncertainty of the result may need to be taken into account when interpreting the measurement results.

8.4. The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	**Range**	**Confidence Level (%)**	**Calculated Uncertainty**
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 GHz	95%	+/- 1.78 dB

8.5. The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A031	2 to 4 GHz Eaton Horn Antenna	Eaton	91889-2	557
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A490	Bilog Antenna	Chase	CBL6111A	1590
M023	ESVP Receiver	Rohde & Schwarz	ESVP	872 991/027
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
S001	DC Supply	GW	GPQ-2030	7112644

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Measurement Methods

Radiated Field Strength Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which the EUT should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20dB of the limit, in these cases the highest point of the noise floor was measured.

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average and Peak detector for measurements above 1000 MHz.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limit as stated in 15.33(a)(1)

Radiated Field Strength Emissions (Continued)

Final measurements were performed on the worst-case configuration as described in Part 15.31(i).

The EUT was configured in accordance with section 5.2 of this report for radiated emissions testing.

The test equipment settings for radiated emissions measurements were as follows:

Receiver Function	**Initial Scan Below 1000 MHz**	**Final Measurements Below 1000 MHz**
Detector Type:	Peak	Quasi-Peak (CISPR)
Mode:	Max Hold	Not applicable
Bandwidth:	100 kHz	120 kHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Receiver Function	**Initial Scan Above 1000 MHz**	**Final Measurements Above 1000 MHz**
Detector Type:	Peak	Peak/Average
Mode:	Max Hold	Max Hold where applicable
Bandwidth:	1 MHz	1 MHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\45129JD02\EMIRAD	Test configuration for measurement of radiated emissions

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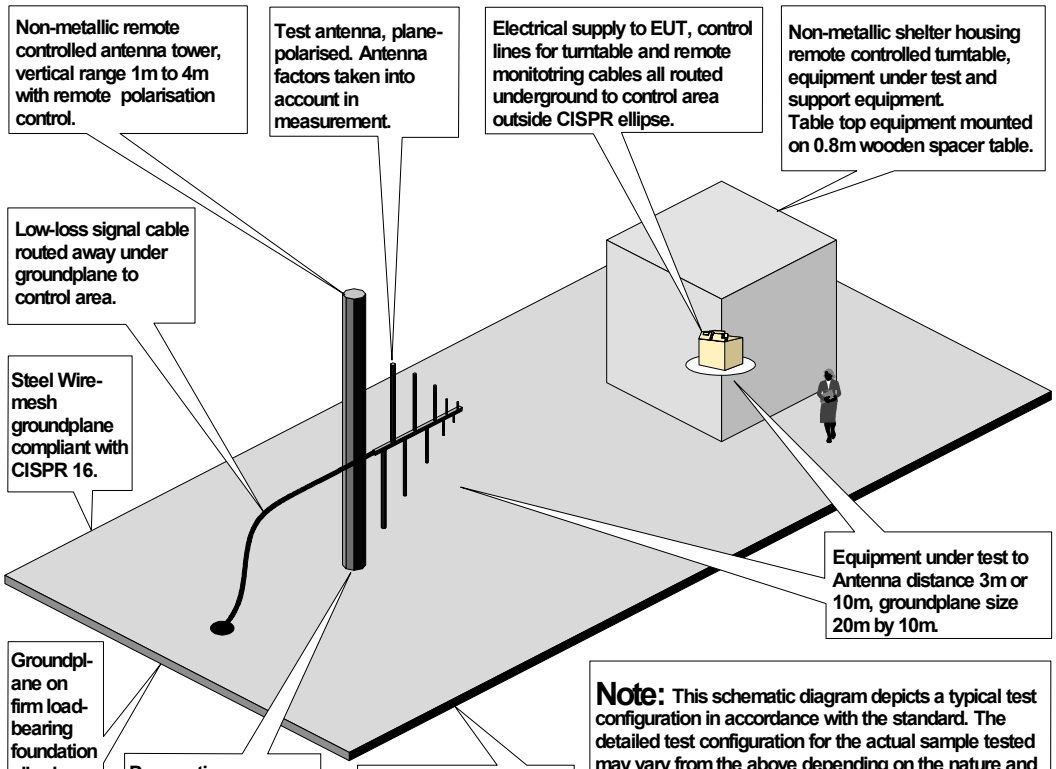
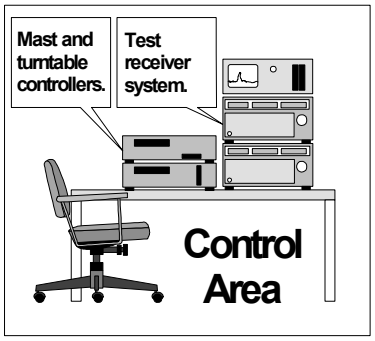
DRG\45129JD02\EMIRAD



Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m
(CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse



Appendix 4. Graphical Test Results

This appendix contains the following graphs:

Graph Reference Number	Title
GPH\45129JD02\001	Transmitter Radiated Spurious Emissions. Transmit Mode (2.0 to 3.2 GHz)
GPH\45129JD02\002	Transmitter Radiated Spurious Emissions. Transmit Mode (2.0 to 3.2 GHz)
GPH\45129JD02\003	Transmitter Radiated Spurious Emissions. Transmit Mode (1.0 to 2.0 GHz)
GPH\45129JD02\004	Transmitter Radiated Spurious Emissions. Receive Mode (1.0 to 2.0 GHz)
GPH\45129JD02\005	Radiated Emissions. PreScan @ 3m. Receive Mode (30 MHz to 1.0 GHz)
GPH\45129JD02\006	Radiated Emissions. PreScan @ 3m. Transmit Mode (30 MHz to 1.0 GHz)

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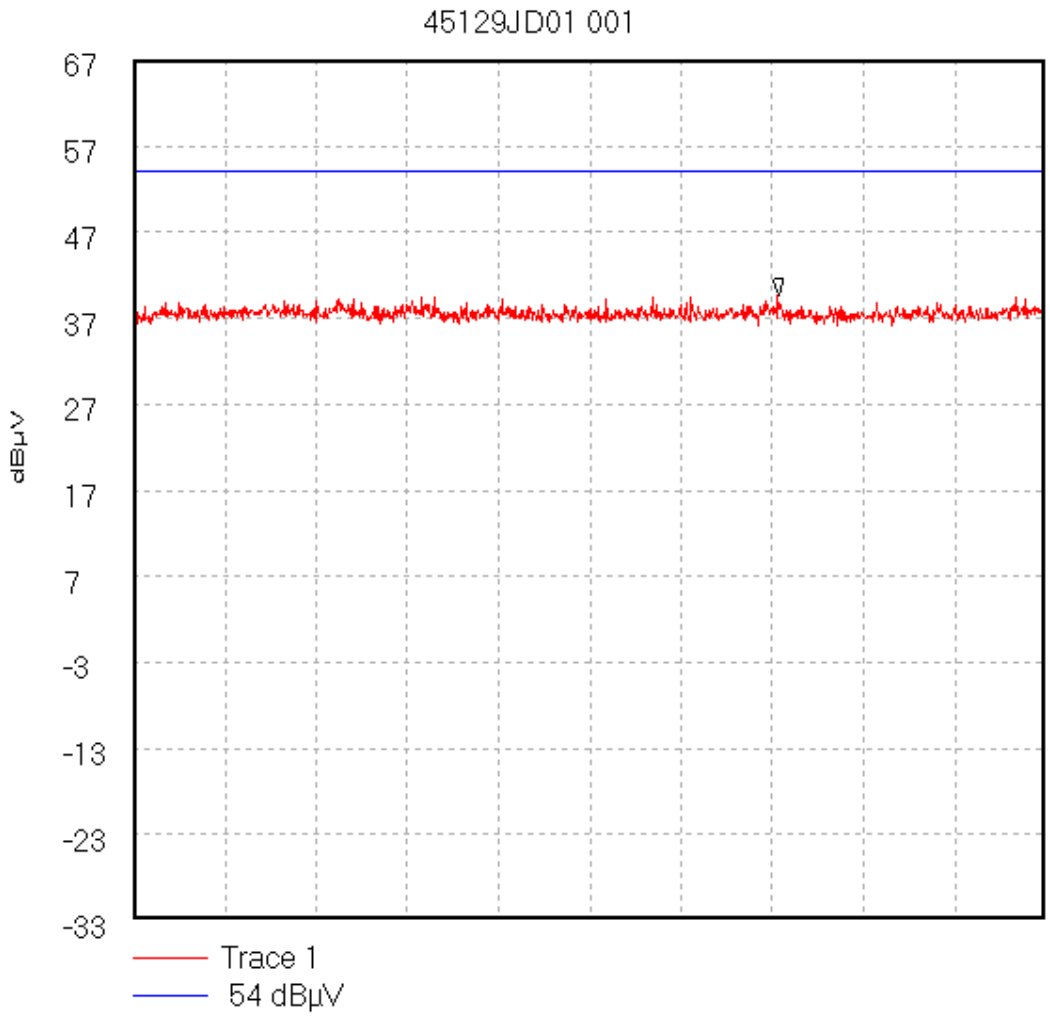
GPH\ 45129JD01\001
Transmitter Radiated Spurious Emissions.
TX Mode



