

Keiser Corporation

TEST REPORT FOR

**Exercise Bike (Radio)
Model: M3i**

Tested To The Following Standards:

FCC Part 15 Subpart C Section 15.247

Report No.: 95964-10

Date of issue: January 22, 2015



This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Keiser Corporation
2470 S. Cherry Avenue
Fresno, CA 93706

Representative: Gus Gustafson
Customer Reference Number: E0007103

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 95964

August 26, 2014

August 26 - December 29, 2014

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.



Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information



Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Mariposa A	US0103	SL2-IN-E-1147R	3082A-2	90477	A-0136

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C

Test Procedure	Description	Modifications*	Results
15.247(a)(2)	-6dB Occupied Bandwidth	NA	Pass
15.247(b)(3)	Peak Power	NA	Pass
15.247(d)	Conducted Spurious Emissions	NA	Pass
15.247(d)	Radiated Spurious Emissions and Band Edge	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass

Modifications* During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

*Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Exercise Bike (Radio)

Manuf: Keiser Corporation

Model: M3i

Serial: 140804-89567

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

Keyboard

Manuf: Gigabyte

Model: GK-KM6150

Serial: SN114125006165

Mouse

Manuf: Gigabyte

Model: GK-KM6150-M

Serial: SN124625000789

Monitor

Manuf: Hewlett Packard

Model: HSTND-2321-A

Serial: CNC930PNC4

Computer

Manuf: Shuttle

Model: S171G

Serial: SA760200R1102F00872

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) CFR 47 Section 15 Subpart C requirements for Intentional Radiators.

15.247(a)(2) -6dB Occupied Bandwidth

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2015
02138	Attenuator	54-10	Weinschel	02/13/2013	02/13/2015
03355	Cable	32022-2-29094-36TC	Astrolab	02/07/2013	02/07/2015

Test Conditions / Setup

Engineer Name: Eddie Mariscal

Test Conditions:

Temp: 18°C

Humidity: 45%

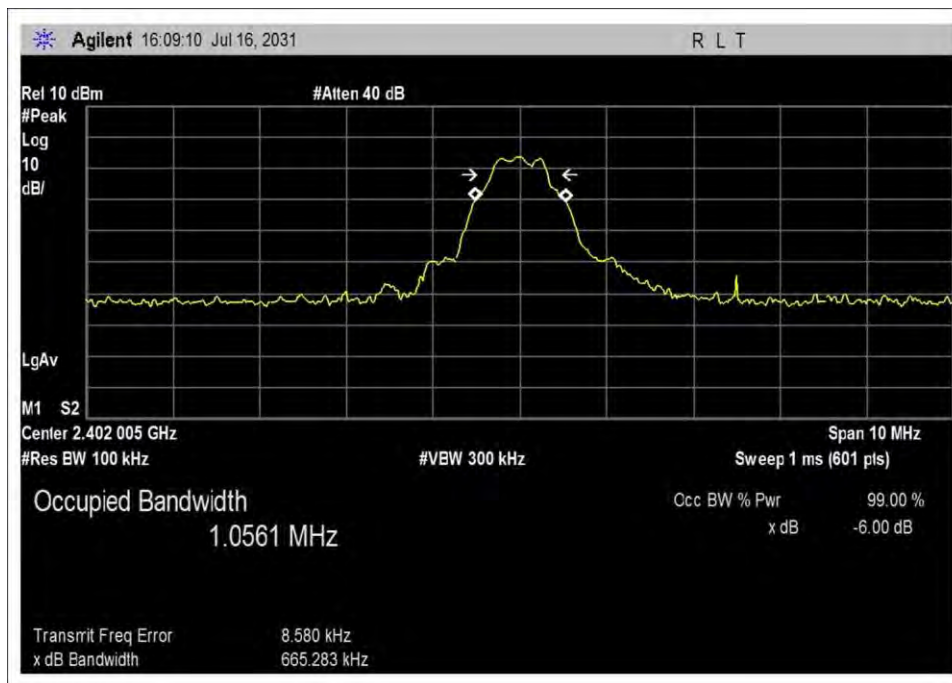
Pressure: 97.8kPa

Freq: 2402-2480MHz

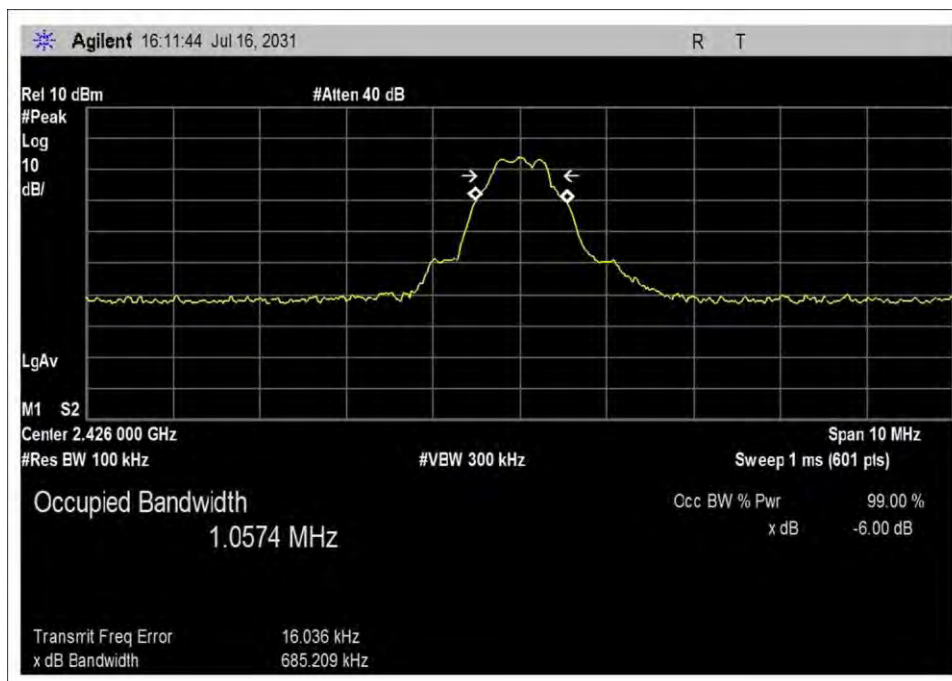
The EUT use a non-removable antenna, however, the test sample was supplied with a temporary antenna connector, and thus the data is gathered through conducted measurements. The EUT is located on top of a Styrofoam support, 80cm above the reference ground plane. EUT is operating in Bluetooth mode during testing. Three orthogonal axes were investigated. The data presented represents the worst case orientation. The test sample was supplied with DC power leads, so the EUT was powered by 3.3VDC by support power supply in accordance with 15.31(e). Testing was performed in accordance with KDB 558074 D01 v03r02.

