Washington Laboratories, Ltd.

FCC Test Report
For the
Eastman Kodak Company
L153 Groucho Media Player

FCC ID: PA408002

WLL JOB# **10512-03**
August 12, 2008

Prepared for:

Eastman Kodak Company
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Rochester, NY 14653

Prepared By:

Washington Laboratories, Ltd.
7560 Lindbergh Drive
Gaithersburg, Maryland 20879

ACCREDITED
Testing Certificate 2675.01

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Prepared by:

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Abstract

This report has been prepared on behalf of Eastman Kodak Company, Inc. to support the attached Application for Equipment Authorization. The test report and application are submitted for a 2.4GHz Transmitter under Part 15.249 (9/2007) of the FCC Rules. This Certification Test Report documents the test configuration and test results for a Eastman Kodak Company, Inc. Media Player.

Testing was performed on an Open Area Test Site (OATS) of Washington Laboratories, Ltd, 7560 Lindbergh Drive, Gaithersburg, MD 20879. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 as an independent FCC test laboratory.

The Eastman Kodak Company, Inc. Media Player complies with the limits for a 2.4 GHz transmitter under Part 15.249.

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1 Introduction

Compliance Statement

The Eastman Kodak Company, Inc. Media Player complies with the limits for a 2.4 GHz transmitter under Part 15.249.

Test Scope

Tests for radiated and conducted (at antenna terminal) emissions were performed. All measurements were performed in accordance CFR47 Part 2 and CFR 47 Part 15. The measurement equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Contract Information

Customer:	Eastman Kodak Company, Inc. 343 State St Rochester, NY 14660-0124
Purchase Order Number:	2008-07-090
Quotation Number:	64374A

Test Dates

Testing was performed on the following date(s):	July 16 – July 22, 2008

Test and Support Personnel

Washington Laboratories, LTD	Steve Dovell
Client Representative	Roy Illingworth

Abbreviations

A	**A**mpere
ac	**a**lternating **c**urrent
AM	Amplitude Modulation
Amps	**Amp**ere**s**
b/s	**b**its per **s**econd
BW	**B**and**w**idth
CE	**C**onducted **E**mission
cm	**C**enti**m**eter
CW	**C**ontinuous **W**ave
dB	**decibel**
dc	**d**irect **c**urrent
EMI	**E**lectro**m**agnetic **I**nterference
EUT	**E**quipment **U**nder **T**est
FM	**F**requency **M**odulation
G	**g**iga - prefix for 10^9 multiplier
Hz	**H**ertz
IF	**I**ntermediate **F**requency
k	**k**ilo - prefix for 10^3 multiplier
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
M	**M**ega - prefix for 10^6 multiplier
m	**M**eter
µ	**m**icro - prefix for 10^{-6} multiplier
NB	**N**arrow**b**and
QP	**Q**uasi-**P**eak
RE	**R**adiated **E**missions
RF	**R**adio **F**requency
rms	**r**oot-**m**ean-**s**quare
SN	**S**erial **N**umber
S/A	**S**pectrum **A**nalyzer
V	**V**olt

2 Equipment Under Test

EUT Identification & Description

The Eastman Kodak Company L153 Media Player is a device which allows a user to interface various media devices, such as a PC, USB stick, memory cards, etc to a HDTV. The PC can be connected via either a wired or wireless LAN connection. Control is via a handheld RF Remote pointing device. The device contains two radios. An 802.11 b/g/n Wireless LAN is used to transfer data and a 2.4HGz Direct Sequence Spread Spectrum Transmitter is used to communicate with the handheld remote.

Table 1. 2.4 GHz Transmitter

ITEM	DESCRIPTION
Manufacturer:	Eastman Kodak Company, Inc.
FCC ID:	PA408002
Model:	Media Player
FCC Rule Parts:	§15.249
Frequency Range:	2401MHz-2482MHz
Maximum Output Power:	Channel 82 – 1334.1uV/m
Modulation:	Minimum-shift keying (MSK)
Occupied Bandwidth:	907kHz
Keying:	Automatic, Manual
Type of Information:	Data
Number of Channels:	82
Power Output Level	Fixed
Antenna Connector	none
Antenna Type	PCB trace
Interface Cables:	none
Power Source & Voltage:	120VAC -12VDC external power supply

Test Configuration

The Media Player was configured with internal antennas and operated from 120VAC – 12VDC external power supply.

Testing Algorithm

The Media Player was programmed for DTS operation via control software.

Worst case emission levels are provided in the test results data.

Test Location

All measurements herein were performed at Washington Laboratories, Ltd. test center in Gaithersburg, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch at the FCC laboratory in Columbia, MD. The Industry Canada OATS numbers are 3035A-1 and 3035A-2 for Washington Laboratories, Ltd. Site 1 and Site 2, respectively. Washington Laboratories, Ltd. has been accepted by the FCC and approved by the American Association for Laboratory Accreditation (A2LA) under Certificate 2675.01 as an independent FCC test laboratory.

Measurements

2.1.1 References

CFR 47 Part 2 Frequency Allocations and Radio Treaty Matters, General Rules and Regulations.

CFR 47 Part 15 Radio Frequency Devices

ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation

ANSI C63.4 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

Measurement Uncertainty

All results reported herein relate only to the equipment tested. The basis for uncertainty calculation uses ANSI/NCSL Z540-2-1997 with a type B evaluation of the standard uncertainty. Elements contributing to the standard uncertainty are combined using the method described in Equation 1 to arrive at the total standard uncertainty. The standard uncertainty is multiplied by the coverage factor to determine the expanded uncertainty which is generally accepted for use in commercial, industrial, and regulatory applications and when health and safety are concerned (see Equation1 and Equation 2). A coverage factor was selected to yield a 95% confidence in the uncertainty estimation.

Equation 1: Standard Uncertainty

$$u_c = \pm\sqrt{\frac{a^2}{div_a{}^2} + \frac{b^2}{div_b{}^2} + \frac{c^2}{div_c{}^2} + \ldots\ldots}$$

where u_c = standard uncertainty

a, b, c,.. = individual uncertainty elements

$div_{a,\,b,\,c}$ = the individual uncertainty element divisor based on the probability distribution

divisor = 1.732 for rectangular distribution

divisor = 2 for normal distribution

divisor = 1.414 for trapezoid distribution

Equation 2: Expanded Uncertainty

$$U = ku_c$$

where U = expanded uncertainty

k = coverage factor

$k \leq 2$ for 95% coverage (ANSI/NCSL Z540-2 Annex G)

u_c = standard uncertainty

The measurement uncertainty complies with the maximum allowed uncertainty from CISPR 16-4-2. Measurement uncertainty is not used to adjust the measurements to determine compliance. The expanded uncertainty values for the various scopes in the WLL accreditation are provided in Table 2 below.

