

Celadon, Inc.

ADDENDUM TO TEST REPORT 94142-11A

SR52C Remote Control with 433.92MHz Radio Model: FGSR52C-BWC-01

Tested To The Following Standards:

FCC Part 15.231
and
RSS 210 Issue 8

Report No.: 94142-11B

Date of issue: October 22, 2013



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:

Celadon, Inc.
500 Tamal Plaza, Ste. 520
Corte Madera, CA 94925

Representative: Michael Griswold
Customer Reference Number: 4944

DATE OF EQUIPMENT RECEIPT:

DATE(S) OF TESTING:

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 94142

May 29, 2013

May 29- August 12, 2013

Revision History

Original: Testing of the SR52C Remote Control with 4333.92MHz Radio, FGSR52C-BWC-01 to FCC Part 15 Subpart C Sections 15.231 and RSS-210 Issue 8.

Addendum A: To make corrections to the test conditions in all test sections except section 15.231(a).

Addendum B: Additional detailed clarification was added to test conditions,

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.
1120 Fulton Place
Fremont, CA 94539

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
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15.231 and RSS 210 Issue 8

Description	Test Procedure/Method	Results
Restricted to Periodic Operation	FCC Part 15 Subpart C Section 15.231(a)	Pass
RF Power Output	FCC Part 15 Subpart C Section 15.231(b)	Pass
Voltage Variation	FCC Part 15 Subpart C Section 15.31(e)	Pass
-20dBc Occupied Bandwidth	FCC Part 15 Subpart C Section 15.231(c)	Pass
99 % Bandwidth	RSS 210 Issue 8	Pass
Field Strength of Spurious Emissions	FCC Part 15 Subpart C Section 15.231(b) / ANSI C63.4	Pass

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions

Setup: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table.

The test data is representative of the device when tested with a fresh battery in accordance with 15.31(e),

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

SR52C Remote Control with 433.92MHz Radio

Manuf: Celadon, Inc.

Model: FGSR52C-BWC-01

Serial: ENG1

PERIPHERAL DEVICES

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

DC Power Supply

Manuf: Protek

Model: 3006B

Serial: AG4070

FCC PART 15.231

Test Conditions / Setup

15.231(a) Restricted To Periodic Operation

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**

Specification: **15.231(a)**

Work Order #: **94142**

Date: 8/12/2013

Test Type: **Radiated Scan**

Time: 12:25:15

Equipment: **SR52C Remote Control with
433.92MHz Radio**

Sequence#: 1

Manufacturer: Celadon, Inc.

Tested By: Hieu Song Nguyenpham

Model: FGSR52C-BWC-01

S/N: ENG2

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamplifier	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG2

Support Devices:

Function	Manufacturer	Model #	S/N

Test Conditions / Notes:

15.231a

Temperature: 21.1°C

Humidity: 40%

Atmospheric Pressure: 101.1 kPa

High Clock: 433.995MHz for TX

Software Used: OTP microcontroller

Transmitting Operation Frequency: 433.92MHz

The EUT is a handheld and battery device. Install two new fresh AAA batteries. The EUT is placed on 80 cm table at the center of turn table and 3 meters away from a measuring antenna.

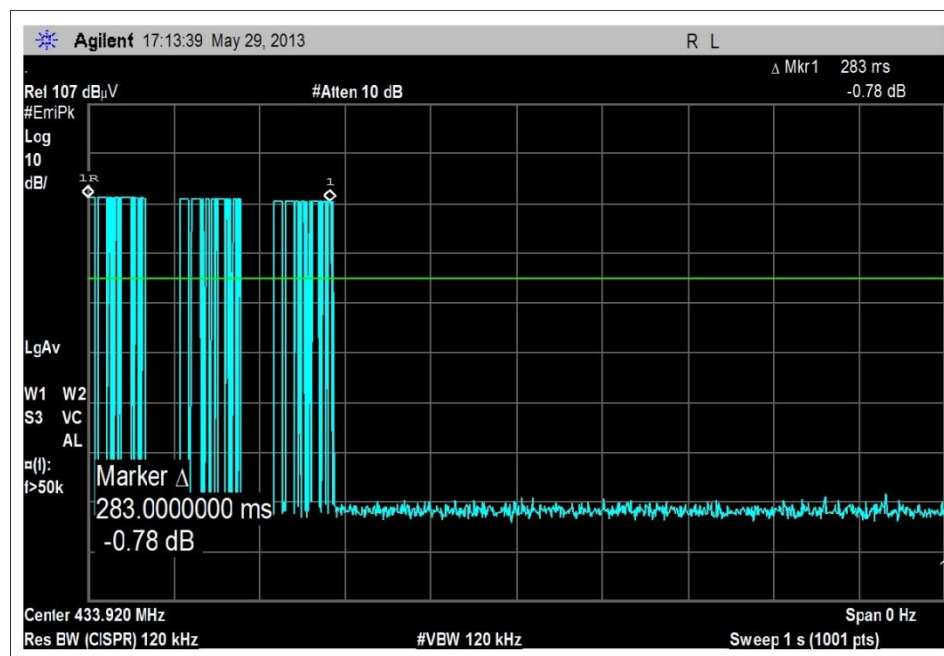
15.231a

(a) The provisions of this section are restricted to periodic operation within the band 40.66-40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Continuous transmissions, voice, video and the radio control of toys are not permitted. Data is permitted to be sent with a control signal. The following conditions shall be met to comply with the provisions for this periodic operation:

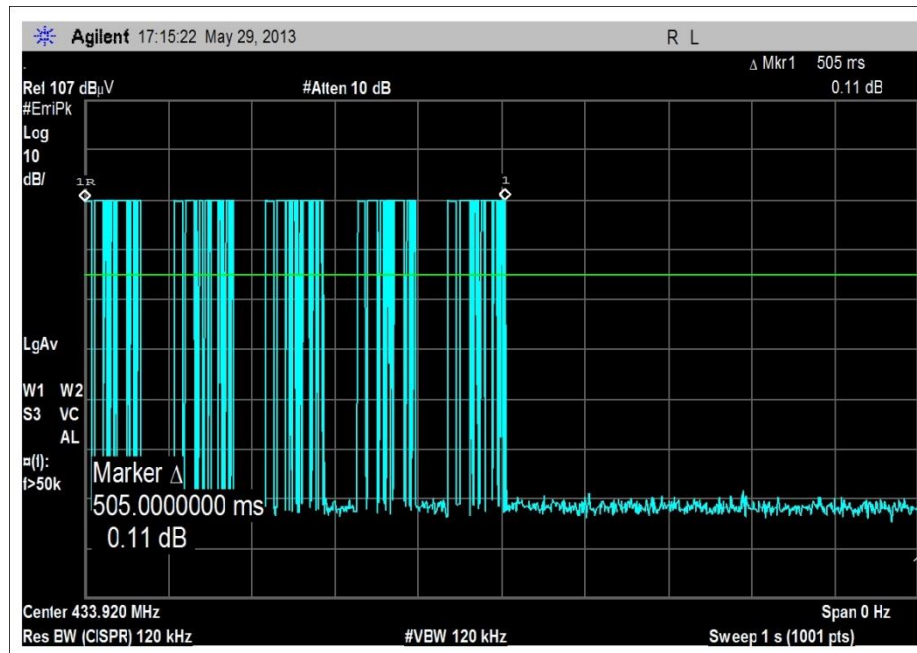
(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Test Data

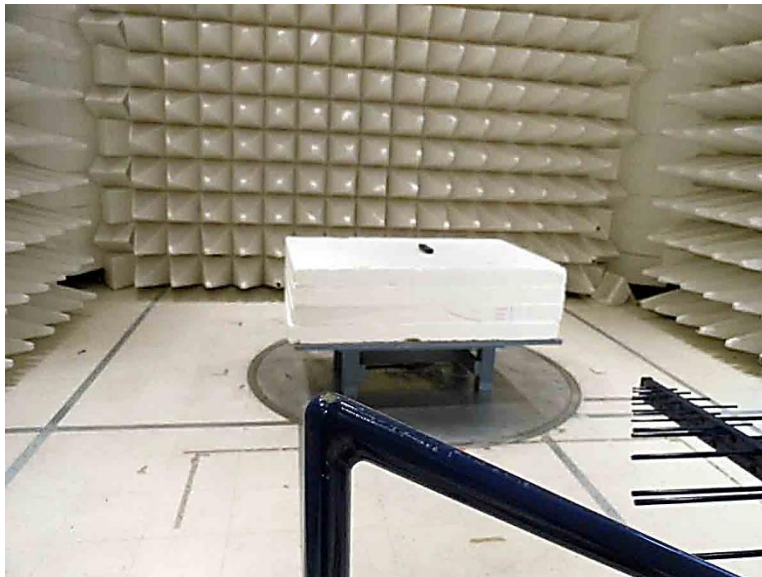


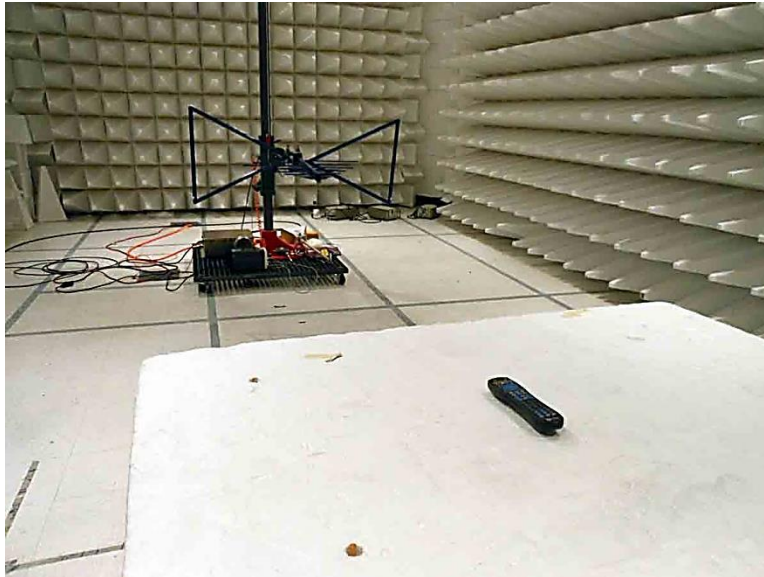
15.231a (1): After putting a button and releasing it in 1s. A manually operated transmitter is 0.283 second which is less than 5 seconds.



15.231a (2): After holding the transmitting button in 10s a transmitter activated automatically ceases transmission within 0.505 seconds which is less than 5 seconds.

Test Setup Photos





15.231(b) RF Power Output

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**

Specification: **15.231(b) Fundamental Field Strength**

Work Order #: **94142**

Date: 8/12/2013

Test Type: **Radiated Scan**

Time: 12:25:15

Equipment: **SR52C Remote Control with
433.92MHz Radio**

Sequence#: 1

Manufacturer: Celadon, Inc.