Frequency (MHz)	6dB Bandwidth (kHz)
2402	665.28
2426	685.21
2480	652.54

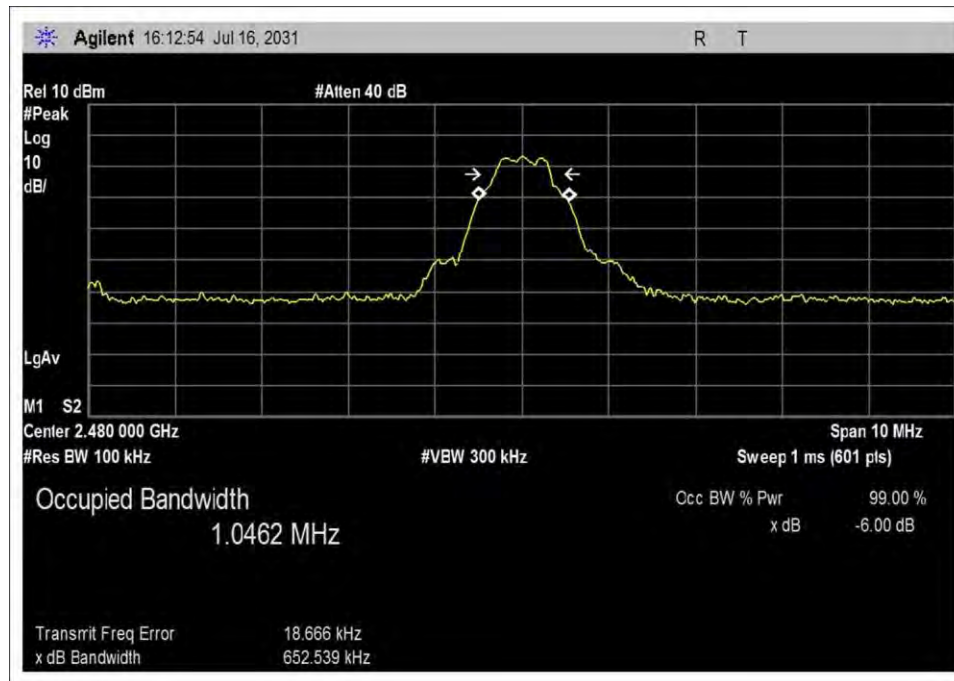
Test Data



Low



Middle



High

Test Setup Photo



Test Setup

15.247(b)(3) Peak Power

Test Equipment					
Asset#	Description	Model	Manufacturer	Cal Date	Cal Due
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2015
02138	Attenuator	54-10	Weinschel	02/13/2013	02/13/2015
03355	Cable	32022-2-29094-36TC	Astrolab	02/07/2013	02/07/2015

Test Conditions / Setup

Engineer Name: Eddie Mariscal

Test Conditions:

Temp: 18°C

Humidity: 35%

Pressure: 97.8kPa

Freq: 2402-2480MHz

Software used: nRFgo Studio ver. 1.17.0.3211

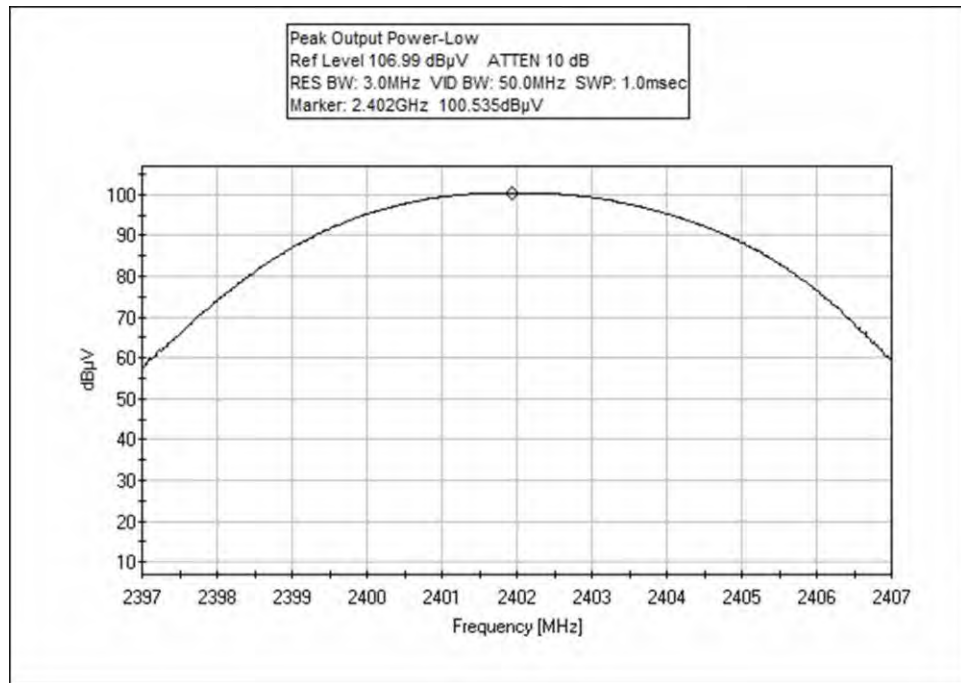
Payload model: PRBS9

The EUT use a non-removable antenna, however the test sample was supplied with a temporary antenna connector, thus the data is gathered through conducted measurements. The test sample was supplied with DC power leads, so the EUT was powered by 3.3VDC by support power supply in accordance with 15.31(e). Testing was performed in accordance with KDB 558074 D01 v03r02.