Table 2: Expanded Uncertainty List

Scope	Standard(s)	Expanded Uncertainty
Conducted Emissions	CISPR11, CISPR22, CISPR14, FCC Part 15	2.63 dB
Radiated Emissions	CISPR11, CISPR22, CISPR14, FCC Part 15	4.55 dB

Test Equipment

Table 3 shows a list of the test equipment used for measurements along with the calibration information.

Table 3: Test Equipment List

Test Name:	Conducted Emissions Voltage	Test Date:	7/17/08
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00124	Solar, 8012-50-R-24-BNC	LISN	09/28/2008
00069	HP, 85650A	Adapter, QP	07/09/2009
00069	HP, 85650A	Adapter, QP	07/09/2009
00073	HP, 8568B	Analyzer, Spectrum	07/08/2009
Test Name:	**Radiated Emissions**	**Test Date:**	**7/16/08**
ASSET #	**Manufacturer/Model**	**Description**	**Cal. Due**
00644	Sunol Science JB1	BiConalog Antenna	11/27/2009
00069	HP, 85650A	Adapter, QP	07/09/2009
00071	HP, 85685A	Preselector, RF	07/09/2009
00073	HP, 8568B	Analyzer, Spectrum	07/08/2009
00667	MegaPhase, LLC EM18-S1NK5-600	Test cable DC to 18 GHz SMA male	03/17/2009
00004	ARA, DRG-118/A	Antenna, DRG, 1-18GHz	02/02/2009
00066	HP, 8449B	Pre-Amplifier, RF. 1-26.5GHz	07/15/2009
Test Name:	**Antenna Port Conducted Emissions**	Test Date:	**7/22/08**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00605	Agilent HP - N1911A	Power Meter	04/10/2009
00606	Agilent HP - N1921A	Power Sensor	04/11/2009
00528	Agilent, E4446A	Analyzer, Spectrum	02/15/2009

3 Test Results

Results Summary Part 15.249

TX Test Summary (Direct Sequence Spread Spectrum)			
FCC Rule Part	**Description**	**Limit**	**Result**
15.249 (a)(e)	Transmit Output Power	50mV/m	Pass
15.249 (a)	Harmonics	500uV/m	Pass
15.249 (d)	Radiated Spurious emissions	500uV/m	Pass
15.205 15.209	General Field Strength Limits (Restricted Bands & RE Limits)		Pass
15.207	AC Conducted Emissions		Pass
RX/Digital Test Summary (Direct Sequence Spread Spectrum)			
FCC Rule Part	**Description**		**Result**
15.207	AC Conducted Emissions		Pass
15.209	General Field Strength Limits (Restricted Bands & RE Limits)		Pass

Output Power Part 15.249 (a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
2400 - 2483.5 MHz	50	500

3.1.1 Test Procedure

The EUT was placed on motorized turntable for radiated testing on a 3-meter open field test site for testing above 1GHz. The emissions from the EUT were measured continuously at every azimuth by rotating the turntable. Receiving antennas were mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna was varied between 1 and 4 meters. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Cables were varied in position to produce maximum emissions. Both the horizontal and vertical field components were measured.

The Duty Cycle of the transmitter was measured and applied to the peak measurement to obtain the Average measurement.

3.1.2 Test Results

In accordance with the FCC 15.35 the spurious radiated emissions measurements may be adjusted if using a duty cycle correction factor if the dwell time per channel of the hopping signal is less than 100 ms.

The duty cycle correction factor is calculated by:

20 x LOG (dwell time/100 ms)

The following dwell times was calculated from data shown in Figure 1 and Figure 2.