Tested By: Hieu Song Nguyenpham

Model: FGSR52C-BWC-01

S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Fundamental of the EUT

Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa

High Clock: 433.995MHz for TX

Software Used: OTP microcontroller

Rated Output Power = 0 dBm

Transmitting Operation Frequency: 433.92MHz

RBW=100kHz

VBW=300kHz

Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on

the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table

Test Data

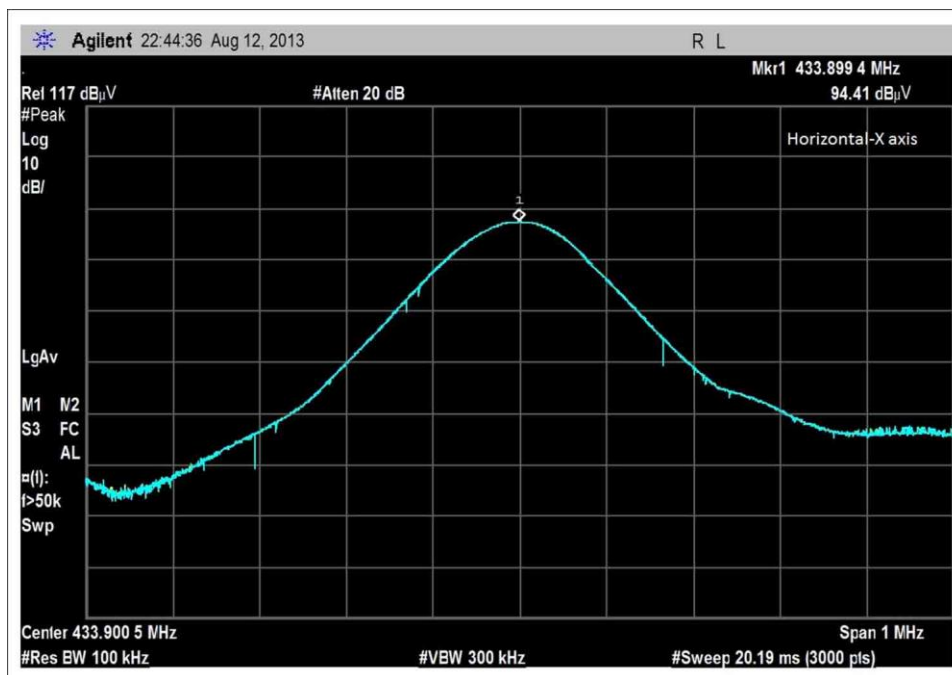
Ext Attn: 0 dB

Measurement Data:

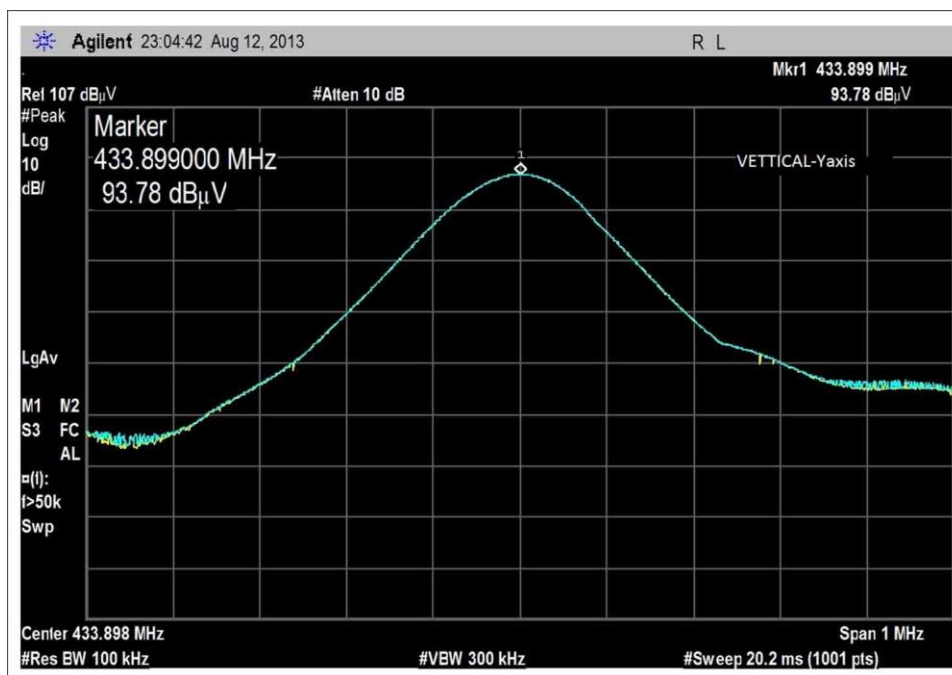
Reading listed by margin.

Test Distance: 3 Meters

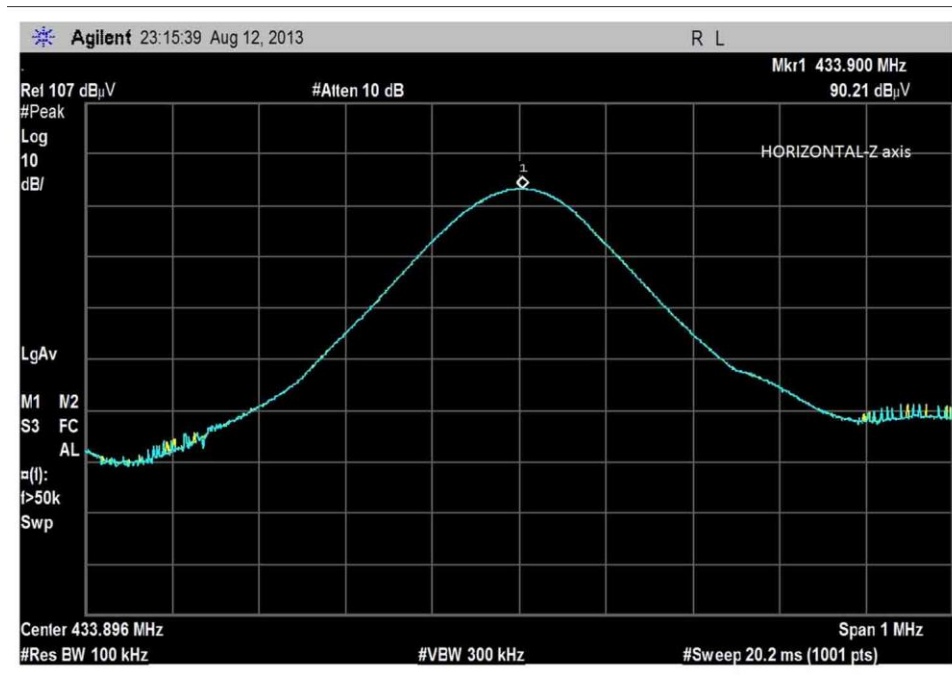
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dB μ V	dB	dB	dB	dB	Table	dB μ V/m	dB μ V/m	dB	Ant
1	433.920M Ave	83.0	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	76.0	80.5 X-axis	-4.5	Horiz
2	433.920M Ave	81.2	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	74.2	80.5 Y-axis	-6.3	Vert
3	433.920M Ave	79.0	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	72.0	80.5 Z-axis	-8.5	Horiz
^	433.920M	94.4	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	87.4	80.5 X-axis	+6.9	Horiz
^	433.920M	90.2	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	83.2	80.5 Z-axis	+2.7	Horiz
^	433.920M	83.6	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	76.6	80.5 Y-axis	-3.9	Horiz
7	433.920M Ave	76.9	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	69.9	80.5 Z-axis	-10.6	Vert
^	433.920M	93.8	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	86.8	80.5 Y-axis	+6.3	Vert
^	433.920M	89.1	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	82.1	80.5 Z-axis	+1.6	Vert
^	433.920M	79.3	-27.1 +0.6	+16.8	+2.2	+0.5	+0.0	72.3	80.5 X-axis	-8.2	Vert



X AXIS, HORIZONTAL

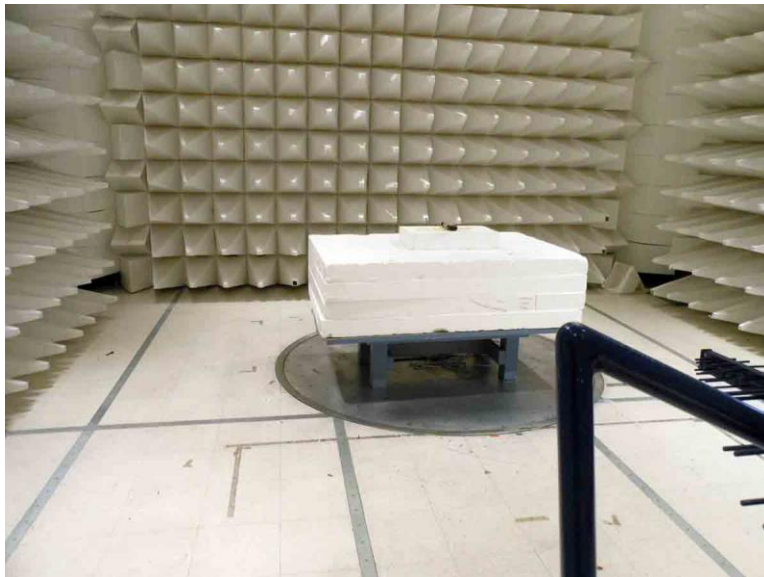


Y AXIS, VERTICAL

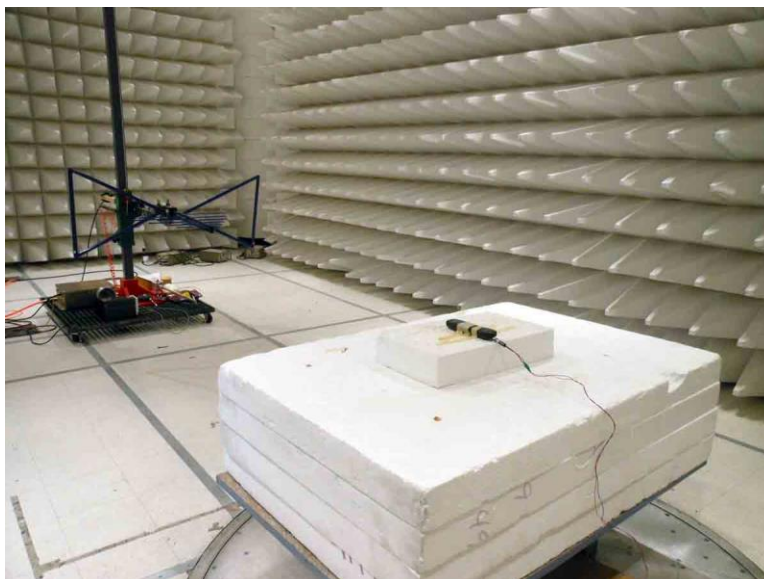


Z AXIS, HORIZONTAL

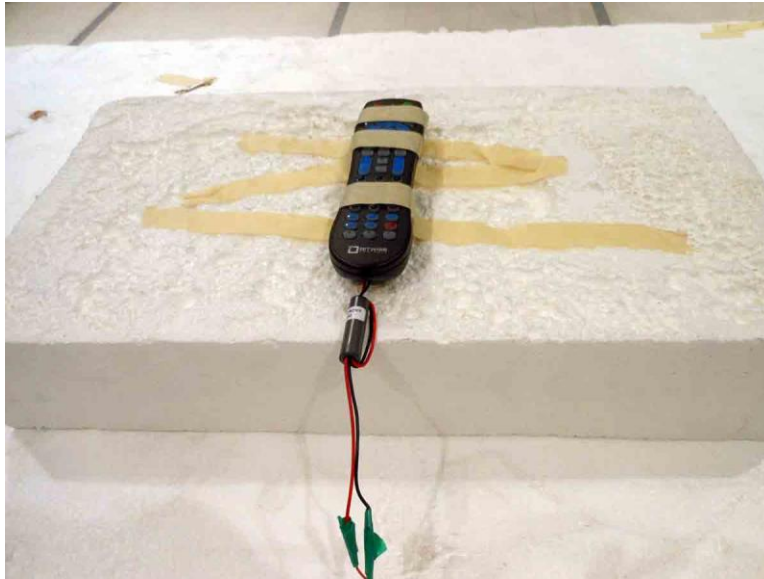
Test Setup Photos



TEST SETUP, FRONT VIEW



TEST SETUP, BACK VIEW



X AXIS



Y AXIS



Z AXIS

15.31(e) Voltage Variations

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**

Specification: **15.31e**

Work Order #: **94142**

Date: 8/12/2013

Test Type: **Radiated Scan**

Time: 12:25:15

Equipment: **SR52C Remote Control with
433.92MHz Radio**

Sequence#: 1

Manufacturer: Celadon, Inc.