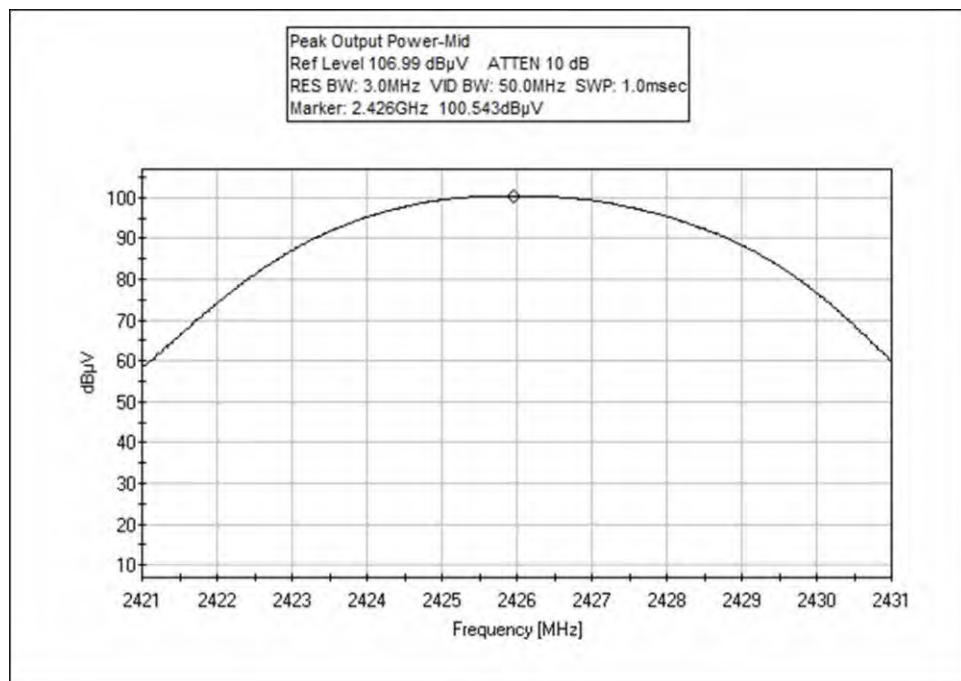
Plots do not have corrections applied. See correction factors in table below.

Frequency (MHz)	Spectrum Analyzer Measurement (dBuV)	Corrections due to cable and attenuator (dB)	Corrected Reading (dBuV)	Corrected Reading (dBm)	Conducted Power (mW)	Limit (mW)
2402	100.535	10.47	111.01	4.01	2.52	1000
2426	100.543	10.47	111.01	4.01	2.52	1000
2480	100.075	10.48	110.56	3.56	2.27	1000

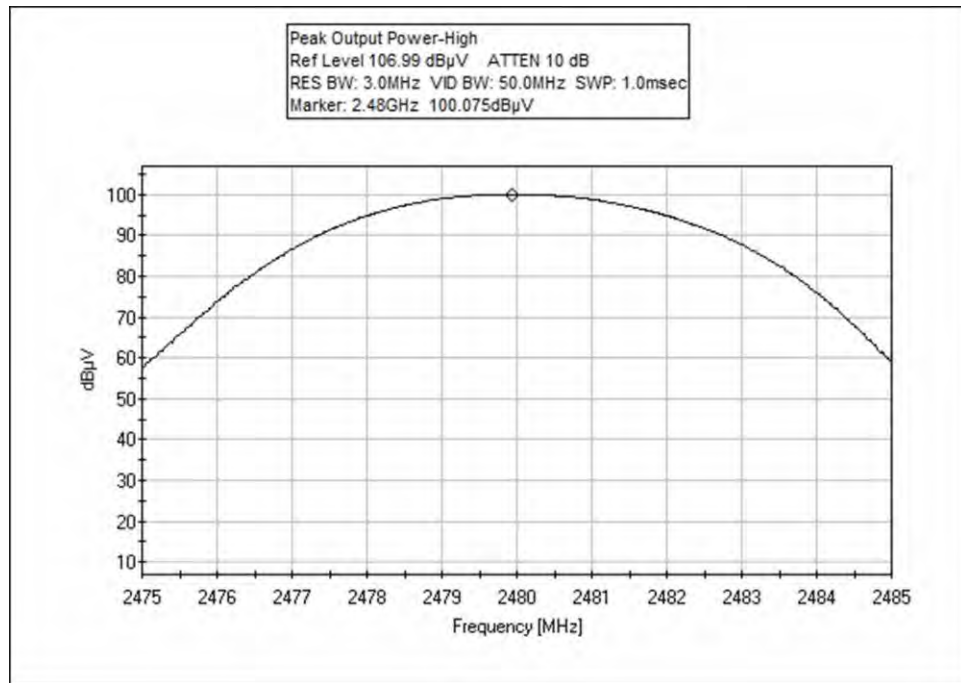
Test Data



Low



Middle



High

Test Setup Photo



15.247(d) Conducted Spurious Emissions

Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer: **Keiser Corporation**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **95964**
 Test Type: **Conducted Scan**
 Equipment: **Exercise Bike**
 Manufacturer: Keiser Corporation
 Model: M3i
 S/N: 140804-89567

Date: 8/26/2014
 Time: 15:51:55
 Sequence#: 1
 Tested By: Eddie Mariscal
 3VDC

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02138	Attenuator	54-10	2/13/2013	2/13/2015
	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
T2	AN03359	Cable	32022-2-29094-36TC	12/8/2014	12/8/2016

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Exercise Bike*	Keiser Corporation	M3i	140804-89567

Support Devices:

Function	Manufacturer	Model #	S/N
Keyboard	Gigabyte	GK-KM6150	SN114125006165
Mouse	Gigabyte	GK-KM6150-M	SN124625000789
Monitor	Hewlett Packard	HSTND-2321-A	CNC930PNC4
Computer	Shuttle	S171G	SA760200R1102F00872

Test Conditions / Notes:

The RF Output port of the EUT is connected to the spectrum analyzer via high frequency cable. The EUT is configured to transmit continuously.

Frequency Range of Interest: 0.009-2483.5MHz excluding restricted bands as defined in FCC 15.205.
 RBW = 100kHz; VBW > RBW

The test sample was provided with DC power leads, so it was powered by an AC-DC power supply in accordance with 15.31(e).

Testing was performed in accordance with KDB 558074 D01 v03r02.