Each pulse is 878µs wide, reference Figure 1

There are 4 Pulses / 100ms, reference Figure 2

This results in a total a dwell time of (4 * 878 µs) = 3.51ms

The Correction factor = 20 * LOG (3.5ms/100ms) => 29.1dB

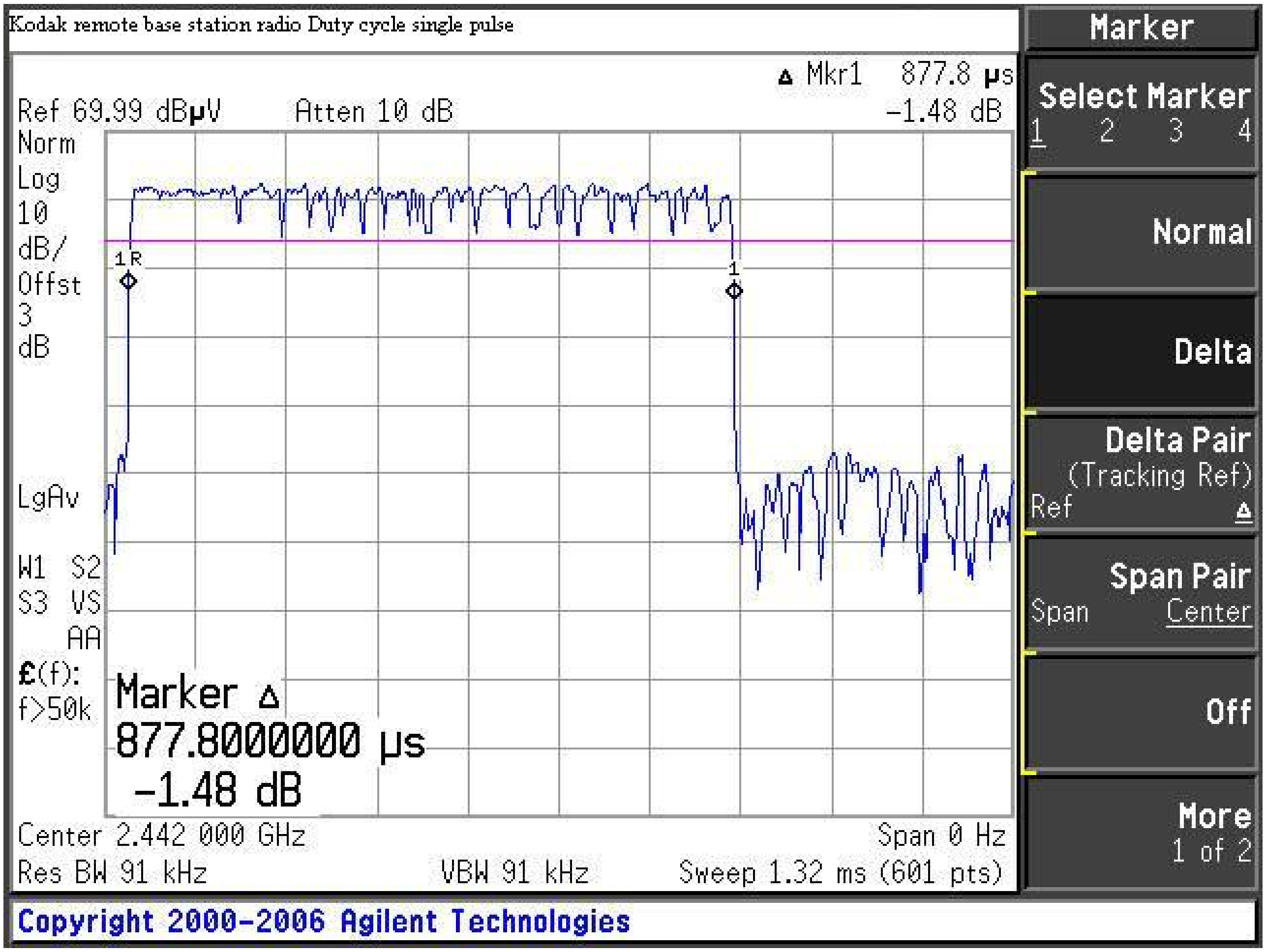

Figure 1: Duty Cycle Individual Pulse

Average correction factors given in the operational description state they are a probabilistic approach. The FCC expects worse case information provided in the theory and then the test data would be less then or equal to this information. However theory is based on long term probability and not actual worse case as the FCC desires. It would appear that with using weighting factors only and not a table that has to utilize all frequencies – that in theory the same channel can possible be used 100% or 50% (if a different channel has to be chosen next). Therefore the measured duty cycle is not the worst possible case as described in the theory of operation. To account for the worst possible case, the calculated values are used as the duty cycle correction factor and not the measured values.

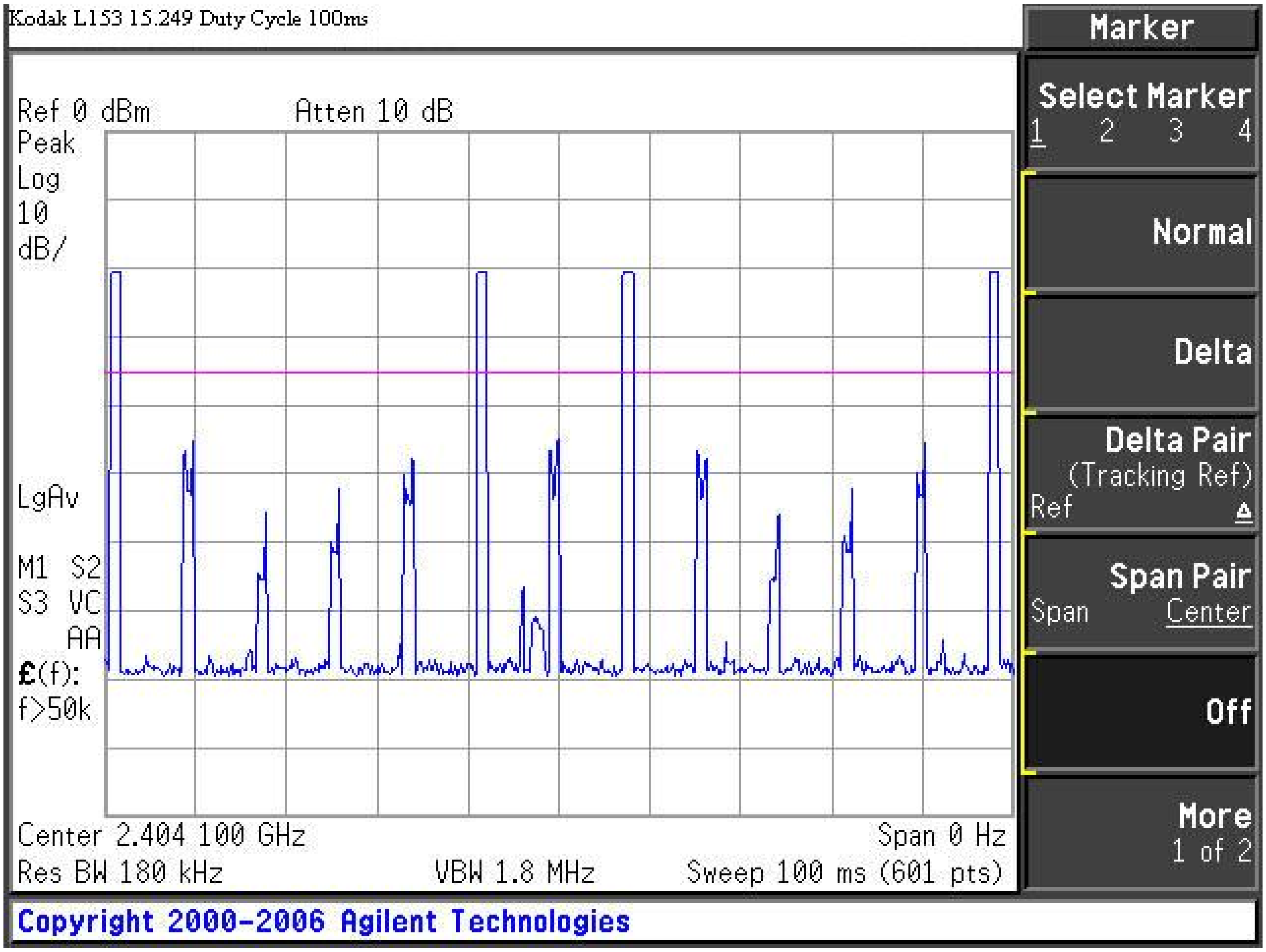

Figure 2: Duty Cycle (100ms)

Table 4: Radiated Power of Fundamental Frequencies

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Duty Cycle Corr	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)
Power											
2401.000	V	15.0	2.4	57.1	30.1	1.4	24.4	64.2	1620.5	50000.0	-29.8
2401.000	H	15.0	2.3	64.6	30.1	1.4	24.4	71.7	3825.2	50000.0	-22.3
2442.000	V	15.0	2.5	56.5	30.2	1.2	24.4	63.5	1496.2	50000.0	-30.5
2442.000	H	0.0	2.8	64.8	30.2	1.2	24.4	71.8	3890.4	50000.0	-22.2
2482.000	H	0.0	2.4	66.6	30.2	1.1	24.4	73.5	4737.1	50000.0	-20.5
2482.000	V	15.0	2.6	55.4	30.2	1.1	24.4	62.3	1304.7	50000.0	-31.7