Tested By: Hieu Song Nguyenpham

Model: FGSR52C-BWC-01

S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

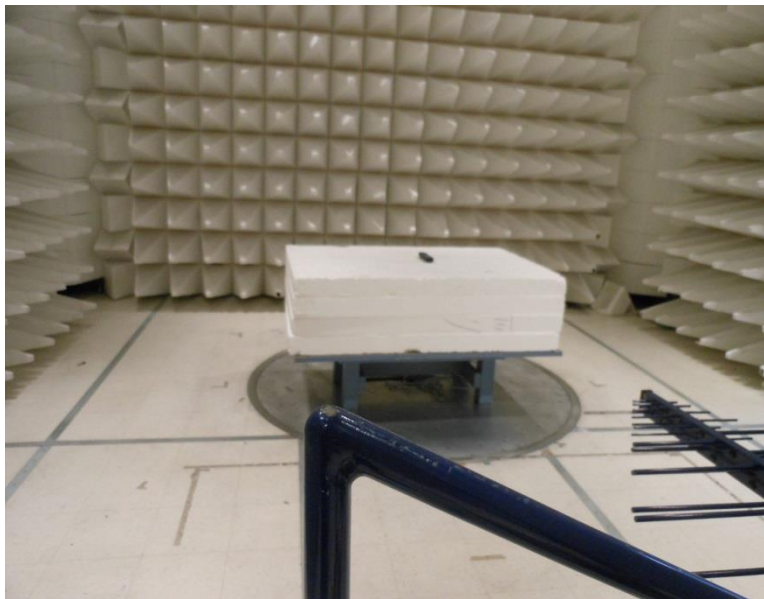
Test Conditions / Notes:

15.31e Set up
Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa

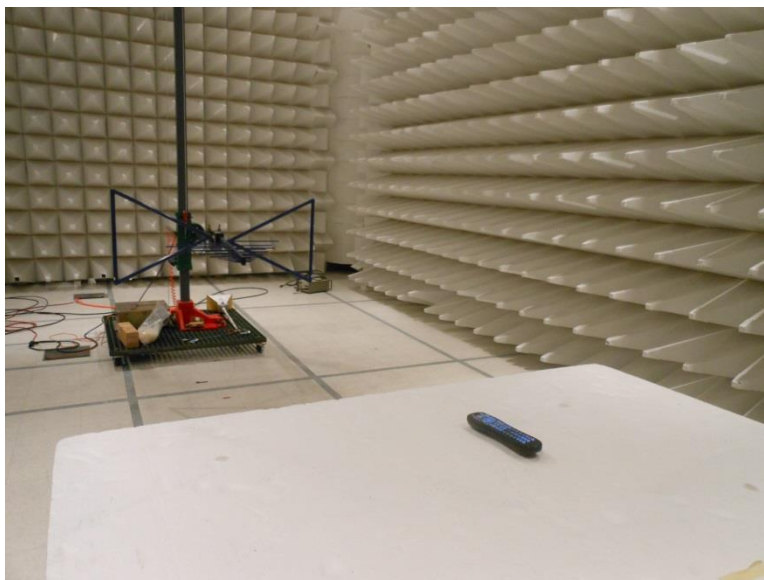
High Clock: 433.995MHz for TX
Software Used: OTP microcontroller
Transmitting Operation Frequency: 433.92MHz
RBW=100kHz
VBW=300kHz

15.31e: Using a fresh battery. The fundamental is not changed.

Test Setup Photos



TEST SETUP, FRONT VIEW



TEST SETUP, BACK VIEW

15.231(c) -20dBc Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Celadon, Inc.**
 Specification: **15.231 c**
 Work Order #: **94142** Date: 8/12/2013
 Test Type: **Radiated Scan** Time: 12:25:15
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 1
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

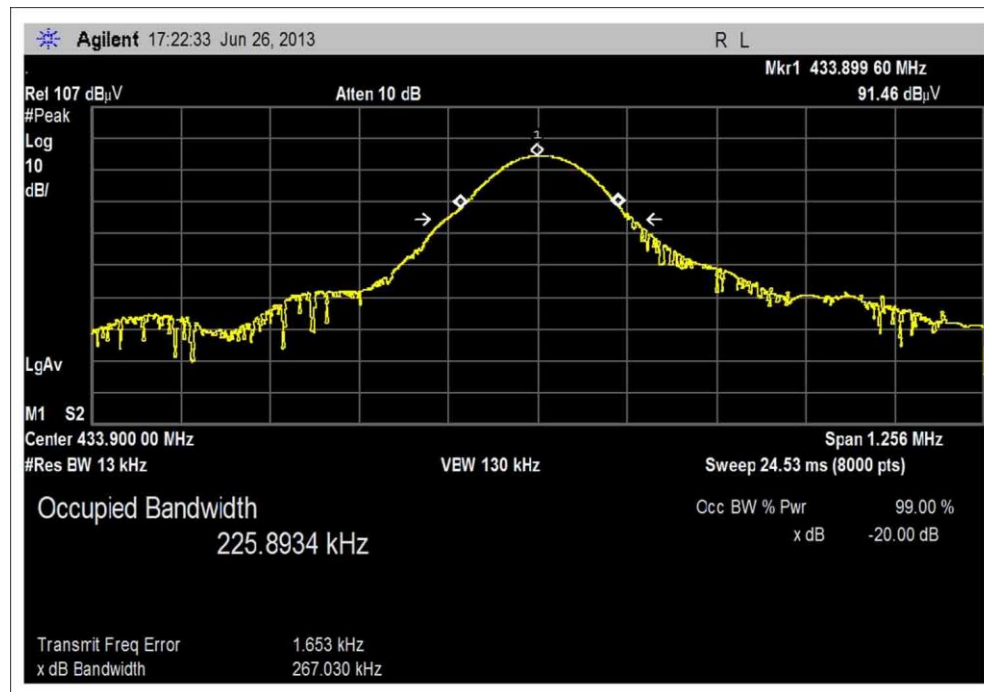
Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

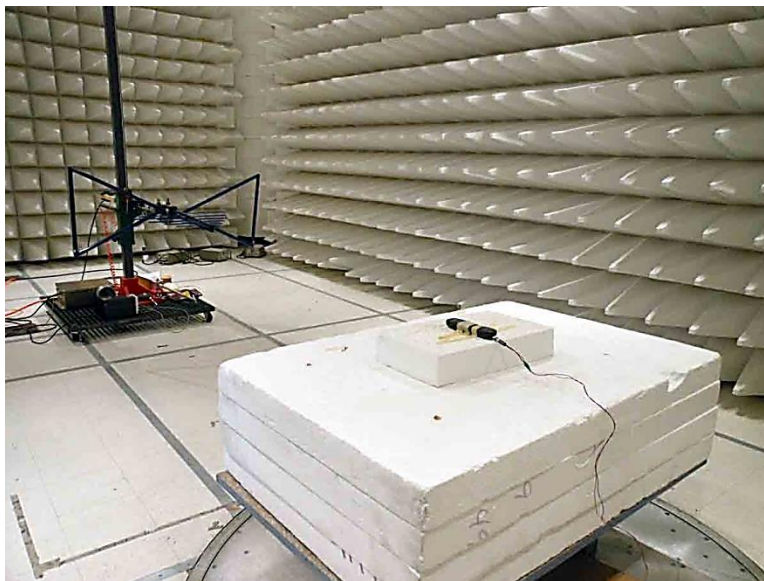
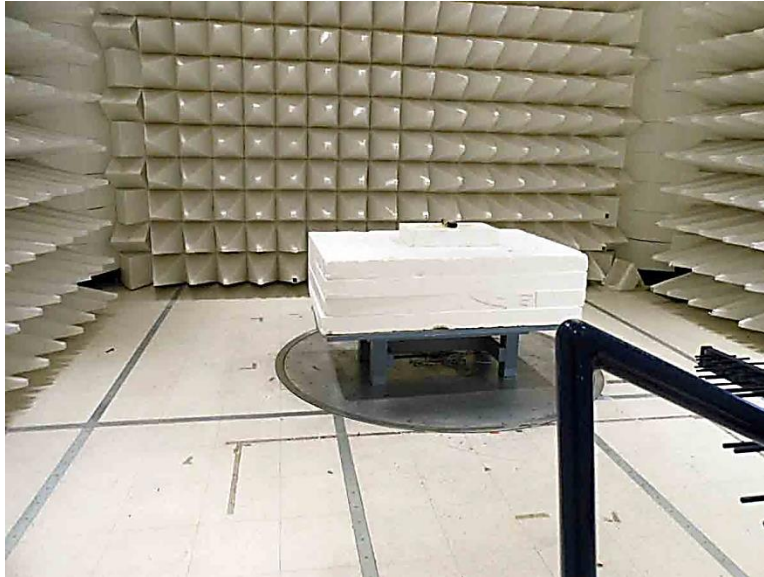
Test Conditions / Notes:

15.231 c
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Transmitting Operation Frequency: 433.92MHz
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 15.231(c) Limit: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Data



Test Setup Photos



RSS-210 99 % Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**

Specification: **RSS-210**

Work Order #: **94142**

Date: 8/12/2013

Test Type: **Radiated Scan**

Time: 12:25:15

Equipment: **SR52C Remote Control with
433.92MHz Radio**

Sequence#: 1

Manufacturer: Celadon, Inc.

Tested By: Hieu Song Nguyenpham

Model: FGSR52C-BWC-01

S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T5	ANP05300	Cable	RG214/U	3/25/2013	3/25/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

15. 231 c

Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa

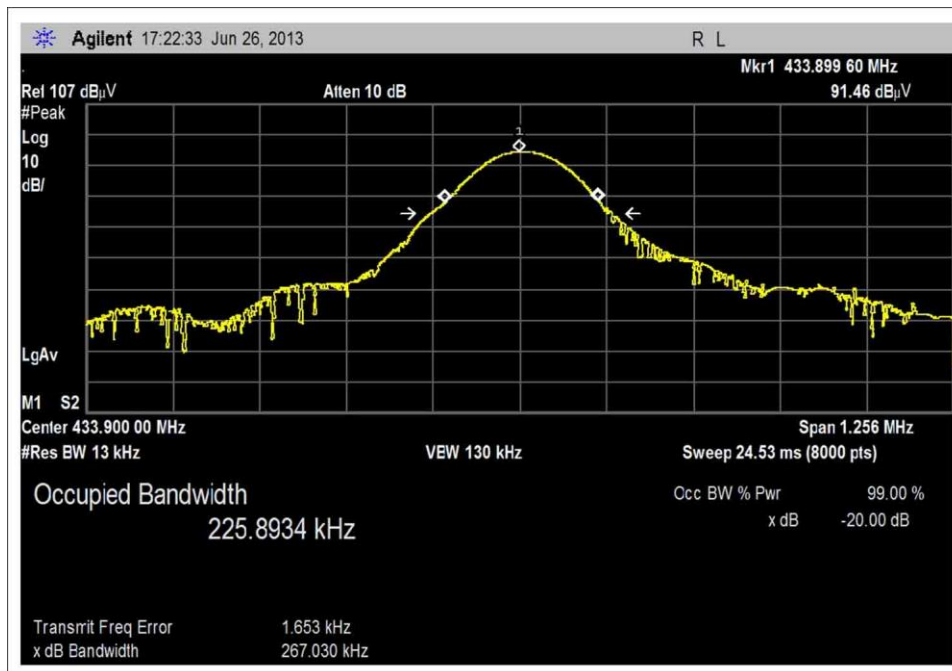
High Clock: 433.995MHz for TX; Software Used: OTP microcontroller

Transmitting Operation Frequency: 433.92MHz,

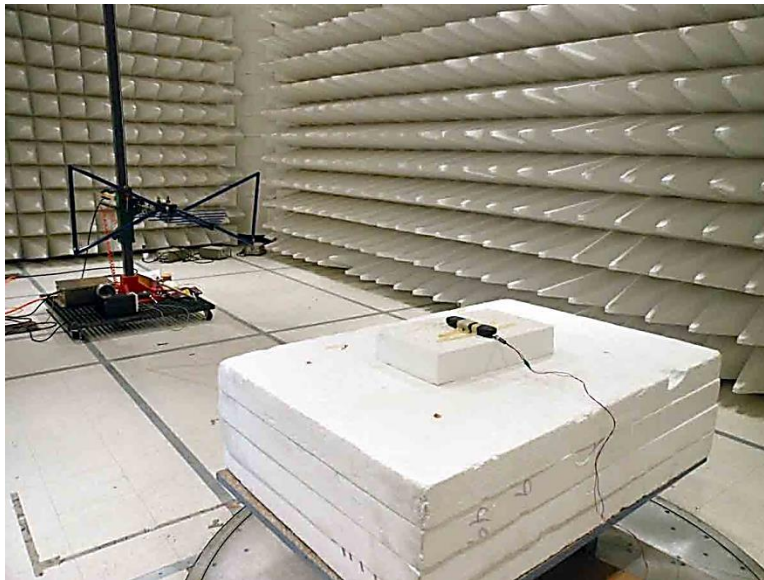
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table