Environmental Conditions:

Temperature: 21°C

Relative Humidity: 44%

Atmospheric Pressure: 97.8kPa

Ext Attn: 0 dB

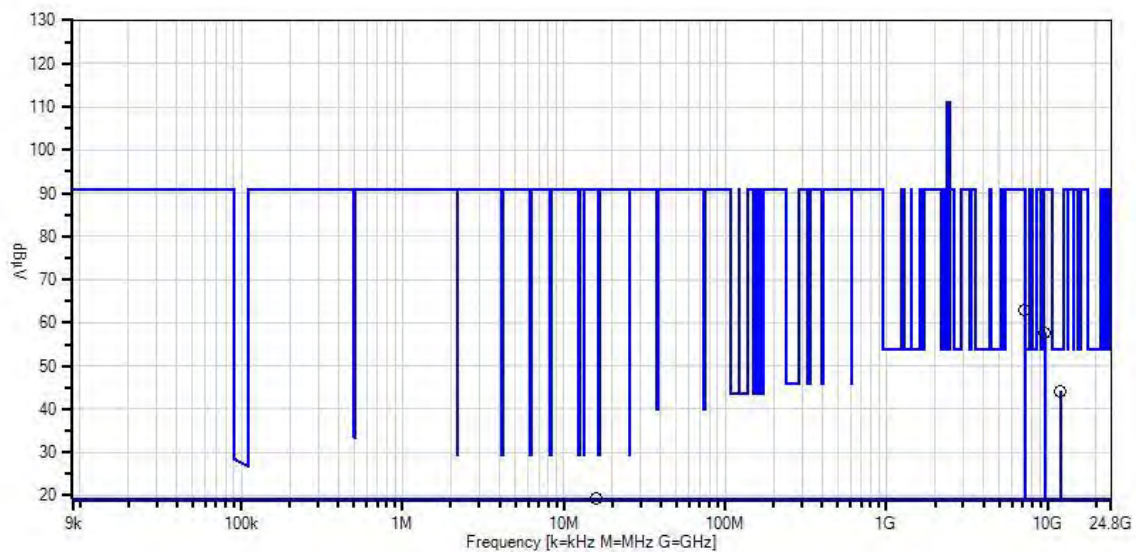
Measurement Data:

Reading listed by margin.

Test Lead: RF Output Port

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB		Dist Table	Corr dB μ V	Spec dB μ V	Margin dB	Polar Ant
1	12008.860 M	32.8	+10.1	+1.3		+0.0	44.2	54.0	-9.8	RF Ou
2	7206.075M	51.7	+10.1	+1.0		+0.0	62.8	90.9	-28.1	RF Ou
3	9608.005M	46.4	+10.1	+1.2		+0.0	57.7	90.9	-33.2	RF Ou
4	16.000M	19.1	+0.0	+0.1		+0.0	19.2	90.9	-71.7	RF Ou

CKC Laboratories, Inc. Date: 8/26/2014 Time: 15:51:55 Keiser Corporation WO#: 95964
15.247(d) Conducted Spurious Emissions Test Lead: RF Output Port 3VDC Sequence#: 1 Ext ATTN: 0 dB



— Sweep Data
○ Peak Readings
* Average Readings
— Readings
x QP Readings
▼ Ambient
— 1 - 15.247(d) Conducted Spurious Emissions

Test Setup Photo



15.247(d) Radiated Spurious Emissions and Band Edge

Test Data

Test Location: CKC Laboratories, Inc. • 5046 Sierra Pines Dr. • Mariposa, CA 95338 • (209) 966-5240

Customer: **Keiser Corporation**

Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**

Work Order #: **95964**

Date: 12/29/2014

Test Type: **Radiated Scan**

Time: 14:16:30

Equipment: **Exercise Bike**

Sequence#: 1

Manufacturer: Keiser Corporation

Tested By: Eddie Mariscal

Model: M3i

S/N: 140804-89567

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03155	Preamp	83017A	6/26/2013	6/26/2015
T2	AN00327	Horn Antenna	3115	3/18/2014	3/18/2016
T3	AN03358	Cable	32022-2-29094K-36TC	2/7/2013	2/7/2015
T4	AN03359	Cable	32022-2-29094-36TC	12/8/2014	12/8/2016
T5	AN03362	Cable	32022-2-29094-48TC	12/8/2014	12/8/2016
T6	ANP05904	Cable	32022-2-29094K-144TC	12/8/2014	12/8/2016
T7	AN02668	Spectrum Analyzer	E4446A	8/4/2014	8/4/2015
	AN00226	Loop Antenna	6502	3/28/2014	3/28/2016
	ANP06232	Cable	CXTA04A-35	9/5/2014	9/5/2016
	ANP05922	Cable	RG/214	9/5/2014	9/5/2016
	AN00449	Preamp-Bottom Amp (dB)	8447F	4/7/2014	4/7/2016
	AN02046	Horn Antenna-ANSI C63,5 (2006) 3m (dB)	MWH-1826/B	2/4/2013	2/4/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Exercise Bike*	Keiser Corporation	M3i	140804-89567

Support Devices:

Function	Manufacturer	Model #	S/N
Keyboard	Gigabyte	GK-KM6150	SN114125006165
Mouse	Gigabyte	GK-KM6150-M	SN124625000789
Monitor	Hewlett Packard	HSTND-2321-A	CNC930PNC4
Computer	Shuttle	S171G	SA760200R1102F00872

Test Conditions / Notes:

The EUT is placed atop a wooden nonconductive turntable of height 80cm. The EUT is investigated while continuously transmitting at three representative channels individually: Low (2412MHz), Middle (2426MHz) and High (2480MHz).

Software used: nRFgo Studio ver. 1.17.0.3211

Payload model: PRBS9

The test sample was supplied with DC power leads, so the EUT was powered by 3.3VDC by support power supply in accordance with 15.31(e).

Testing was performed in accordance with KDB 558074 D01 v03r02.

Test Method: ANSI C63.4 (2003)

Frequency Range of Interest: 0.009-2483.5MHz

0.009-0.150: RBW = 200Hz; VBW > RBW

0.15-30MHz: RBW = 9kHz; VBW > RBW

30-1000MHz: RBW = 120kHz; VBW > RBW

1-24.835GHz: RBW = 1MHz; VBW > RBW

Environmental Conditions:

Temperature: 21°C

Relative Humidity: 44%

Atmospheric Pressure: 97.8kPa

Note

No EUT spurious emissions were detected within 6dB of the limit within the frequency range of 9kHz-1000MHz.