3.1.3 Results

Table 5: Harmonic Emissions – Channel 1

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Duty Cycle Corr	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)	Notes
2401.000													
4802.000	V	125.0	2.6	60.5	33.1	5.0	35.7	0.0	62.9	1401.8	5000.0	-11.0	Peak
7203.000	V	180.0	2.6	44.5	37.3	6.5	35.6	0.0	52.7	433.9	5000.0	-21.2	Peak
9604.000	V	180.0	2.6	44.2	39.3	8.0	36.0	0.0	55.6	601.9	5000.0	-18.4	Peak
12005.000	V	180.0	2.6	43.3	42.4	8.7	35.8	0.0	58.6	849.9	5000.0	-15.4	Peak
14406.000	V	180.0	2.6	43.7	41.9	10.6	34.5	0.0	61.8	1229.2	5000.0	-12.2	Peak
16807.000	V	180.0	2.6	42.8	40.1	8.9	34.9	0.0	56.9	703.5	5000.0	-17.0	Peak
4802.000	V	125.0	2.6	60.5	33.1	5.0	35.7	24.4	38.5	84.5	500.0	-15.4	Avg
7203.000	V	180.0	2.6	44.5	37.3	6.5	35.6	24.4	28.3	26.1	500.0	-25.6	Avg
9604.000	V	180.0	2.6	44.2	39.3	8.0	36.0	24.4	31.2	36.3	500.0	-22.8	Avg
12005.000	V	180.0	2.6	43.3	42.4	8.7	35.8	24.4	34.2	51.2	500.0	-19.8	Avg
14406.000	V	180.0	2.6	43.7	41.9	10.6	34.5	24.4	37.4	74.1	500.0	-16.6	Avg
16807.000	V	180.0	2.6	42.8	40.1	8.9	34.9	24.4	32.5	42.4	500.0	-21.4	Avg
4802.000	H	270.0	2.4	55.1	33.1	5.0	35.7	0.0	57.5	752.8	5000.0	-16.4	Peak
7203.000	H	0.0	2.4	43.1	37.3	6.5	35.6	0.0	51.3	367.6	5000.0	-22.7	Peak
9604.000	H	0.0	2.4	44.0	39.3	8.0	36.0	0.0	55.4	588.2	5000.0	-18.6	Peak
12005.000	H	0.0	2.4	43.5	42.4	8.7	35.8	0.0	58.8	870.7	5000.0	-15.2	Peak
14406.000	H	0.0	2.4	44.7	41.9	10.6	34.5	0.0	62.8	1374.4	5000.0	-11.2	Peak
16807.000	H	0.0	2.4	42.3	40.1	8.9	34.9	0.0	56.4	664.1	5000.0	-17.5	Peak
4802.000	H	270.0	2.4	55.1	33.1	5.0	35.7	24.4	33.1	45.4	500.0	-20.8	Avg
7203.000	H	0.0	2.4	43.1	37.3	6.5	35.6	24.4	26.9	22.2	500.0	-27.1	Avg
9604.000	H	0.0	2.4	44.0	39.3	8.0	36.0	24.4	31.0	35.4	500.0	-23.0	Avg
12005.000	H	0.0	2.4	43.5	42.4	8.7	35.8	24.4	34.4	52.5	500.0	-19.6	Avg
14406.000	H	0.0	2.4	44.7	41.9	10.6	34.5	24.4	38.4	82.8	500.0	-15.6	Avg
16807.000	H	0.0	2.4	42.3	40.1	8.9	34.9	24.4	32.0	40.0	500.0	-21.9	Avg

Table 6: Harmonic Emissions – Channel 42

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBµV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Duty Cycle Corr	Corr. Level (dBµV/m)	Corr. Level (µV/m)	Limit (µV/m)	Margin (dB)	Notes
2442.000													
4884.000	V	180.0	2.6	55.7	33.3	5.1	35.7	0.0	58.3	821.0	5000.0	-15.7	Peak
7326.000	V	0.0	2.6	46.1	37.4	6.4	35.6	0.0	54.4	523.4	5000.0	-19.6	Peak
9768.000	V	0.0	2.6	42.2	39.4	8.1	36.0	0.0	53.7	485.3	5000.0	-20.3	Peak
12210.000	V	0.0	2.6	44.2	42.2	8.5	35.6	0.0	59.4	930.4	5000.0	-14.6	Peak
14652.000	V	0.0	2.6	40.6	42.5	10.5	34.6	0.0	59.1	903.3	5000.0	-14.9	Peak
17094.000	V	0.0	2.6	42.3	40.9	9.2	34.6	0.0	57.8	774.1	5000.0	-16.2	Peak
4884.000	V	180.0	2.6	55.7	33.3	5.1	35.7	24.4	33.9	49.5	500.0	-20.1	Avg
7326.000	V	0.0	2.6	46.1	37.4	6.4	35.6	24.4	30.0	31.5	500.0	-24.0	Avg
9768.000	V	0.0	2.6	42.2	39.4	8.1	36.0	24.4	29.3	29.2	500.0	-24.7	Avg
12210.000	V	0.0	2.6	44.2	42.2	8.5	35.6	24.4	35.0	56.1	500.0	-19.0	Avg
14652.000	V	0.0	2.6	40.6	42.5	10.5	34.6	24.4	34.7	54.4	500.0	-19.3	Avg
17094.000	V	0.0	2.6	42.3	40.9	9.2	34.6	24.4	33.4	46.6	500.0	-20.6	Avg
4884.000	H	190.0	2.6	57.4	33.3	5.1	35.7	0.0	60.0	998.5	5000.0	-14.0	Peak
7326.000	H	0.0	2.6	42.3	37.4	6.4	35.6	0.0	50.6	337.9	5000.0	-23.4	Peak
9768.000	H	0.0	2.6	42.5	39.4	8.1	36.0	0.0	54.0	502.4	5000.0	-20.0	Peak
12210.000	H	0.0	2.6	43.9	42.2	8.5	35.6	0.0	59.1	898.8	5000.0	-14.9	Peak
14652.000	H	0.0	2.6	43.1	42.5	10.5	34.6	0.0	61.6	1208.7	5000.0	-12.3	Peak
17094.000	H	0.0	2.6	44.4	40.9	9.2	34.6	0.0	59.9	985.9	5000.0	-14.1	Peak
4884.000	H	190.0	2.6	57.4	33.3	5.1	35.7	24.4	35.6	60.2	500.0	-18.4	Avg
7326.000	H	0.0	2.6	42.3	37.4	6.4	35.6	24.4	26.2	20.4	500.0	-27.8	Avg
9768.000	H	0.0	2.6	42.5	39.4	8.1	36.0	24.4	29.6	30.3	500.0	-24.4	Avg
12210.000	H	0.0	2.6	43.9	42.2	8.5	35.6	24.4	34.7	54.2	500.0	-19.3	Avg
14652.000	H	0.0	2.6	43.1	42.5	10.5	34.6	24.4	37.2	72.8	500.0	-16.7	Avg
17094.000	H	0.0	2.6	44.4	40.9	9.2	34.6	24.4	35.5	59.4	500.0	-18.5	Avg