Start 2.0 GHz; Stop 3.2 GHz
Ref 67 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.848 GHz, 39.66 dBµV
Display Line: 54 dBµV;
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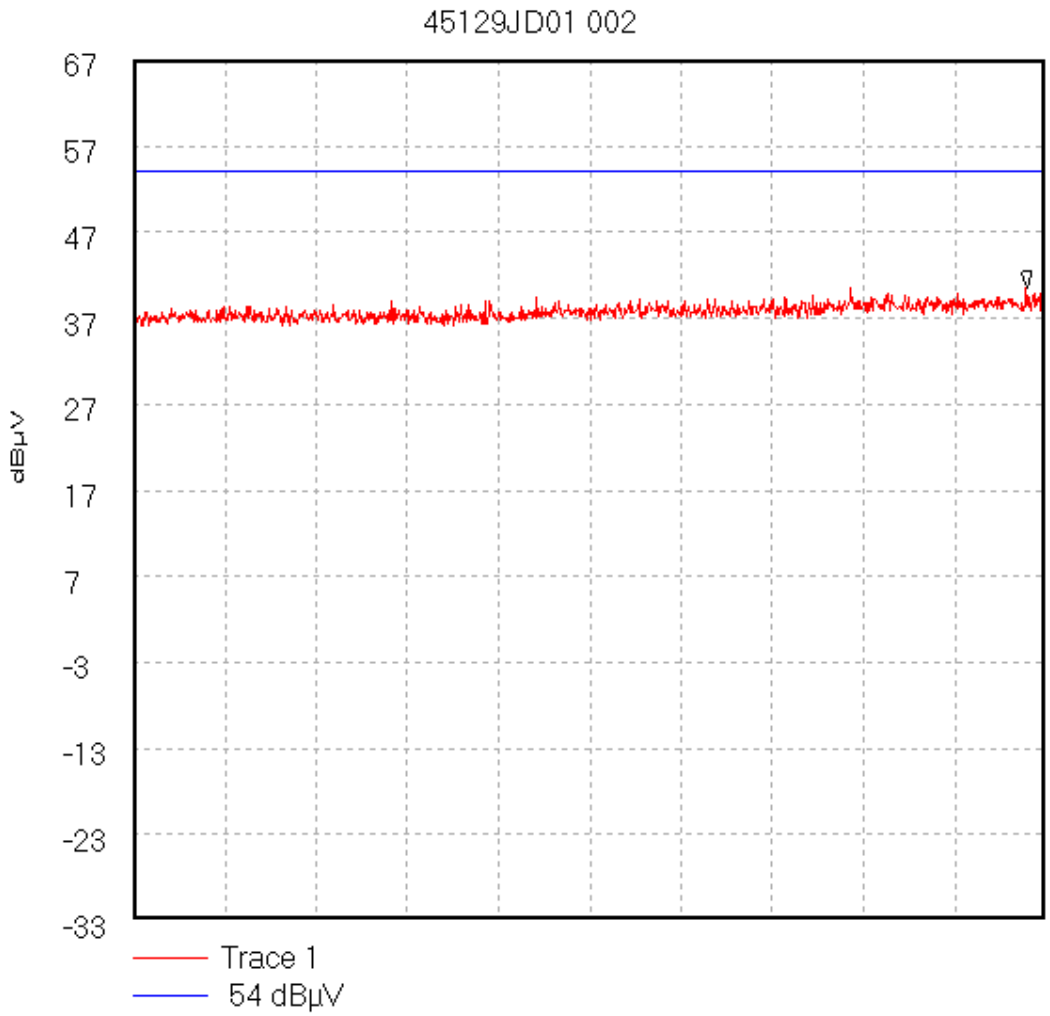
GPH\ 45129JD01\002
Transmitter Radiated Spurious Emissions.
TX Mode