Ext Attn: 0 dB

Measurement Data:

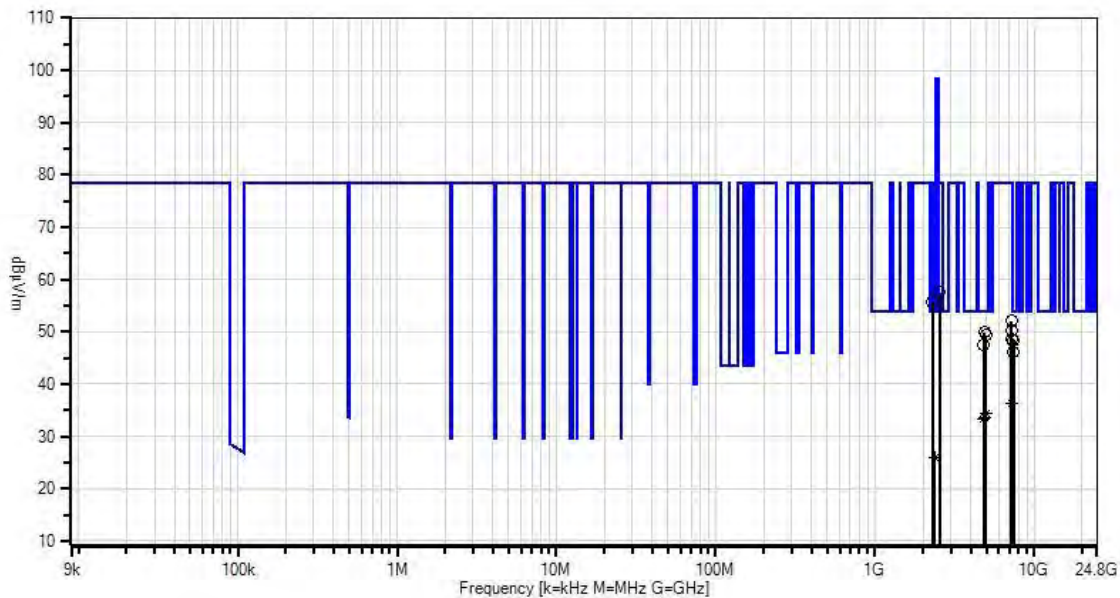
Reading listed by margin.

Test Distance: 3 Meters

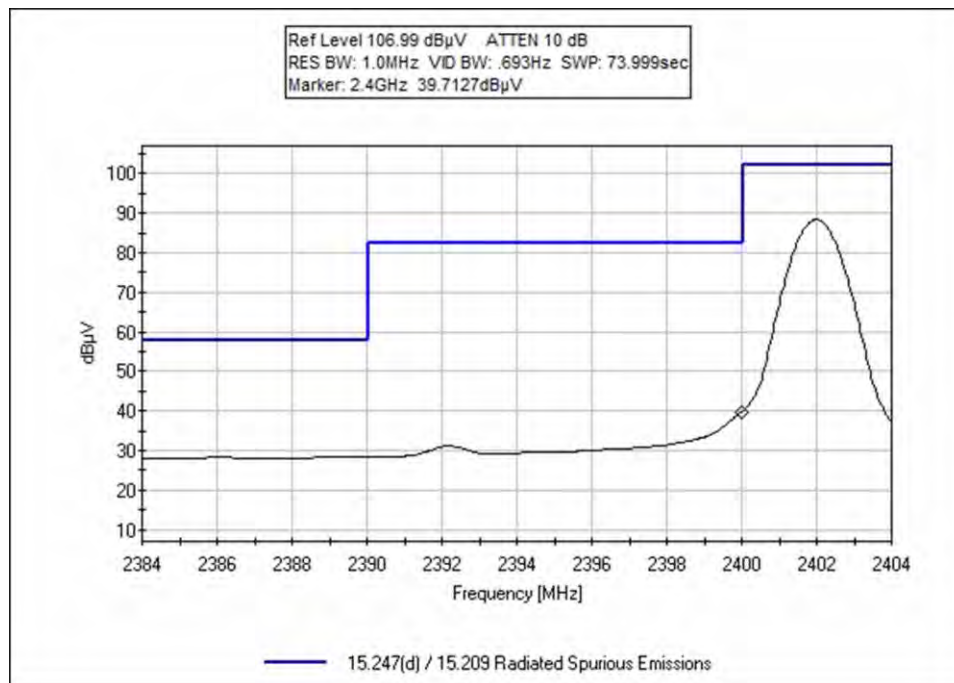
#	Freq MHz	Rdng dBμV	T1 T5 dB	T2 T6 dB	T3 T7 dB	T4 dB	Dist Table	Corr dBμV/m	Spec dBμV/m	Margin dB	Polar Ant
1	4852.000M	46.2	-32.9 +1.1	+30.1 +3.4	+1.2 +0.0	+0.8	+0.0	49.9	54.0 Transmit Mid	-4.1	Horiz
2	4959.830M	45.6	-33.0 +1.1	+30.3 +3.4	+1.2 +0.0	+0.8	+0.0	49.4	54.0 Transmit High	-4.6	Horiz
3	7278.000M	39.8	-32.7 +1.3	+33.7 +4.2	+1.3 +0.0	+1.0	+0.0	48.6	54.0 Transmit Mid	-5.4	Vert
4	7439.750M	39.3	-32.6 +1.3	+33.9 +4.2	+1.3 +0.0	+1.0	+0.0	48.4	54.0 Transmit High	-5.6	Vert
5	4803.967M	44.0	-33.0 +1.1	+30.0 +3.4	+1.2 +0.0	+0.8	+0.0	47.5	54.0 Transmit Low	-6.5	Horiz
6	7439.620M	37.0	-32.6 +1.3	+33.9 +4.2	+1.3 +0.0	+1.0	+0.0	46.1	54.0 Transmit High	-7.9	Horiz
7	7277.933M Ave	27.4	-32.7 +1.3	+33.7 +4.2	+1.3 +0.0	+1.0	+0.0	36.2	54.0 Transmit Mid	-17.8	Horiz
^	7277.930M	42.1	-32.7 +1.3	+33.7 +4.2	+1.3 +0.0	+1.0	+0.0	50.9	54.0 Transmit Mid	-3.1	Horiz
9	4960.000M Ave	30.6	-33.0 +1.1	+30.3 +3.4	+1.2 +0.0	+0.8	+0.0	34.4	54.0 Transmit High	-19.6	Vert
^	4960.000M	48.3	-33.0 +1.1	+30.3 +3.4	+1.2 +0.0	+0.8	+0.0	52.1	54.0 Transmit High	-1.9	Vert