Table 7: Harmonic Emissions – Channel 82

Frequency (MHz)	Polarity H/V	Azimuth Degree	Ant. Height (m)	SA Level (Peak) (dBμV)	Ant. Corr. (dB/m)	Cable Corr. (dB)	Amp Gain (dB)	Duty Cycle Corr	Corr. Level (dBμV/m)	Corr. Level (μV/m)	Limit (μV/m)	Margin (dB)	Notes
2482.000													
4964.000	V	0.0	2.4	55.4	33.4	5.1	35.8	0.0	58.1	806.7	5000.0	-15.8	Peak
7446.000	V	200.0	2.4	44.3	37.6	6.3	35.6	0.0	52.6	426.8	5000.0	-21.4	Peak
9928.000	V	180.0	2.4	42.3	39.6	8.1	36.0	0.0	53.9	498.0	5000.0	-20.0	Peak
12410.000	V	170.0	2.4	44.1	42.1	8.4	35.4	0.0	59.2	907.3	5000.0	-14.8	Peak
14892.000	V	180.0	2.4	44.7	43.1	10.0	34.7	0.0	63.1	1434.8	5000.0	-10.8	Peak
17374.000	V	180.0	2.4	44.4	41.8	9.7	34.3	0.0	61.6	1198.8	5000.0	-12.4	Peak
4964.000	V	0.0	2.4	55.4	33.4	5.1	35.8	24.4	33.7	48.6	500.0	-20.2	Avg
7446.000	V	200.0	2.4	44.3	37.6	6.3	35.6	24.4	28.2	25.7	500.0	-25.8	Avg
9928.000	V	180.0	2.4	42.3	39.6	8.1	36.0	24.4	29.5	30.0	500.0	-24.4	Avg
12410.000	V	170.0	2.4	44.1	42.1	8.4	35.4	24.4	34.8	54.7	500.0	-19.2	Avg
14892.000	V	180.0	2.4	44.7	43.1	10.0	34.7	24.4	38.7	86.5	500.0	-15.2	Avg
17374.000	V	180.0	2.4	44.4	41.8	9.7	34.3	24.4	37.2	72.2	500.0	-16.8	Avg
4964.000	H	225.0	2.4	56.6	33.4	5.1	35.8	0.0	59.3	926.2	5000.0	-14.6	Peak
7446.000	H	200.0	2.4	48.7	37.6	6.3	35.6	0.0	57.0	708.3	5000.0	-17.0	Peak
9928.000	H	0.0	2.4	44.0	39.6	8.1	36.0	0.0	55.6	605.7	5000.0	-18.3	Peak
12410.000	H	0.0	2.4	46.2	42.1	8.4	35.4	0.0	61.3	1155.4	5000.0	-12.7	Peak
14892.000	H	0.0	2.4	46.3	43.1	10.0	34.7	0.0	64.7	1725.0	5000.0	-9.2	Peak
17374.000	H	0.0	2.4	45.6	41.8	9.7	34.3	0.0	62.8	1376.4	5000.0	-11.2	Peak
4964.000	H	225.0	2.4	56.6	33.4	5.1	35.8	24.4	34.9	55.8	500.0	-19.0	Avg
7446.000	H	200.0	2.4	48.7	37.6	6.3	35.6	24.4	32.6	42.7	500.0	-21.4	Avg
9928.000	H	0.0	2.4	44.0	39.6	8.1	36.0	24.4	31.2	36.5	500.0	-22.7	Avg
12410.000	H	0.0	2.4	46.2	42.1	8.4	35.4	24.4	36.9	69.6	500.0	-17.1	Avg
14892.000	H	0.0	2.4	46.3	43.1	10.0	34.7	24.4	40.3	103.9	500.0	-13.6	Avg
17374.000	H	0.0	2.4	45.6	41.8	9.7	34.3	24.4	38.4	82.9	500.0	-15.6	Avg