Start 1.0 GHz; Stop 2.0 GHz
Ref 67 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.979 GHz, 40.57 dBµV
Display Line: 54 dBµV;
7/17/2003 2:35:18 PM

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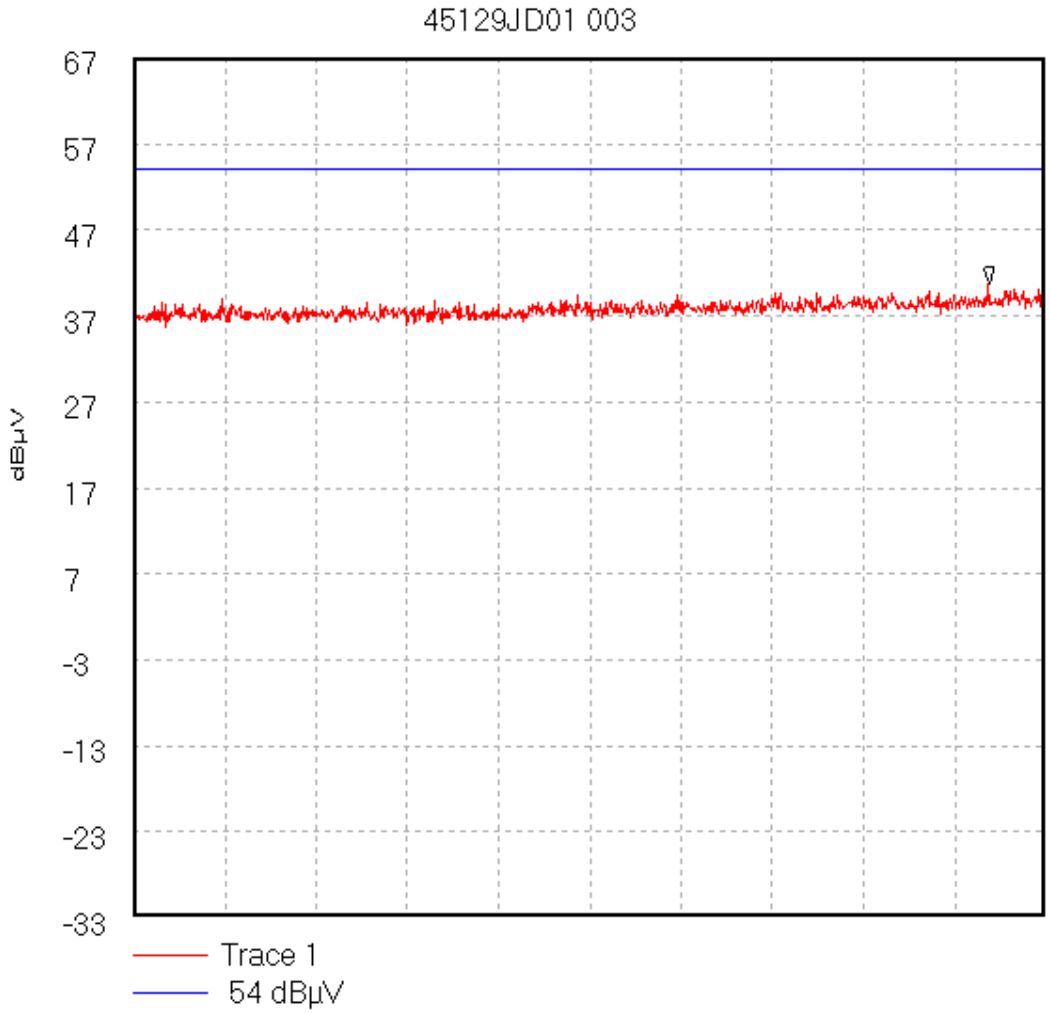
GPH\ 45129JD01\003
Transmitter Radiated Spurious Emissions.
RX Mode