11	4852.000M	29.8	-32.9	+30.1	+1.2	+0.8	+0.0	33.5	54.0	-20.5	Vert
	Ave		+1.1	+3.4	+0.0				Transmit Mid		
^	4852.000M	47.6	-32.9	+30.1	+1.2	+0.8	+0.0	51.3	54.0	-2.7	Vert
			+1.1	+3.4	+0.0				Transmit Mid		
13	4803.967M	29.7	-33.0	+30.0	+1.2	+0.8	+0.0	33.2	54.0	-20.8	Vert
	Ave		+1.1	+3.4	+0.0				Transmit Low		
^	4803.967M	47.6	-33.0	+30.0	+1.2	+0.8	+0.0	51.1	54.0	-2.9	Vert
			+1.1	+3.4	+0.0				Transmit Low		
15	2556.600M	60.9	-32.8	+25.1	+0.6	+0.6	+0.0	57.6	78.4	-20.8	Horiz
			+0.8	+2.4	+0.0				Transmit High		
16	2305.483M	59.9	-33.0	+24.9	+0.5	+0.5	+0.0	55.8	78.4	-22.6	Vert
			+0.7	+2.3	+0.0				Transmit Low		
17	7205.967M	43.4	-32.7	+33.7	+1.3	+1.0	+0.0	52.1	78.4	-26.3	Horiz
			+1.3	+4.1	+0.0				Transmit Low		
18	2362.067M	29.8	-32.9	+24.9	+0.5	+0.5	+0.0	25.8	54.0	-28.2	Vert
	Ave		+0.7	+2.3	+0.0				Transmit Low		
^	2362.033M	62.5	-32.9	+24.9	+0.5	+0.5	+0.0	58.5	54.0	+4.5	Vert
			+0.7	+2.3	+0.0				Transmit Low		
20	7205.970M	41.4	-32.7	+33.7	+1.3	+1.0	+0.0	50.1	78.4	-28.3	Vert
			+1.3	+4.1	+0.0				Transmit Low		

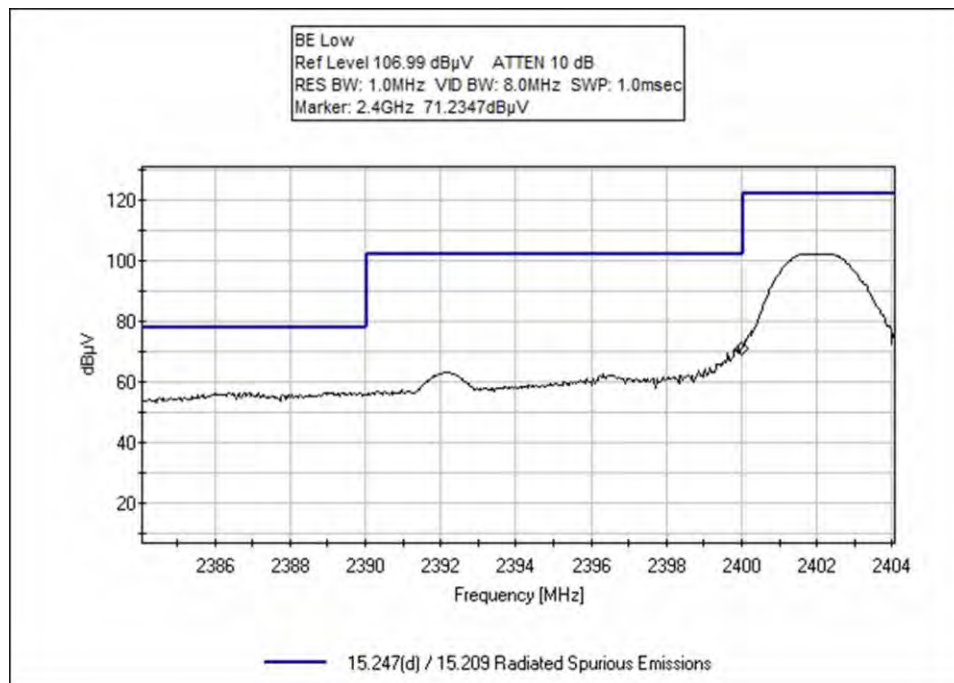
CKC Laboratories, Inc. Date: 12/29/2014 Time: 14:16:30 Keiser Corporation WO#: 95964
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Sequence#: 1 Ext ATTN: 0 dB