3.1.4 Bandwidth

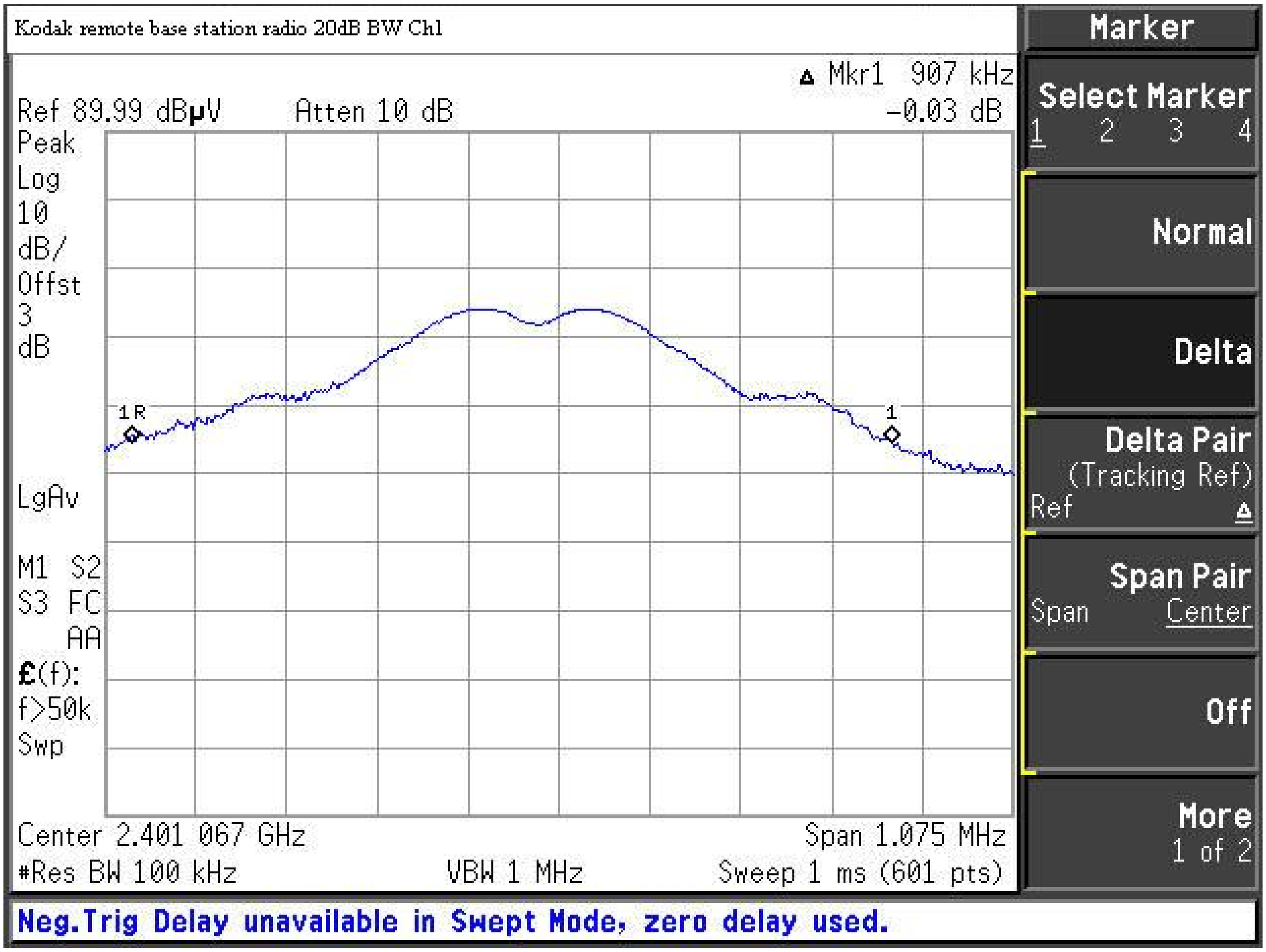

Figure 3: 20dB Bandwidth Channel 1

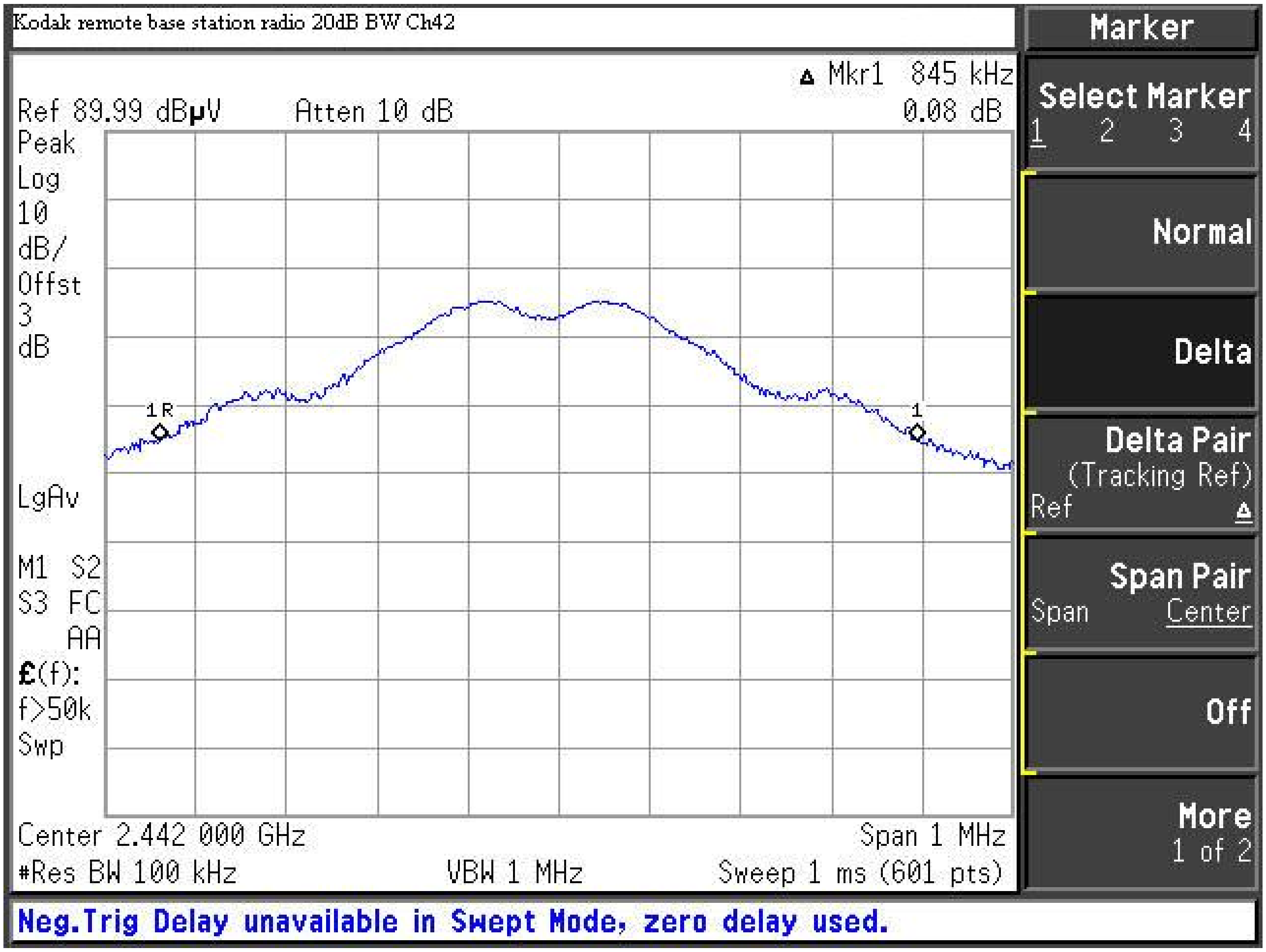

Figure 4: 20dB Bandwidth Channel 42

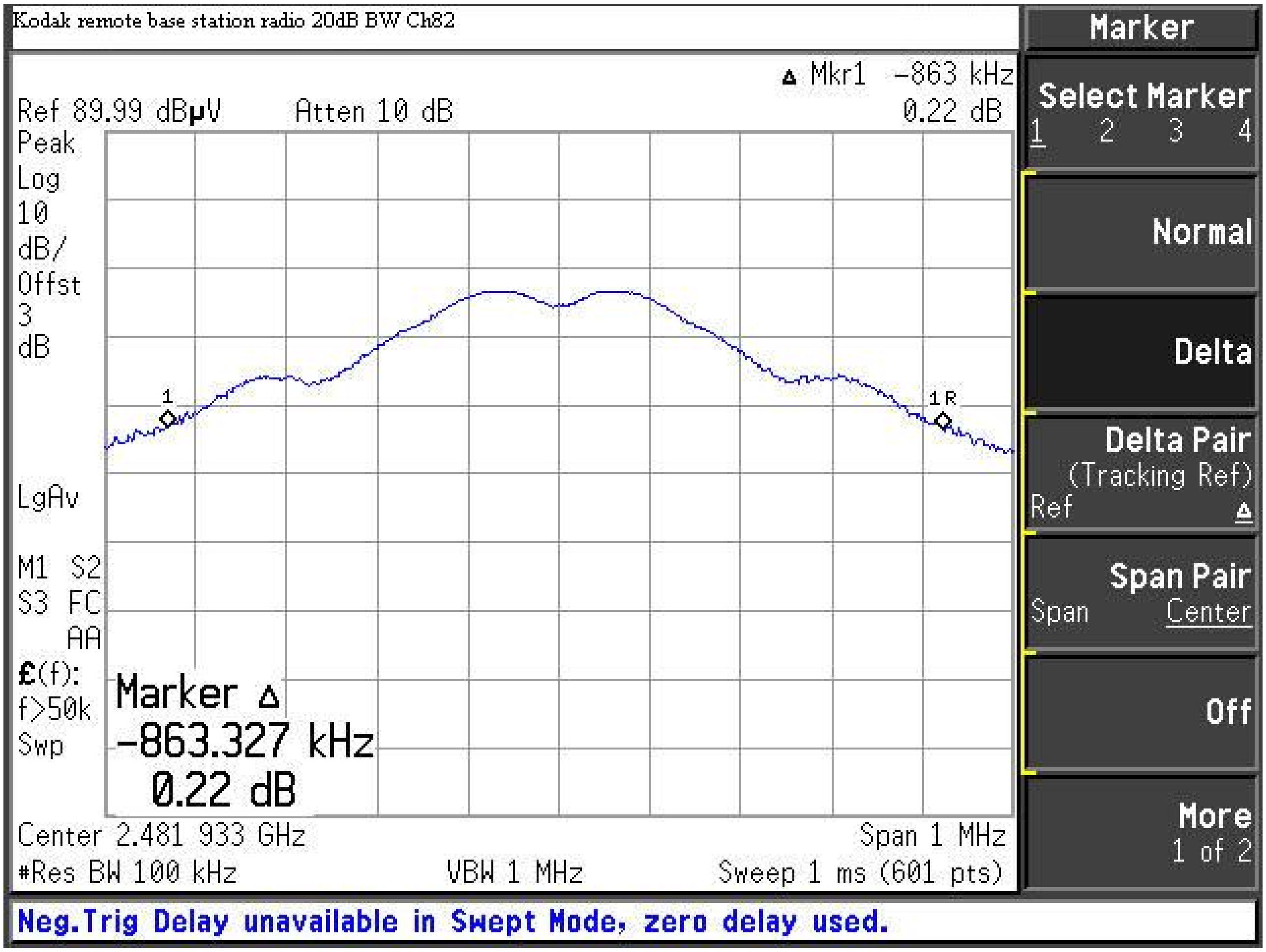

Figure 5: 20dB Bandwidth Channel 82

3.1.5 Band edge

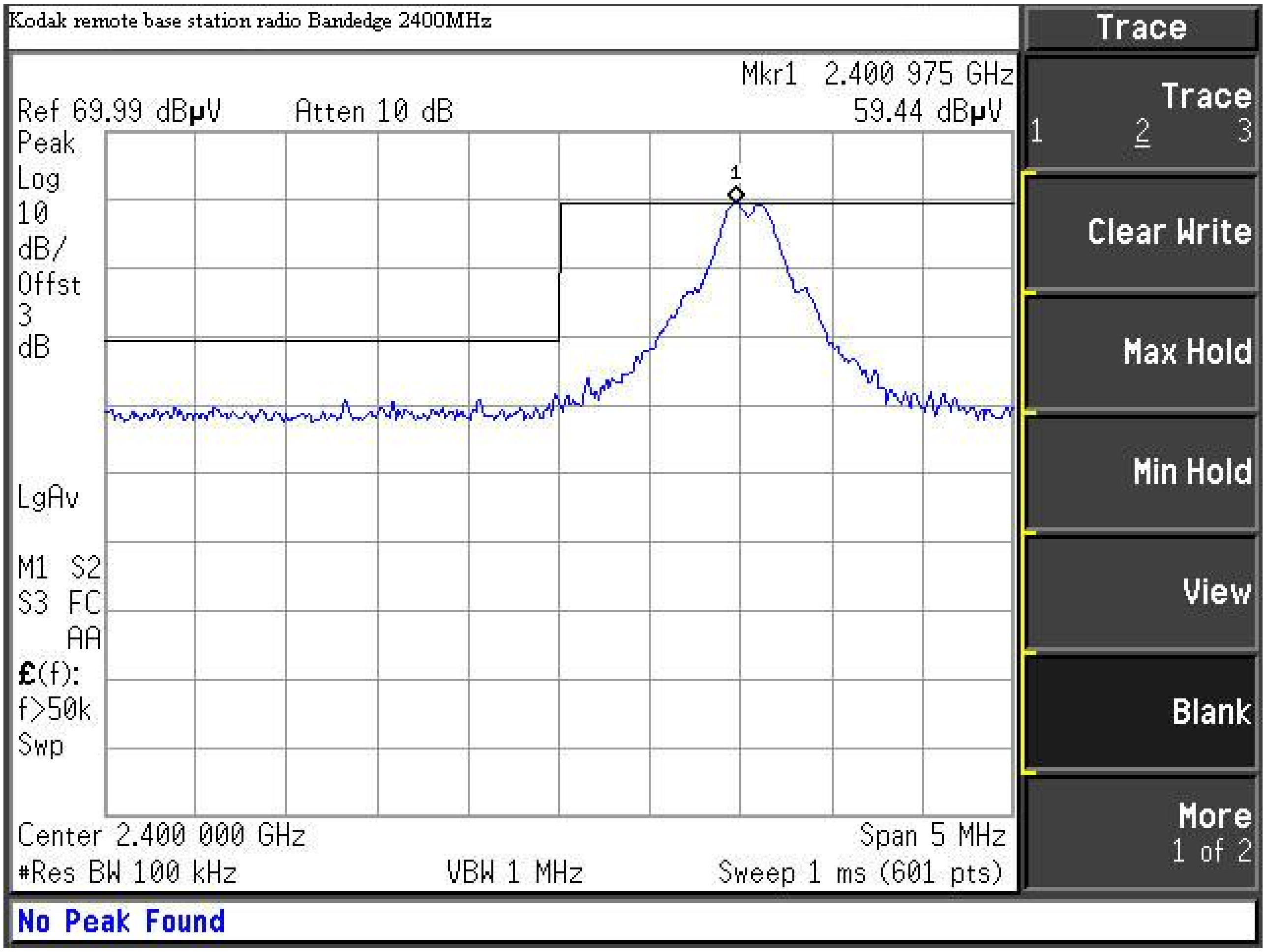

Figure 6: 20dB Band Edge Channel 1

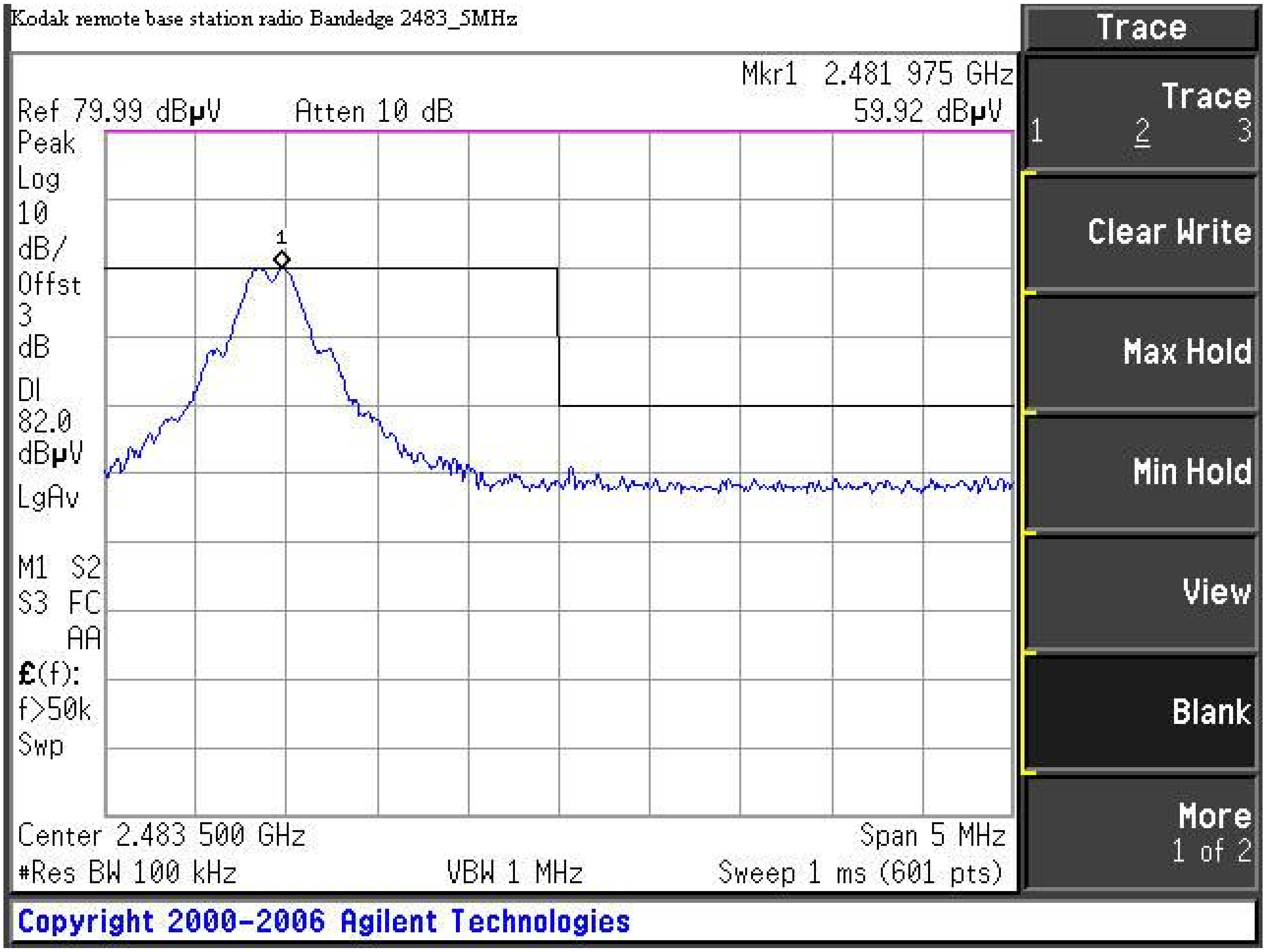

Figure 7: 20dB Band Edge Channel 82

Conducted Emissions

3.1.6 Requirements

Test Arrangement: Table Top

Compliance Standard: FCC Part 15.207

FCC Compliance Limits		
Frequency	**Quasi-peak**	**Average**
0.15-0.5MHz	66 to 56dBμV	56 to 46dBμV
0.5 to 5MHz	56dBμV	46dBμV
0.5-30MHz	60dBμV	50dBμV

3.1.7 Test Equipment

Test Name:	**Conducted Emissions Voltage**	Test Date:	**7/17/08**
Asset #	**Manufacturer/Model**	**Description**	**Cal. Due**
00124	Solar, 8012-50-R-24-BNC	LISN	09/28/2008
00069	HP, 85650A	Adapter, QP	07/09/2009
00069	HP, 85650A	Adapter, QP	07/09/2009
00073	HP, 8568B	Analyzer, Spectrum	07/08/2009

3.1.8 Test Procedure

The EUT was placed on an 80 cm high 1 X 1.5 m non-conductive table above a ground plane. Power to the EUT was provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 3 X 2 meter ground plane. The LISN has its AC