15.231(c) Limit: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Data



Test Setup Photos



15.231(b) Field Strength of Spurious Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 16:39:04
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 22
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T1	AN00432	Loop Antenna	6502	4/2/2013	4/2/2015
T2	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T3	ANP05440	Cable	RG214/U	1/21/2013	1/21/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 9kHz to 30MHz
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Rated Output Power = 0dBm
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW= 200Hz from 9kHz to 150kHz
 RBW=VBW= 9kHz from 150kHz to 30MHz
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: X-axis

Ext Attn: 0 dB

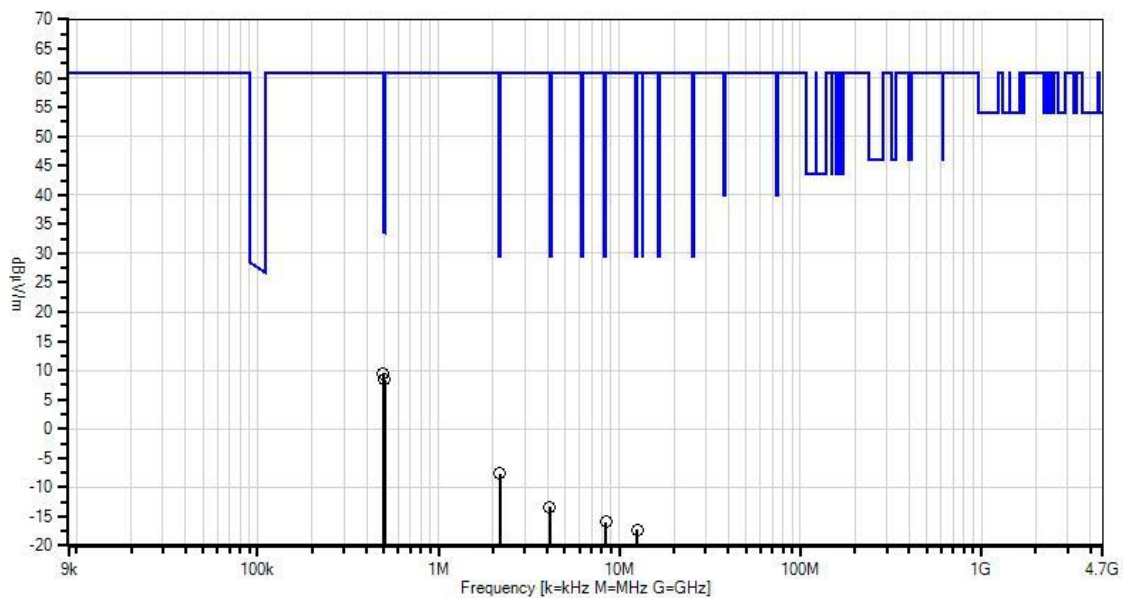
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB		Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	496.414k	39.6	+9.8	+0.1	+0.0		-40.0	9.5	33.7	-24.2	Perpe
2	503.329k	38.5	+9.8	+0.1	+0.0		-40.0	8.4	33.5	-25.1	Paral
3	2.178M	22.2	+9.9	+0.1	+0.1		-40.0	-7.7	29.5	-37.2	Perpe
4	4.125M	16.5	+9.8	+0.2	+0.1		-40.0	-13.4	29.5	-42.9	Perpe
5	8.385M	13.8	+9.8	+0.3	+0.2		-40.0	-15.9	29.5	-45.4	Paral
6	12.520M	13.0	+9.2	+0.3	+0.2		-40.0	-17.3	29.5	-46.8	Paral

CKC Laboratories, Inc Date: 5/29/2013 Time: 16:39:04 Celadon, Inc WO#: 94142
Test Distance: 3 Meters Sequence#: 22



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
— 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 11:39:50
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 4
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
T5	ANP05440	Cable	RG214/U	1/21/2013	1/21/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T6	ANDuty Cycle	<-Select Sub Type->		5/29/2013	5/29/2015
	Corrected Factor				

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 30MHz to 1000MHz
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW=120kHz
 Rated Output Power = 0dBm
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: X-axis

Ext Attn: 0 dB

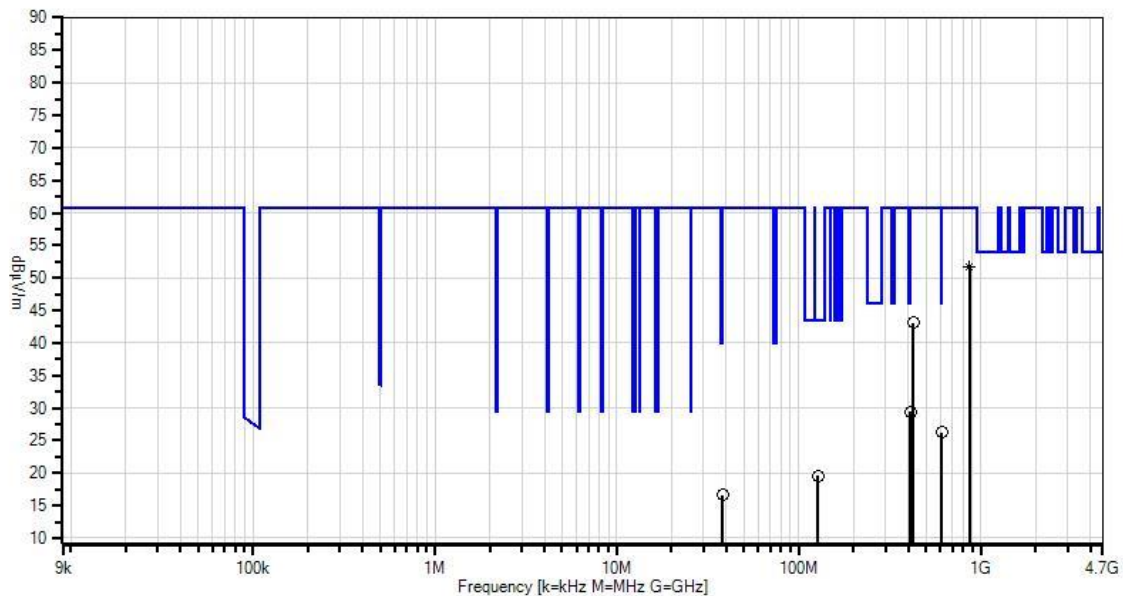
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	867.802M	61.2	-27.0 +2.1	+22.9 -11.8	+3.4	+0.9	+0.0	51.7	60.8	-9.1	Vert
^	867.802M	73.7	-27.0 +2.1	+22.9 +0.0	+3.4	+0.9	+0.0	76.0	60.8	+15.2	Vert
^	867.802M	70.2	-27.0 +2.1	+22.9 +0.0	+3.4	+0.9	+0.0	72.5	60.8	+11.7	Vert
4	409.702M	36.5	-27.0 +1.3	+16.0 +0.0	+2.2	+0.4	+0.0	29.4	46.0	-16.6	Vert
5	425.798M	49.5	-27.0 +1.3	+16.6 +0.0	+2.2	+0.5	+0.0	43.1	60.8	-17.7	Vert
6	608.741M	29.0	-26.9 +1.6	+19.2 +0.0	+2.7	+0.6	+0.0	26.2	46.0	-19.8	Horiz
7	38.119M	28.3	-27.1 +0.3	+14.3 +0.0	+0.6	+0.2	+0.0	16.6	40.0	-23.4	Horiz
8	127.540M	33.5	-27.1 +0.6	+11.4 +0.0	+1.1	+0.1	+0.0	19.6	43.5	-23.9	Horiz

CKC Laboratories, Inc Date: 5/29/2013 Time: 11:39:50 Celadon, Inc WO#: 94142
Test Distance: 3 Meters Sequence#: 4



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
— 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 6/13/2013
 Test Type: **Radiated Scan** Time: 16:32:15
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 19
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T1	AN03114	Preamp	AMF-7D-00101800-30-10P	4/11/2013	4/11/2015
T2	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T4	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
T5	ANP05843	Cable	32022-2-29094K-48TC	8/7/2012	8/7/2014
T6	AN02754	High Pass Filter	6IH40-500/T3000-O/O	2/9/2012	2/9/2014
T7	ANDuty Cycle Correcte Factor	<-Select Sub Type->		5/29/2013	5/29/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 1000MHz to 4500MHz
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW=1MHz
 Rated Output Power = 0dBm
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: X-axis

Ext Attn: 0 dB

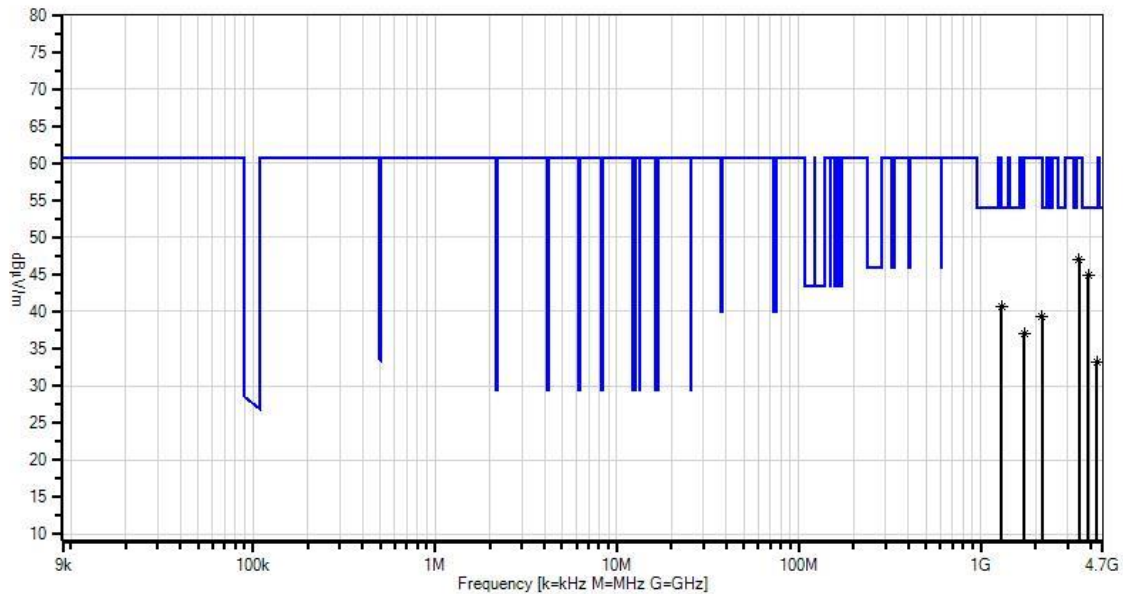
Measurement Data:

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	3905.022M	77.3	-59.4 +1.1	+32.5 +0.3	+1.4 -11.8	+3.4	+0.0	44.8	54.0	-9.2	Vert
^	3905.022M	87.4	-59.4 +1.1	+32.5 +0.3	+1.4 +0.0	+3.4	+0.0	66.7	54.0	+12.7	Vert
^	3905.022M	85.4	-59.4 +1.1	+32.5 +0.3	+1.4 +0.0	+3.4	+0.0	64.7	54.0	+10.7	Vert
4	1301.771M	82.6	-59.0 +0.6	+25.4 +0.3	+0.8 -11.8	+1.7	+0.0	40.6	54.0	-13.4	Horiz
^	1301.771M	101.3	-59.0 +0.6	+25.4 +0.3	+0.8 +0.0	+1.7	+0.0	71.1	54.0	+17.1	Horiz
^	1301.771M	101.0	-59.0 +0.6	+25.4 +0.3	+0.8 +0.0	+1.7	+0.0	70.8	54.0	+16.8	Horiz
7	3471.175M	81.5	-59.3 +1.0	+31.2 +0.2	+1.3 -11.8	+3.0	+0.0	47.1	60.8	-13.7	Horiz
^	3471.175M	93.3	-59.3 +1.0	+31.2 +0.2	+1.3 +0.0	+3.0	+0.0	70.7	60.8	+9.9	Horiz
^	3471.175M	93.2	-59.3 +1.0	+31.2 +0.2	+1.3 +0.0	+3.0	+0.0	70.6	60.8	+9.8	Horiz
10	4338.958M	65.3	-59.0 +1.2	+32.2 +0.3	+1.4 -11.8	+3.6	+0.0	33.2	54.0	-20.8	Horiz
^	4338.958M	85.9	-59.0 +1.2	+32.2 +0.3	+1.4 +0.0	+3.6	+0.0	65.6	54.0	+11.6	Horiz
^	4338.958M	84.3	-59.0 +1.2	+32.2 +0.3	+1.4 +0.0	+3.6	+0.0	64.0	54.0	+10.0	Horiz
13	2169.439M	77.3	-58.5 +0.9	+27.8 +0.2	+1.0 -11.8	+2.5	+0.0	39.4	60.8	-21.4	Vert
^	2169.439M	89.6	-58.5 +0.9	+27.8 +0.2	+1.0 +0.0	+2.5	+0.0	63.5	60.8	+2.7	Vert
^	2169.439M	88.1	-58.5 +0.9	+27.8 +0.2	+1.0 +0.0	+2.5	+0.0	62.0	60.8	+1.2	Vert
16	1735.595M	77.2	-58.8 +0.8	+26.4 +0.2	+0.9 -11.8	+2.0	+0.0	36.9	60.8	-23.9	Vert
^	1735.595M	90.3	-58.8 +0.8	+26.4 +0.2	+0.9 +0.0	+2.0	+0.0	61.8	60.8	+1.0	Vert
^	1735.595M	90.1	-58.8 +0.8	+26.4 +0.2	+0.9 +0.0	+2.0	+0.0	61.6	60.8	+0.8	Vert

CKC Laboratories, Inc Date: 6/13/2013 Time: 16:32:15 Celadon, Inc WO#: 94142
 Test Distance: 3 Meters Sequence#: 19



— Readings
 × QP Readings
 ▼ Ambient
 ○ Peak Readings
 * Average Readings
 — 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 16:50:16
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 25
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T1	AN00432	Loop Antenna	6502	4/2/2013	4/2/2015
T2	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T3	ANP05440	Cable	RG214/U	1/21/2013	1/21/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 9kHz to 30MHz
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Rated Output Power = 0dBm
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW=200 from 9kHz to 150kHz
 RBW=VBW=9kHz from 150kHz to 30MHz
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: Y-axis

Ext Attn: 0 dB

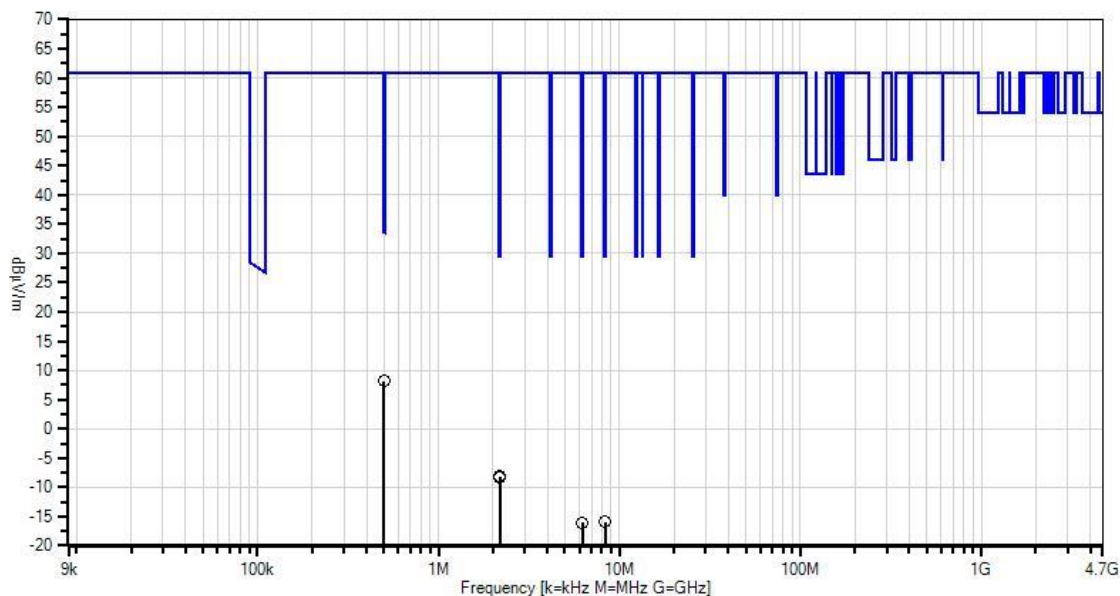
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB		Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	498.920k	38.3	+9.8	+0.1	+0.0		-40.0	8.2	33.6	-25.4	Perpe
2	498.920k	38.2	+9.8	+0.1	+0.0		-40.0	8.1	33.6	-25.5	Paral
3	2.175M	21.7	+9.9	+0.1	+0.1		-40.0	-8.2	29.5	-37.7	Paral
4	2.175M	21.6	+9.9	+0.1	+0.1		-40.0	-8.3	29.5	-37.8	Perpe
5	8.362M	13.8	+9.8	+0.3	+0.2		-40.0	-15.9	29.5	-45.4	Perpe
6	6.218M	13.9	+9.8	+0.2	+0.1		-40.0	-16.0	29.5	-45.5	Paral

CKC Laboratories, Inc Date: 5/29/2013 Time: 16:50:16 Celadon, Inc WO#: 94142
Test Distance: 3 Meters Sequence#: 25



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
— 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 13:38:55
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 7
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
T5	ANP05440	Cable	RG214/U	1/21/2013	1/21/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T6	ANDuty Cycle	<-Select Sub Type->		5/29/2013	5/29/2015
	Correcte Factor				

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 30MHz to 1000MHz
 Temperature: 21.1°C
 Humidity: 40%
 Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW=120kHz
 Rated Output Power = 0dBm
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: Y-axis

Ext Attn: 0 dB

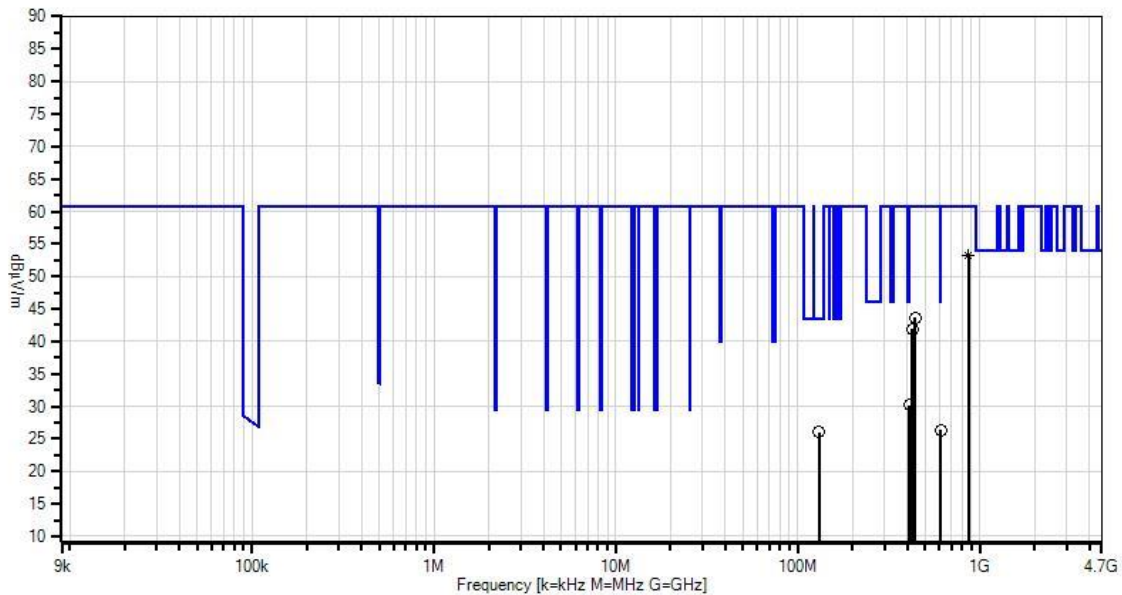
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	867.807M	62.6	-27.0 +2.1	+22.9 -11.8	+3.4	+0.9	+0.0	53.1	60.8	-7.7	Horiz
^	867.807M	74.7	-27.0 +2.1	+22.9 +0.0	+3.4	+0.9	+0.0	77.0	60.8	+16.2	Horiz
3	409.702M	37.3	-27.0 +1.3	+16.0 +0.0	+2.2	+0.4	+0.0	30.2	46.0	-15.8	Vert
4	441.894M	49.6	-27.1 +1.3	+17.1 +0.0	+2.2	+0.5	+0.0	43.6	60.8	-17.2	Vert
5	131.624M	39.9	-27.0 +0.6	+11.3 +0.0	+1.1	+0.1	+0.0	26.0	43.5	-17.5	Horiz
6	425.798M	48.3	-27.0 +1.3	+16.6 +0.0	+2.2	+0.5	+0.0	41.9	60.8	-18.9	Horiz
7	610.903M	28.9	-26.9 +1.6	+19.4 +0.0	+2.7	+0.6	+0.0	26.3	46.0	-19.7	Vert

CKC Laboratories, Inc Date: 5/29/2013 Time: 13:38:55 Celadon, Inc WO#: 94142
Test Distance: 3 Meters Sequence#: 7



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
— 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 15:49:35
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 16
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T1	AN03114	Preamp	AMF-7D-00101800-30-10P	4/11/2013	4/11/2015
T2	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T4	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
T5	ANP05843	Cable	32022-2-29094K-48TC	8/7/2012	8/7/2014
T6	AN02754	High Pass Filter	6IH40-500/T3000-O/O	2/9/2012	2/9/2014
T7	ANDuty Cycle Correcte Factor	<-Select Sub Type->		5/29/2013	5/29/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 1000MHz to 4500MHz
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Rated Output Power = 0dBm
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW=1MHz
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: Y-axis

Ext Attn: 0 dB

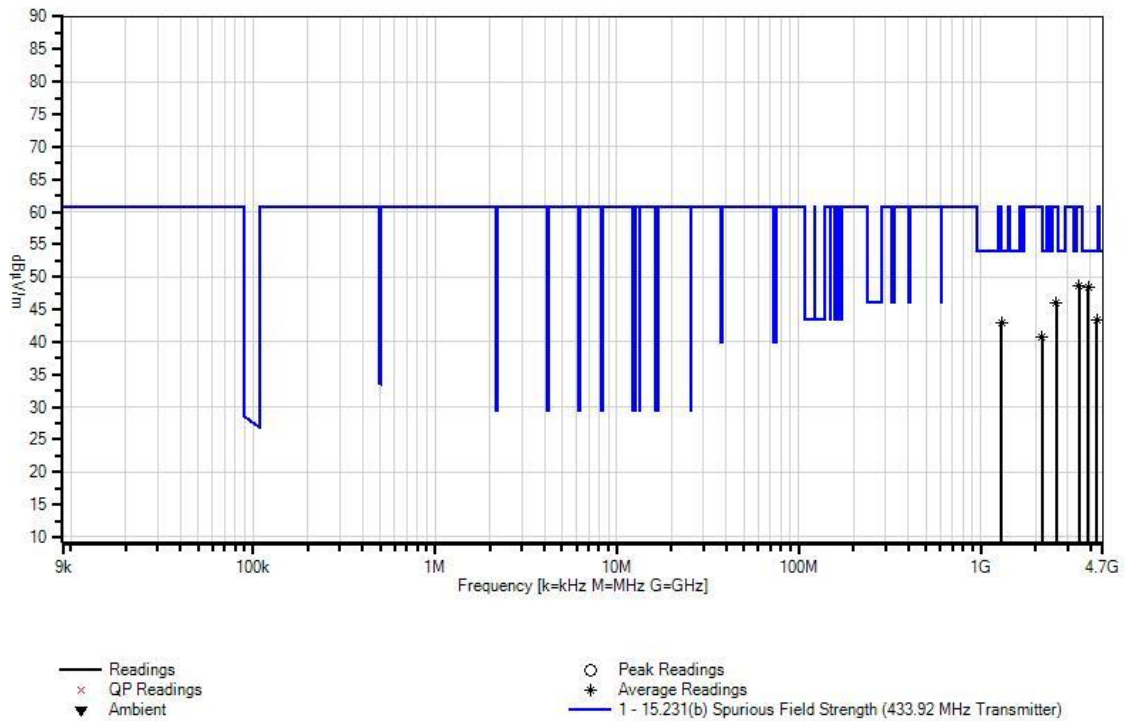
Measurement Data:

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	3905.062M Ave	81.0	-59.4 +1.1	+32.5 +0.3	+1.4 -11.8	+3.4	+0.0	48.5	54.0	-5.5	Horiz
^	3905.062M	92.3	-59.4 +1.1	+32.5 +0.3	+1.4 +0.0	+3.4	+0.0	71.6	54.0	+17.6	Horiz
^	3905.062M	92.0	-59.4 +1.1	+32.5 +0.3	+1.4 +0.0	+3.4	+0.0	71.3	54.0	+17.3	Horiz
4	4339.063M Ave	75.5	-59.0 +1.2	+32.2 +0.3	+1.4 -11.8	+3.6	+0.0	43.4	54.0	-10.6	Horiz
^	4339.063M	87.8	-59.0 +1.2	+32.2 +0.3	+1.4 +0.0	+3.6	+0.0	67.5	54.0	+13.5	Horiz
^	4339.063M	87.2	-59.0 +1.2	+32.2 +0.3	+1.4 +0.0	+3.6	+0.0	66.9	54.0	+12.9	Horiz
7	1301.764M Ave	84.8	-59.0 +0.6	+25.4 +0.3	+0.8 -11.8	+1.7	+0.0	42.8	54.0	-11.2	Vert
^	1301.764M	98.0	-59.0 +0.6	+25.4 +0.3	+0.8 +0.0	+1.7	+0.0	67.8	54.0	+13.8	Vert
^	1301.764M	96.2	-59.0 +0.6	+25.4 +0.3	+0.8 +0.0	+1.7	+0.0	66.0	54.0	+12.0	Vert
10	3471.217M Ave	83.1	-59.3 +1.0	+31.2 +0.2	+1.3 -11.8	+3.0	+0.0	48.7	60.8	-12.1	Horiz
^	3471.217M	95.5	-59.3 +1.0	+31.2 +0.2	+1.3 +0.0	+3.0	+0.0	72.9	60.8	+12.1	Horiz
^	3471.217M	94.6	-59.3 +1.0	+31.2 +0.2	+1.3 +0.0	+3.0	+0.0	72.0	60.8	+11.2	Horiz
13	2603.480M Ave	82.4	-58.9 +0.9	+29.3 +0.2	+1.1 -11.8	+2.8	+0.0	46.0	60.8	-14.8	Vert
^	2603.480M	94.9	-58.9 +0.9	+29.3 +0.2	+1.1 +0.0	+2.8	+0.0	70.3	60.8	+9.5	Vert
^	2603.480M	94.6	-58.9 +0.9	+29.3 +0.2	+1.1 +0.0	+2.8	+0.0	70.0	60.8	+9.2	Vert
16	2169.457M Ave	78.7	-58.5 +0.9	+27.8 +0.2	+1.0 -11.8	+2.5	+0.0	40.8	60.8	-20.0	Vert
^	2169.457M	90.5	-58.5 +0.9	+27.8 +0.2	+1.0 +0.0	+2.5	+0.0	64.4	60.8	+3.6	Vert
^	2169.457M	89.1	-58.5 +0.9	+27.8 +0.2	+1.0 +0.0	+2.5	+0.0	63.0	60.8	+2.2	Vert

CKC Laboratories, Inc Date: 5/29/2013 Time: 15:49:35 Celadon, Inc WO#: 94142
 Test Distance: 3 Meters Sequence#: 16



Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 17:00:30
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 28
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T1	AN00432	Loop Antenna	6502	4/2/2013	4/2/2015
T2	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T3	ANP05440	Cable	RG214/U	1/21/2013	1/21/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

<p>Radiated Spurious Emission Frequency Range: 9kHz to 30MHz</p> <p>Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa</p> <p>High Clock: 433.995MHz for TX Software Used: OTP microcontroller Transmitting Operation Frequency: 433.92MHz RBW=VBW= 200Hz from 9kHz to 150kHz RBW=VBW=9kHz from 150kHz to 30MHz Rated Output Power = 0dBm</p> <p>Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table</p> <p>Note: Z-axis</p>
--

Ext Attn: 0 dB

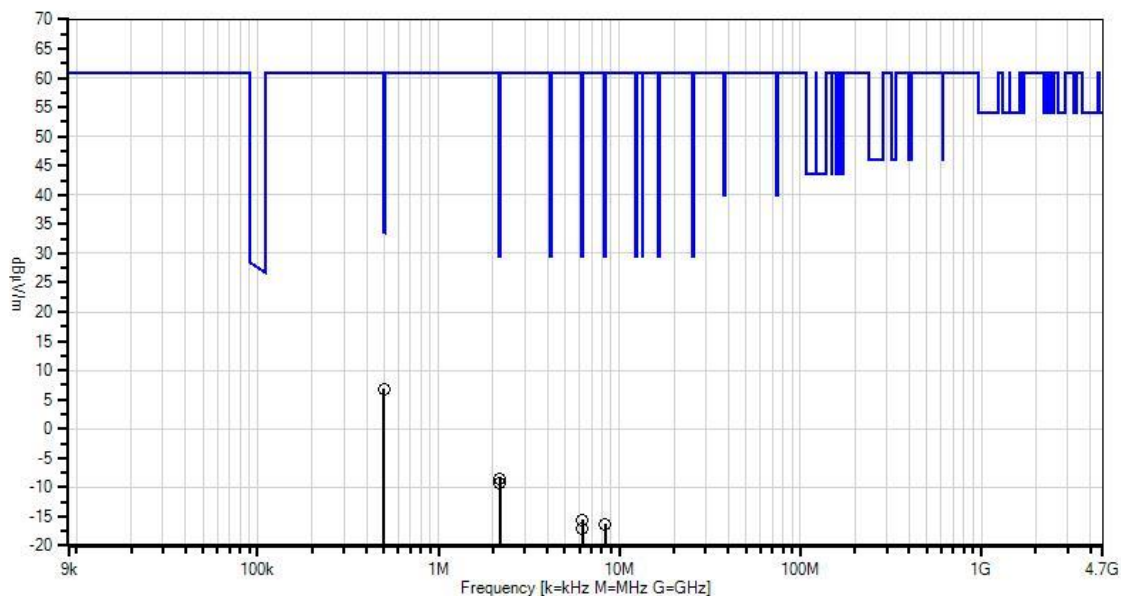
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 dB	T2 dB	T3 dB		Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	498.920k	36.9	+9.8	+0.1	+0.0		-40.0	6.8	33.6	-26.8	Perpe
2	2.175M	21.4	+9.9	+0.1	+0.1		-40.0	-8.5	29.5	-38.0	Perpe
3	2.184M	20.7	+9.9	+0.1	+0.1		-40.0	-9.2	29.5	-38.7	Paral
4	6.218M	14.4	+9.8	+0.2	+0.1		-40.0	-15.5	29.5	-45.0	Perpe
5	8.362M	13.4	+9.8	+0.3	+0.2		-40.0	-16.3	29.5	-45.8	Paral
6	6.218M	12.7	+9.8	+0.2	+0.1		-40.0	-17.2	29.5	-46.7	Paral

CKC Laboratories, Inc Date: 5/29/2013 Time: 17:00:30 Celadon, Inc WO#: 94142
Test Distance: 3 Meters Sequence#: 28



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
— 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 14:28:32
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 10
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00730	Preamp	8447D	1/17/2013	1/17/2015
T2	AN00852	Biconilog Antenna	CBL 6111C	11/28/2012	11/28/2014
T3	ANP00880	Cable	RG214U	7/30/2012	7/30/2014
T4	ANP01183	Cable	CNT-195	10/24/2011	10/24/2013
T5	ANP05440	Cable	RG214/U	1/21/2013	1/21/2015
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T6	ANDuty Cycle	<-Select Sub Type->		5/29/2013	5/29/2015
	Correcte Factor				

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 30MHz to 1000MHz

Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa

High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Transmitting Operation Frequency: 433.92MHz

RBW=VBW=120kHz

Rated Output Power = 0dBm

Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table

Note: Z-axis

Ext Attn: 0 dB

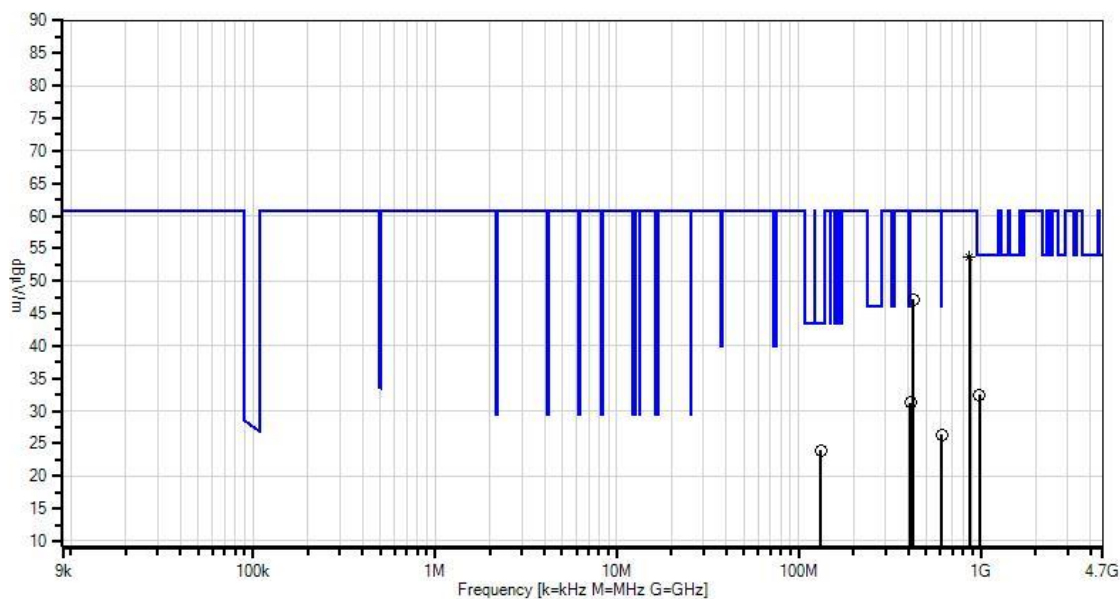
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq MHz	Rdng dB μ V	T1 T5 dB	T2 T6 dB	T3 dB	T4 dB	Dist Table	Corr dB μ V/m	Spec dB μ V/m	Margin dB	Polar Ant
1	867.719M	63.2	-27.0 +2.1	+22.9 -11.8	+3.4	+0.9	+0.0	53.7	60.8	-7.1	Horiz
^	867.719M	75.6	-27.0 +2.1	+22.9 +0.0	+3.4	+0.9	+0.0	77.9	60.8	+17.1	Horiz
^	867.719M	75.5	-27.0 +2.1	+22.9 +0.0	+3.4	+0.9	+0.0	77.8	60.8	+17.0	Horiz
4	425.798M	53.5	-27.0 +1.3	+16.6 +0.0	+2.2	+0.5	+0.0	47.1	60.8	-13.7	Horiz
5	409.702M	38.4	-27.0 +1.3	+16.0 +0.0	+2.2	+0.4	+0.0	31.3	46.0	-14.7	Vert
6	132.825M	37.7	-27.0 +0.6	+11.4 +0.0	+1.1	+0.1	+0.0	23.9	43.5	-19.6	Horiz
7	610.422M	29.0	-26.9 +1.6	+19.3 +0.0	+2.7	+0.6	+0.0	26.3	46.0	-19.7	Vert
8	982.406M	28.6	-27.2 +2.2	+24.3 +0.0	+3.6	+1.0	+0.0	32.5	54.0	-21.5	Vert

CKC Laboratories, Inc Date: 5/29/2013 Time: 14:28:32 Celadon, Inc WO#: 94142
Test Distance: 3 Meters Sequence#: 10