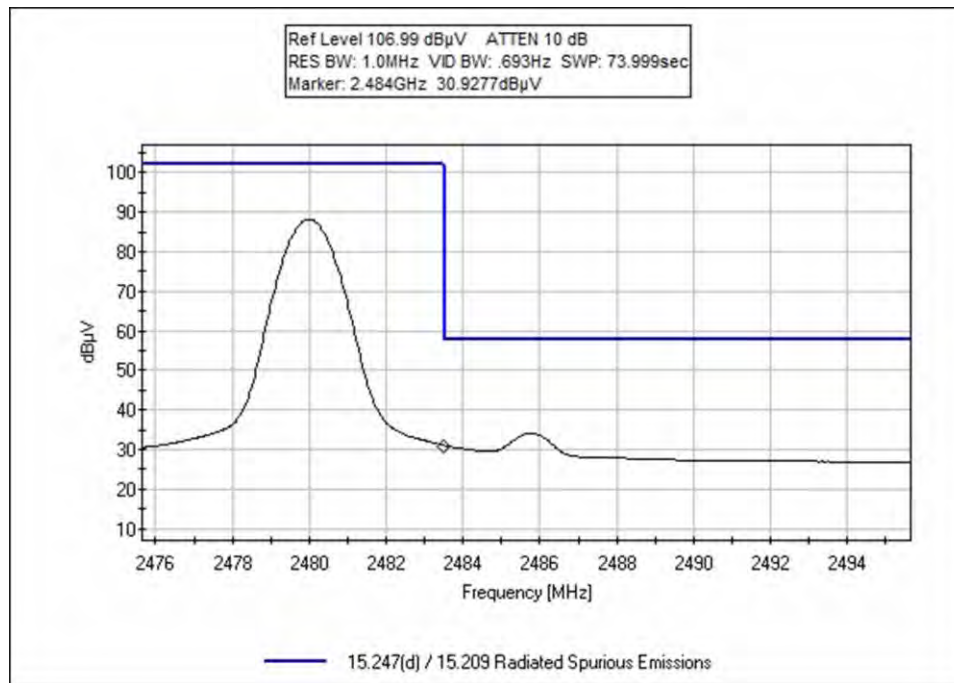
Band Edge Test Data



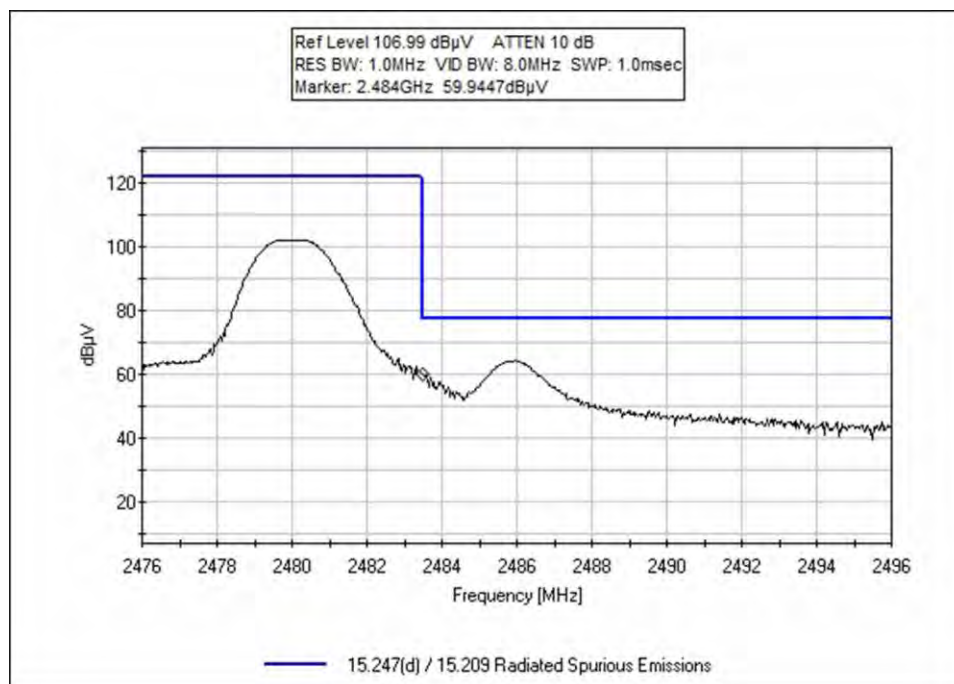
Low, Average



Low, Peak



High, Average

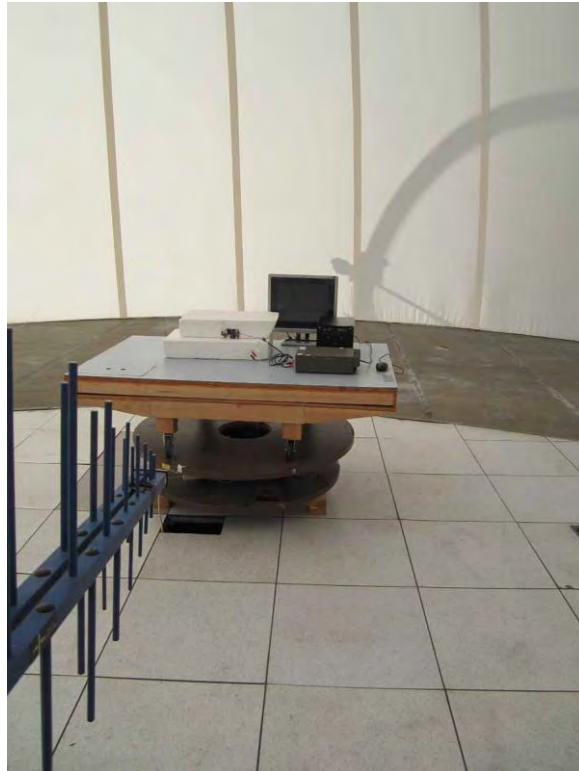


High, Peak

Test Setup Photos



Low



Middle



High

15.247(e) Power Spectral Density

Test Equipment					
Asset#	Description	Model	Manufacturer	Cal Date	Cal Due
02668	Spectrum Analyzer	E4446A	Agilent	08/04/2014	08/04/2015
02138	Attenuator	54-10	Weinschel	02/13/2013	02/13/2015
03355	Cable	32022-2-29094-36TC	Astrolab	02/07/2013	02/07/2015

Test Conditions / Setup

Engineer Name: Eddie Mariscal

Test Conditions:

Temp: 18°C

Humidity: 45%

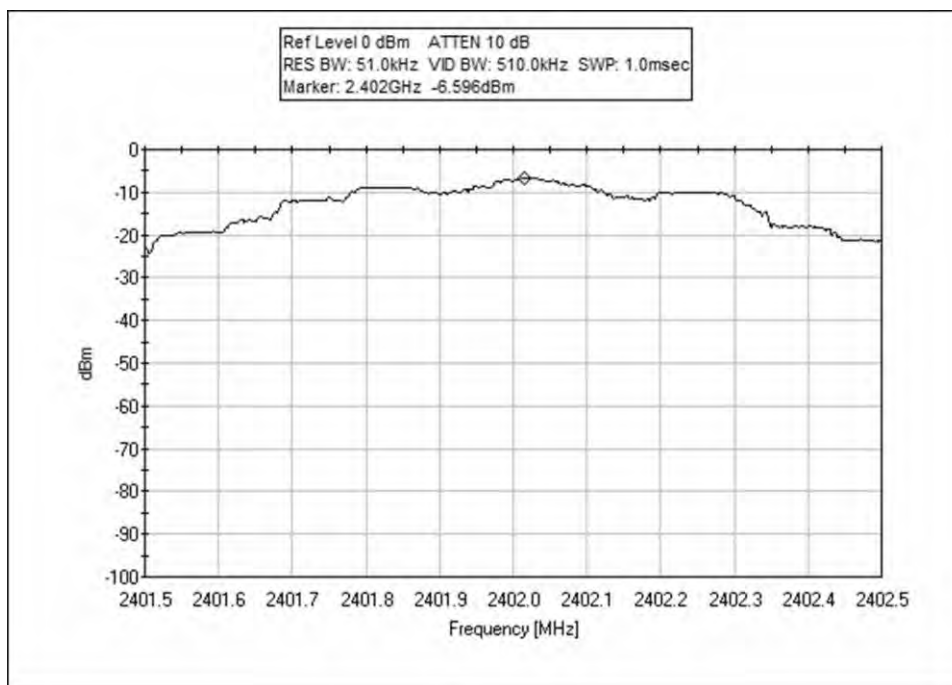
Pressure: 97.8kPa

Freq: 2402-2480MHz

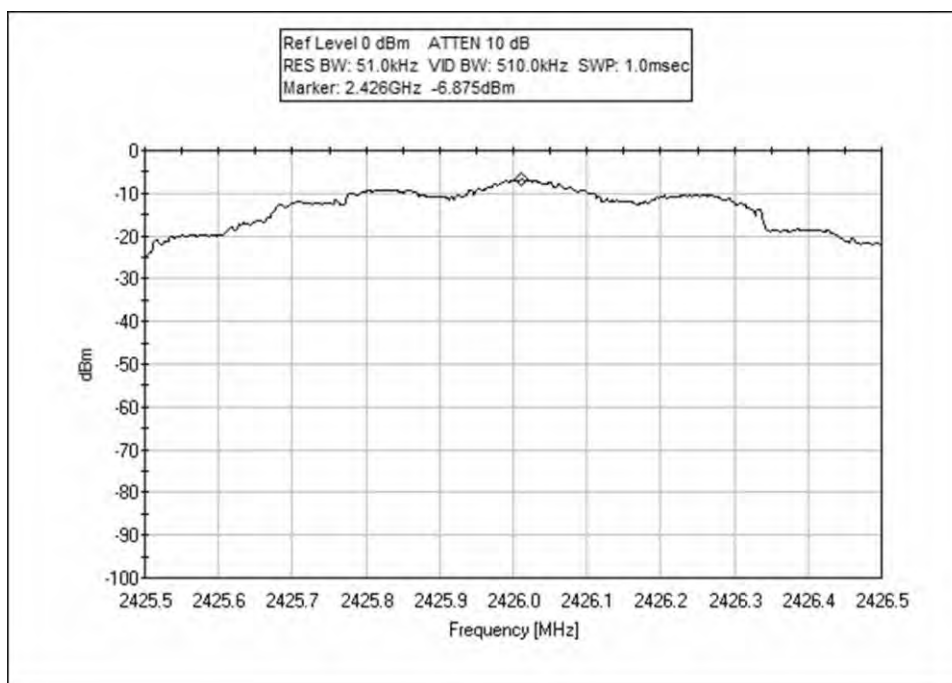
The EUT use a non-removable antenna, however, the test sample was supplied with a temporary antenna connector, and thus the data is gathered through conducted measurements. EUT is located on top of a Styrofoam support, 80cm above the reference ground plane. The EUT is operating in Bluetooth mode during testing. Three orthogonal axes were investigated. The data presented represents the worst case orientation. The test sample was supplied with DC power leads, so the EUT was powered by 3.3VDC by support power supply in accordance with 15.31(e). Testing was performed in accordance with KDB 558074 D01 v03r02.

Frequency (MHz)	Spectrum Analyzer Measurement (dBm)	Corrections due to cable and attenuator (dB)	Power Spectral density (dBm/3kHz)	Limit (dBm/3kHz)
2402	-6.60	10.47	3.87	8
2426	-6.88	10.47	3.59	8
2480	-7.39	10.48	3.09	8

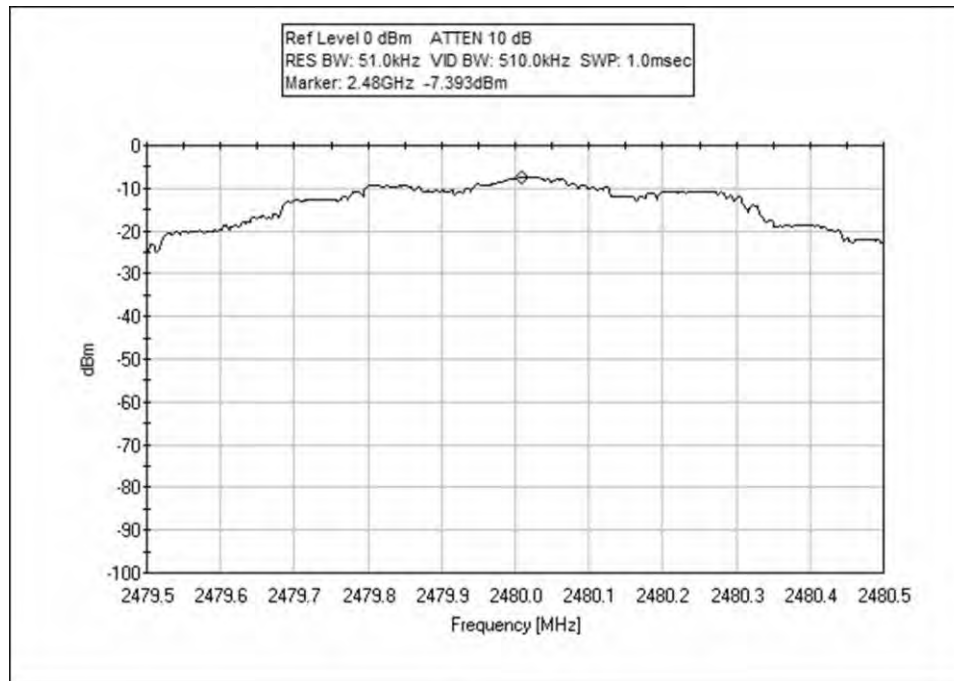
Test Data



Low



Middle



High

Test Setup Photo



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBμV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBμV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.