input supplied from a filtered AC power source. Power was supplied to the peripherals through a second LISN. The peripherals were placed on the table in accordance with ANSI C63.4-2003. Power and data cables were moved about to obtain maximum emissions.

The 50 Ω output of the LISN was connected to the input of the spectrum analyzer and the emissions in the frequency range of 150 kHz to 30 MHz were measured. The detector function was set to quasi-peak, peak, or average as appropriate, and the resolution bandwidth during testing was at least 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth. For average measurements the post-detector filter was set to 10 Hz.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed.

3.1.9 Test Data

The EUT complied with the Conducted Emissions requirements. Table 2 provides the test results for phase and neutral line power line conducted emissions.

At frequencies where quasi-peak or peak measurements comply with the average limit, no average measurements need be performed. The Conducted emissions level to be compared to the FCC limit is calculated as shown in the following example.

Example:

Spectrum Analyzer Voltage:	VdBμV
LISN Correction Factor:	LISN dB
Cable Correction Factor:	CF dB
Electric Field:	EdBμV = V dBμV + LISN dB + CF dB

Table 8: Conducted Emission Test Data

LINE 1 - NEUTRAL

Frequency (MHz)	Level QP (dBµV)	Level AVG (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBµV)	Level Corr Avg (dBµV)	Limit QP (dBµV)	Limit AVG (dBµV)	Margin QP (dB)	Margin AVG (dB)
0.199	36.9	23.0	10.3	0.3	47.5	33.6	63.7	53.7	-16.2	-20.1
0.454	31.6	20.1	10.5	0.2	42.3	30.8	56.8	46.8	-14.5	-16.0
1.196	29.8	19.1	10.6	0.4	40.7	30.0	56.0	46.0	-15.3	-16.0
4.630	31.9	19.1	11.2	0.5	43.6	30.8	56.0	46.0	-12.4	-15.2
13.430	34.6	20.0	11.4	1.2	47.2	32.6	60.0	50.0	-12.8	-17.4
15.730	29.8	15.9	11.3	1.4	42.5	28.6	60.0	50.0	-17.5	-21.4

LINE 1 - Phase

Frequency (MHz)	Level QP (dBµV)	Level AVG (dBµV)	Cable Loss (dB)	LISN Corr (dB)	Level QP Corr (dBµV)	Level Corr Avg (dBµV)	Limit QP (dBµV)	Limit AVG (dBµV)	Margin QP (dB)	Margin AVG (dB)
0.150	40.6	29.1	10.2	0.2	51.0	39.5	66.0	56.0	-15.0	-16.5
0.448	32.4	23.5	10.5	0.7	43.6	34.7	56.9	46.9	-13.3	-12.2
1.194	28.0	17.7	10.6	0.6	39.2	28.9	56.0	46.0	-16.8	-17.1
13.220	37.0	25.3	11.4	1.4	49.8	38.1	60.0	50.0	-10.2	-11.9
15.790	30.1	18.6	11.3	1.5	42.9	31.4	60.0	50.0	-17.1	-18.6
27.970	14.1	1.3	12.5	1.9	28.6	15.8	60.0	50.0	-31.4	-34.2

Test Engineer(s): Steven Dovell

Test Date(s): 7/17/08