— Readings
× QP Readings
▼ Ambient

○ Peak Readings
* Average Readings
— 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170

Customer: **Celadon, Inc.**
 Specification: **15.231(b) Spurious Field Strength (433.92 MHz Transmitter)**
 Work Order #: **94142** Date: 5/29/2013
 Test Type: **Radiated Scan** Time: 15:24:02
 Equipment: **SR52C Remote Control with 433.92MHz Radio** Sequence#: 13
 Manufacturer: Celadon, Inc. Tested By: Hieu Song Nguyenpham
 Model: FGSR52C-BWC-01
 S/N: ENG1

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02668	Spectrum Analyzer	E4446A	2/22/2013	2/22/2015
T1	AN03114	Preamplifier	AMF-7D-00101800-30-10P	4/11/2013	4/11/2015
T2	AN02157	Horn Antenna-ANSI C63.5	3115	1/23/2013	1/23/2015
T3	AN03302	Cable	32026-29094K-29094K-72TC	3/21/2012	3/21/2014
T4	ANP01210	Cable	FSJ1P-50A-4A	2/19/2013	2/19/2015
T5	ANP05843	Cable	32022-2-29094K-48TC	8/7/2012	8/7/2014
T6	AN02754	High Pass Filter	6IH40-500/T3000-O/O	2/9/2012	2/9/2014
T7	ANDuty Cycle Correct Factor	<-Select Sub Type->		5/29/2013	5/29/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
SR52C Remote Control with 433.92MHz Radio*	Celadon, Inc.	FGSR52C-BWC-01	ENG1

Support Devices:

Function	Manufacturer	Model #	S/N
DC power supply	Protek	3006B	AG4070

Test Conditions / Notes:

Radiated Spurious Emission
 Frequency Range: 1000MHz to 4500MHz
 Temperature: 21.1°C, Humidity: 40%, Atmospheric Pressure: 101.1 kPa
 High Clock: 433.995MHz for TX
 Software Used: OTP microcontroller
 Rated Output Power = 0dBm
 Transmitting Operation Frequency: 433.92MHz
 RBW=VBW=1MHz
Set up: The EUT is a handheld and battery device. Because the EUT is set in a continuously transmitting mode, the batteries will be drained fast. For testing purposes only, instead of using two AAA batteries to power the EUT, the EUT is connected straight to a DC power supply at 3VDC to ensure an input voltage consistent with fresh batteries. Since the DC power leads are not part of the EUT during operation, a ferrite (742 700 62) is installed on the DC cable which connects from the EUT to DC power supply with two pass through to suppress any noise on the DC cable more closely representing emissions with the batteries installed. The EUT is placed on 80 cm table at the center of turn table
 Note: Z-axis

Ext Attn: 0 dB

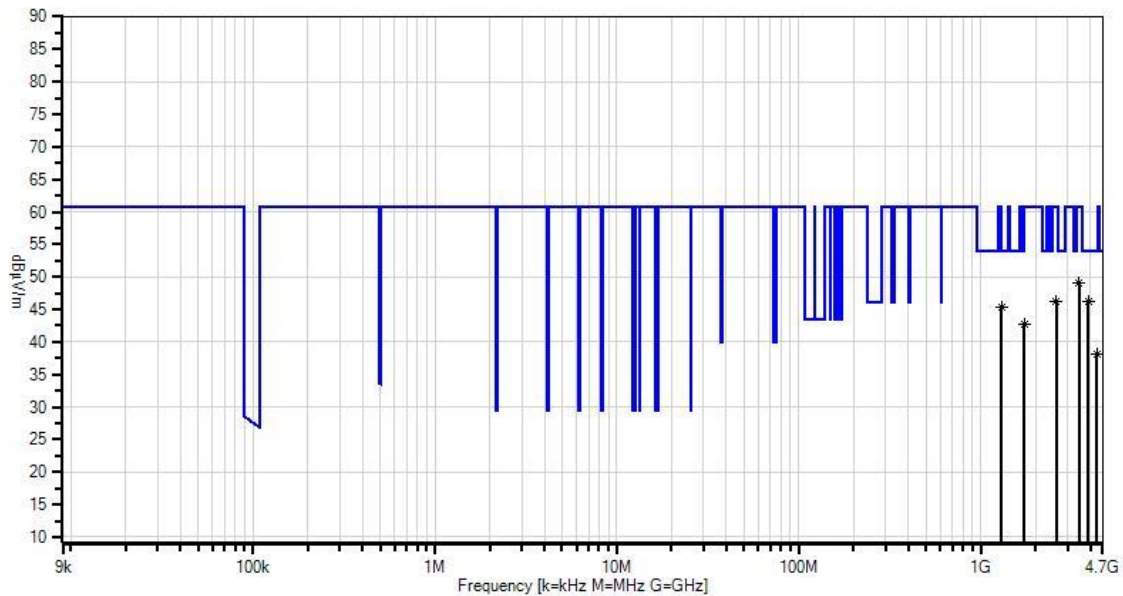
Measurement Data:

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	3905.090M Ave	78.7	-59.4 +1.1	+32.5 +0.3	+1.4 -11.8	+3.4	+0.0	46.2	54.0	-7.8	Horiz
^	3905.090M	90.2	-59.4 +1.1	+32.5 +0.3	+1.4 +0.0	+3.4	+0.0	69.5	54.0	+15.5	Horiz
^	3905.090M	87.2	-59.4 +1.1	+32.5 +0.3	+1.4 +0.0	+3.4	+0.0	66.5	54.0	+12.5	Horiz
4	1301.818M Ave	87.4	-59.0 +0.6	+25.4 +0.3	+0.8 -11.8	+1.7	+0.0	45.4	54.0	-8.6	Vert
^	1301.818M	103.0	-59.0 +0.6	+25.4 +0.3	+0.8 +0.0	+1.7	+0.0	72.8	54.0	+18.8	Vert
^	1301.818M	98.2	-59.0 +0.6	+25.4 +0.3	+0.8 +0.0	+1.7	+0.0	68.0	54.0	+14.0	Vert
7	3471.182M Ave	83.5	-59.3 +1.0	+31.2 +0.2	+1.3 -11.8	+3.0	+0.0	49.1	60.8	-11.7	Vert
^	3471.182M	96.1	-59.3 +1.0	+31.2 +0.2	+1.3 +0.0	+3.0	+0.0	73.5	60.8	+12.7	Vert
^	3471.182M	95.9	-59.3 +1.0	+31.2 +0.2	+1.3 +0.0	+3.0	+0.0	73.3	60.8	+12.5	Vert
10	2603.454M Ave	82.6	-58.9 +0.9	+29.3 +0.2	+1.1 -11.8	+2.8	+0.0	46.2	60.8	-14.6	Vert
^	2603.454M	98.5	-58.9 +0.9	+29.3 +0.2	+1.1 +0.0	+2.8	+0.0	73.9	60.8	+13.1	Vert
^	2603.454M	97.6	-58.9 +0.9	+29.3 +0.2	+1.1 +0.0	+2.8	+0.0	73.0	60.8	+12.2	Vert
13	4339.086M Ave	70.2	-59.0 +1.2	+32.2 +0.3	+1.4 -11.8	+3.6	+0.0	38.1	54.0	-15.9	Horiz
^	4339.086M	82.3	-59.0 +1.2	+32.2 +0.3	+1.4 +0.0	+3.6	+0.0	62.0	54.0	+8.0	Horiz
^	4339.086M	79.4	-59.0 +1.2	+32.2 +0.3	+1.4 +0.0	+3.6	+0.0	59.1	54.0	+5.1	Horiz
16	1735.540M Ave	83.1	-58.8 +0.8	+26.4 +0.2	+0.9 -11.8	+2.0	+0.0	42.8	60.8	-18.0	Horiz
^	1735.540M	95.3	-58.8 +0.8	+26.4 +0.2	+0.9 +0.0	+2.0	+0.0	66.8	60.8	+6.0	Horiz
^	1735.540M	93.1	-58.8 +0.8	+26.4 +0.2	+0.9 +0.0	+2.0	+0.0	64.6	60.8	+3.8	Horiz

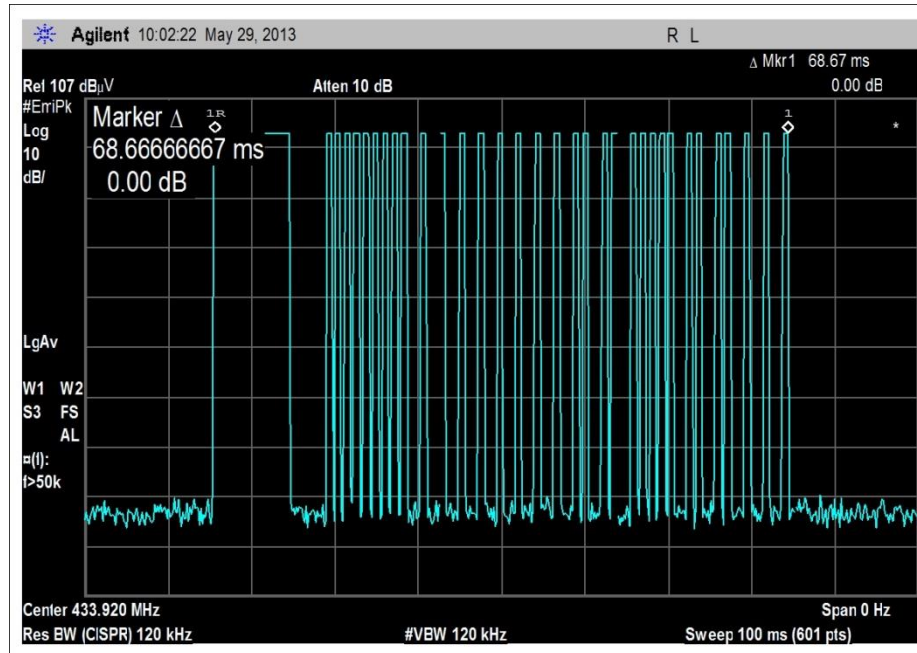
CKC Laboratories, Inc Date: 5/29/2013 Time: 15:24:02 Celadon, Inc WO#: 94142
 Test Distance: 3 Meters Sequence#: 13



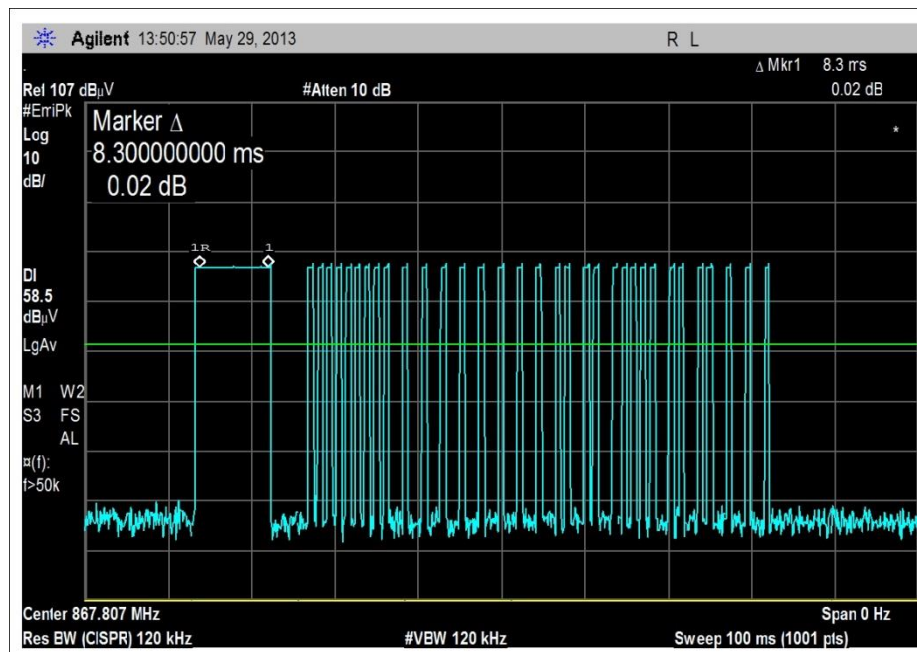
— Readings
 × QP Readings
 ▼ Ambient

○ Peak Readings
 * Average Readings
 — 1 - 15.231(b) Spurious Field Strength (433.92 MHz Transmitter)