Start 1.0 GHz; Stop 2.0 GHz
Ref 67 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.938 GHz, 40.67 dBµV
Display Line: 54 dBµV;
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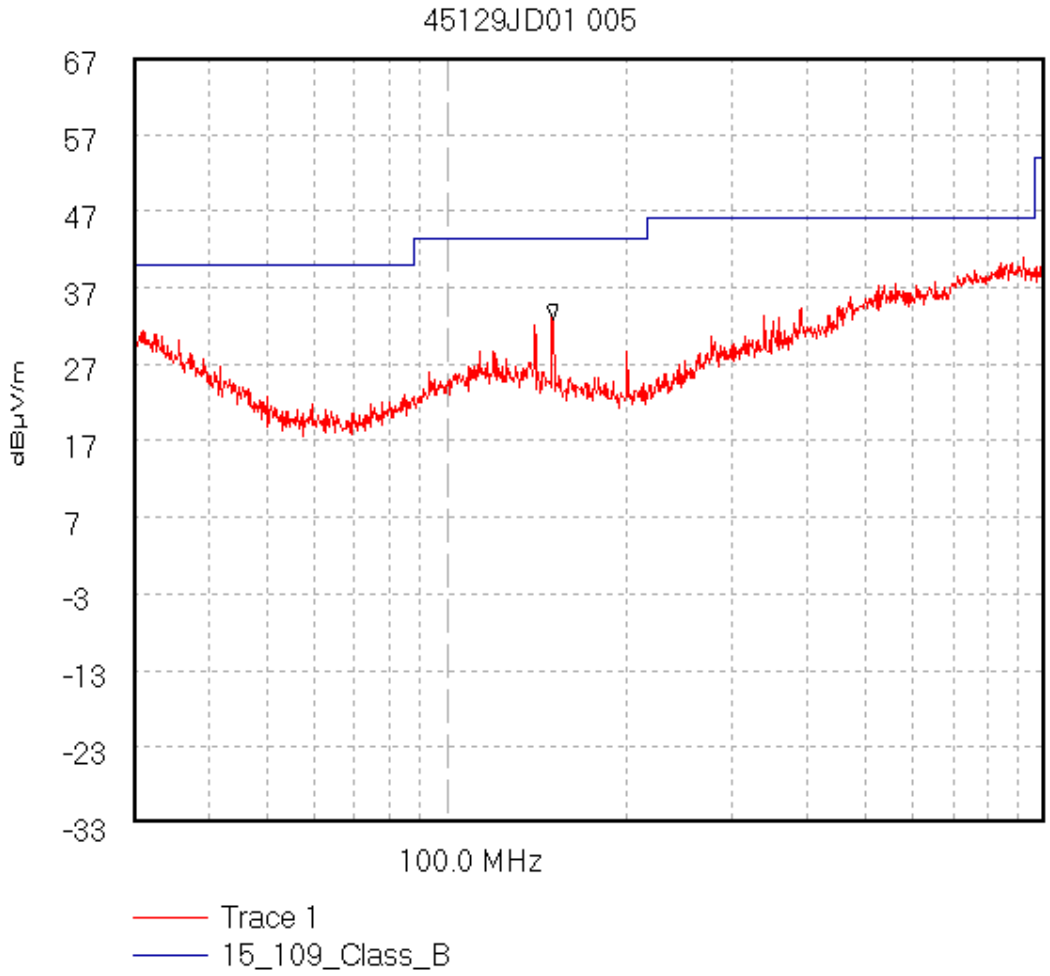
GPH\ 45129JD01\005
Radiated Emissions. FCC Part 15.109 Class B. PreScan @ 3m.
RX Mode



Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 67 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 380.0 mS
Marker 150.538 MHz, 32.9 dBµV/m
Limit/Mask: 15_109_Class_B; ; Limit Test Passed
Transducer Factors: A1037
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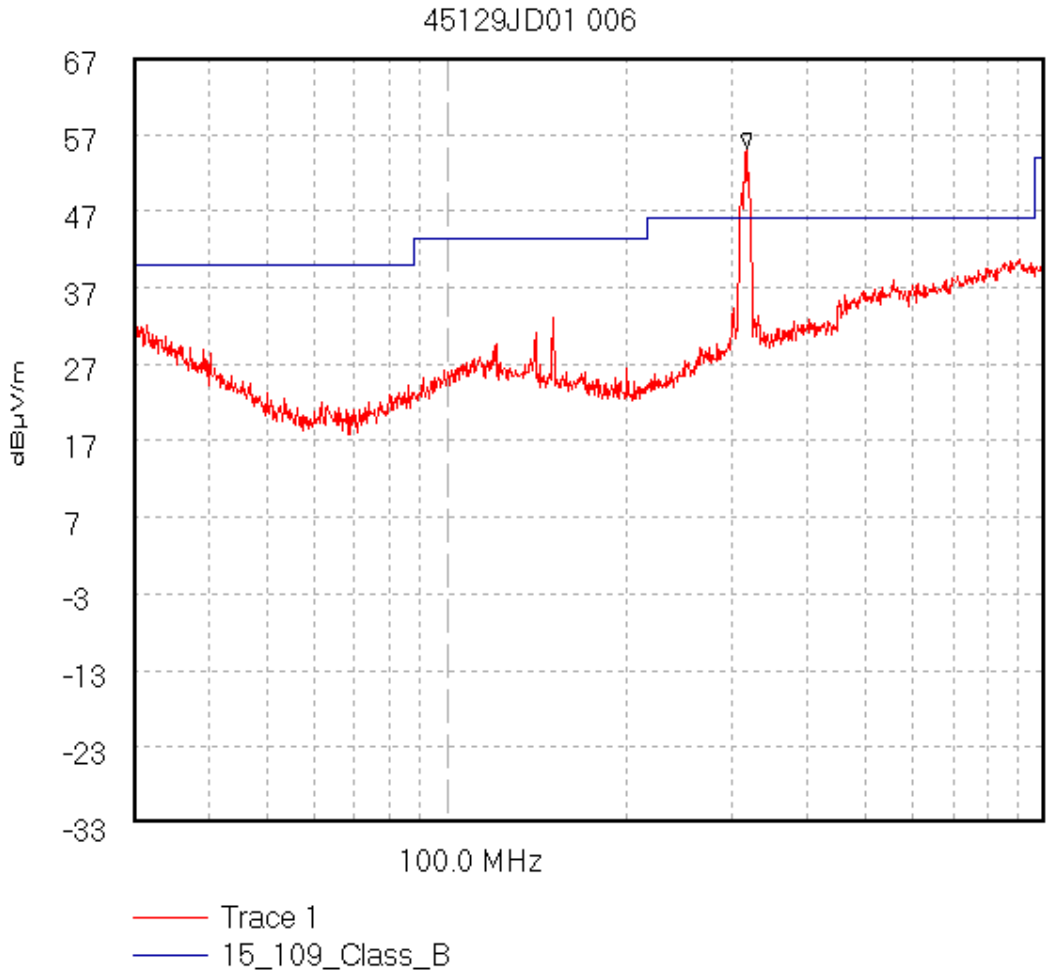
GPH\ 45129JD01\006
Radiated Emissions. FCC Part 15.109 Class B. PreScan @ 3m.
TX Mode



Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 67 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 120.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 380.0 mS
Peak 316.836 MHz, 55.17 dBµV/m
Limit/Mask: 15_109_Class_B; ; Limit Test Failed
Transducer Factors: A1037
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