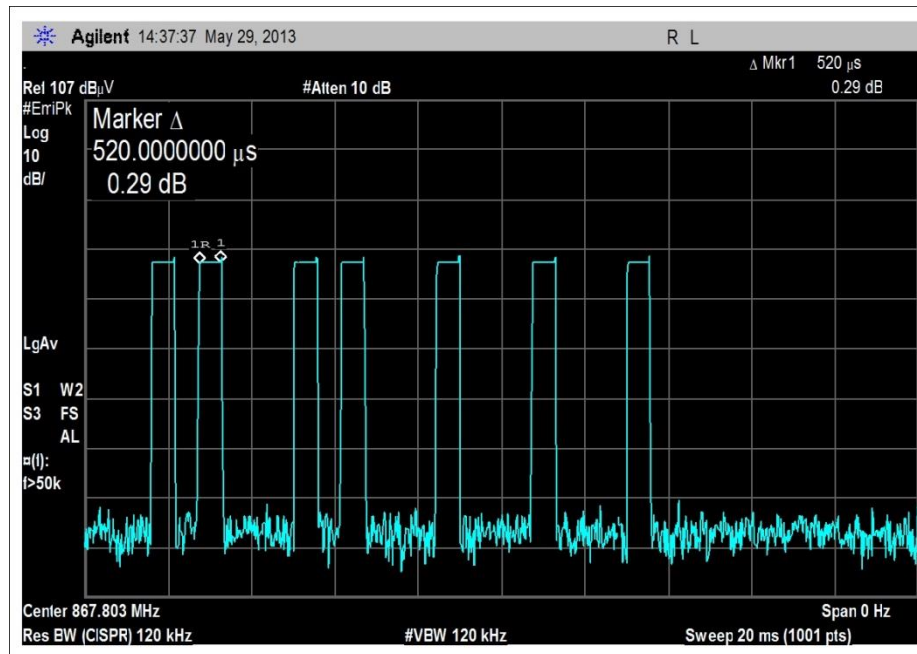
DUTY CYCLE CALCULATIONS FCC 15.231(b)(2)



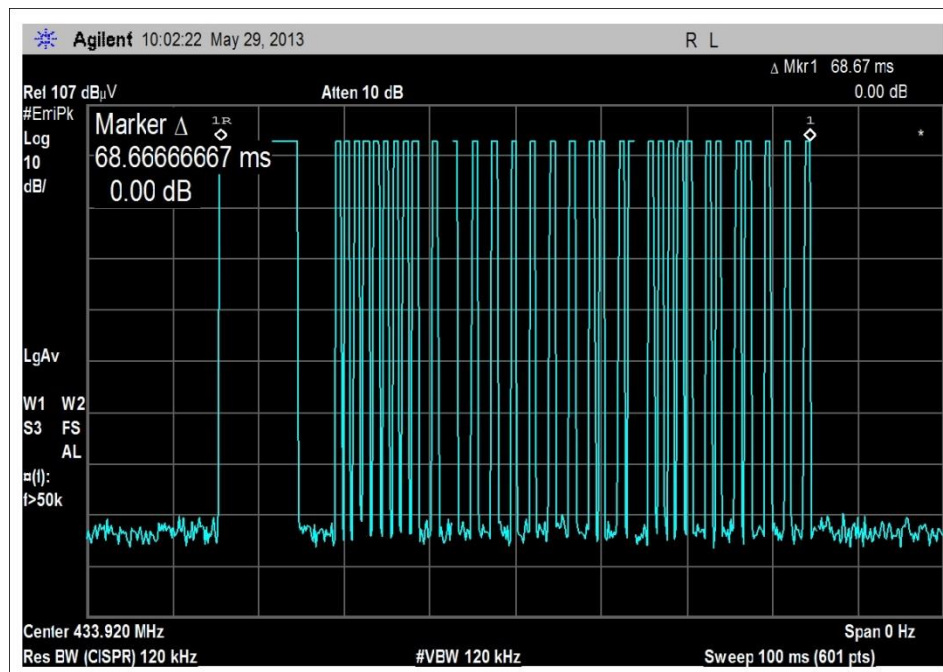
Total time of one pulse = 68.66667ms



Total on time of big pulse=8.3ms



Total on time of small pulse = 0.52ms



Total on time = 8.3 (big pulse) + (0.52*33)(small pulse)=25.46ms

Description	Total Time	On Time
Total Transmission	68.6667mSec.	25.46 mSec. in any 100 mSec.. Window.

FCC Rules 15.35(c)

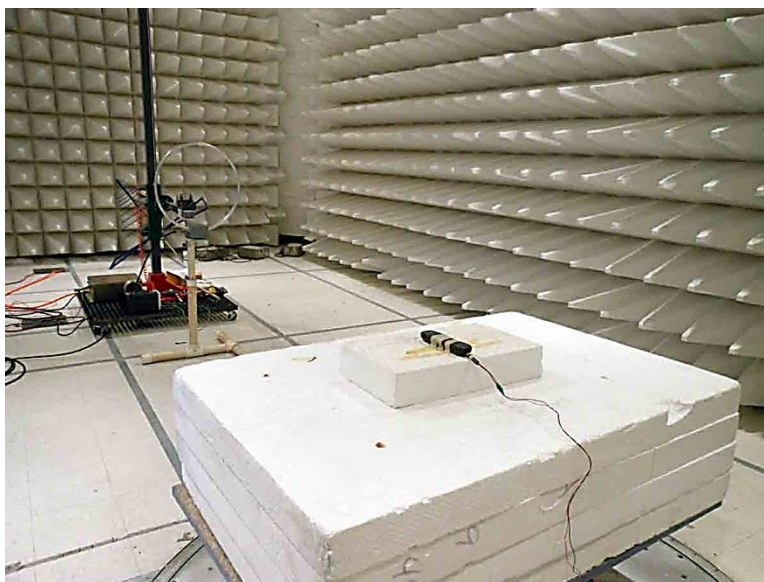
$$\frac{25.46 \text{ E-3 (on time)}}{100 \text{ E-3 (window)}} = 20 \log (0.2546) = -11.88 \text{ dB (per FCC rules)}$$

NOTE: The total on time per RF burst remains static.

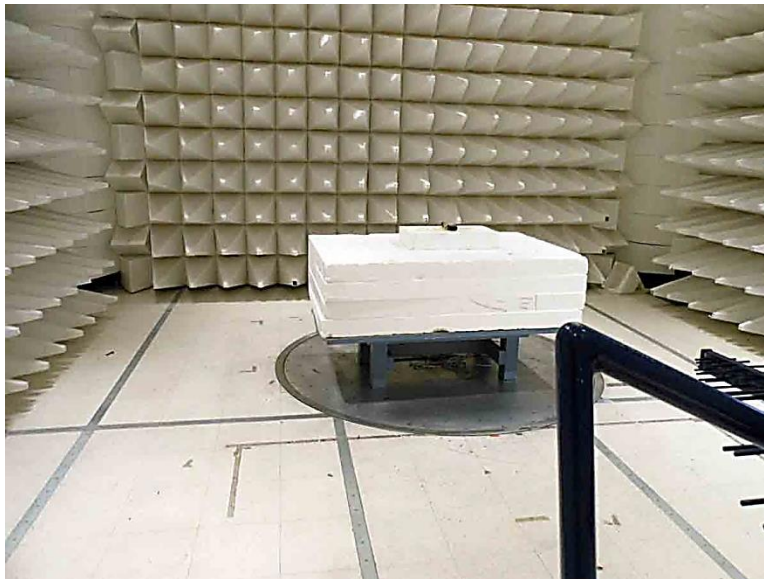
Test Setup Photos



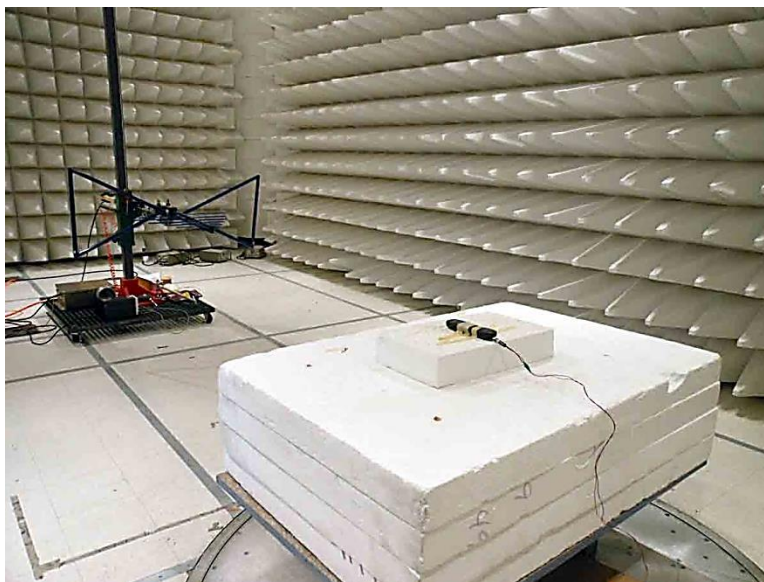
9kHz-30MHz



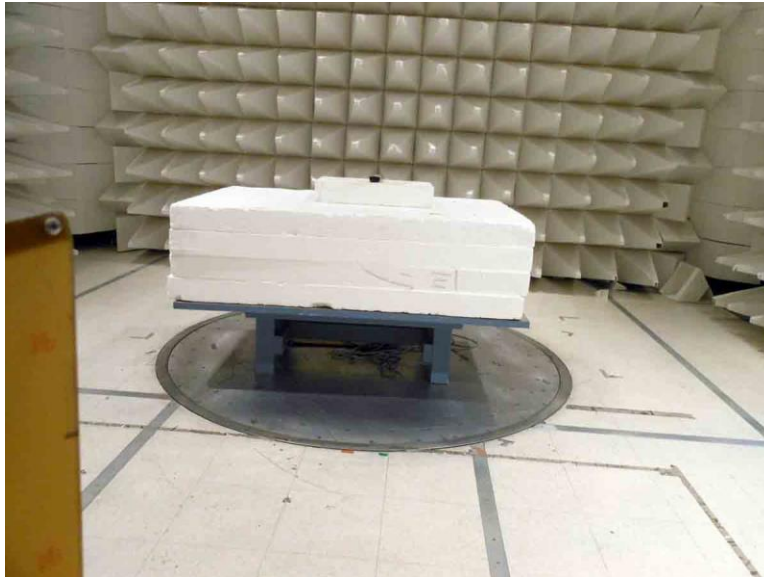
9kHz-30MHz



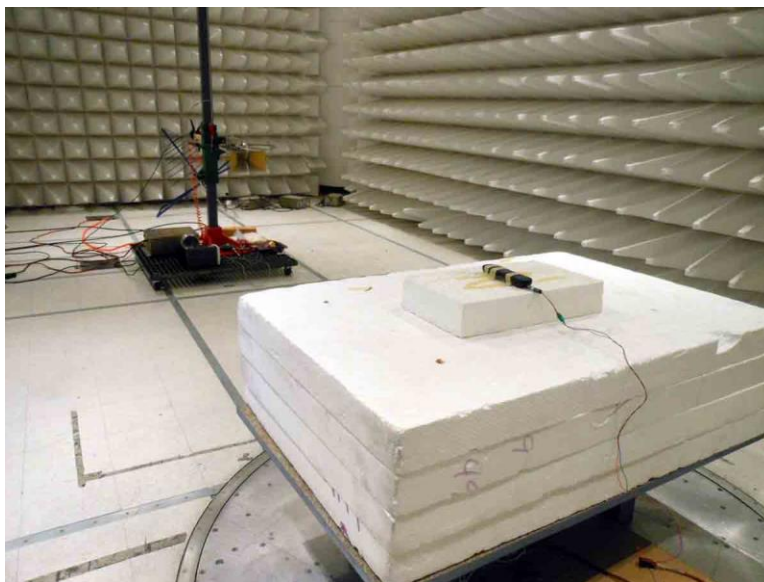
30MHz-1GHz



30MHz-1GHz



1-4.5GHz



1-4.5GHz

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.