

Ittron, Inc.

TEST REPORT FOR

**RF Telemetry Device
Model: CCU100**

Tested To The Following Standards:

**FCC Part 15 Subpart C Sections 15.247
and
RSS 210 Issue 8**

Report No.: 94370-2

Date of issue: April 25, 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:

Ittron, Inc.
2111 N. Molter Road
Liberty Lake, WA 99019

Representative: Jay Holcomb
Customer Reference Number: 50477

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

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 94370

April 17, 2013

April 17, 2013

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.

A handwritten signature in black ink that reads "Steve Behm". The signature is written in a cursive style and is positioned above a horizontal line.

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.
22116 23rd Drive S.E., Suite A
Bothell, WA 98021-4413

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
Bothell	US0081	SL2-IN-E-1145R	3082C-1	318736	A-0148

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C 15.247 & RSS 210 Issue 8

Description	Test Procedure/Method	Results
Radiated Spurious Emissions	FCC Subpart C 15.247 / RSS 210	Pass
Bandedge	FCC Subpart C 15.247	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
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

RF Telemetry Device

Manuf: Itron, Inc.

Model: CCU100

Serial: 74045094

PERIPHERAL DEVICES

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

Antenna

Manuf: Antenna Products

Model: AMR360-902-5-T0-N

Serial: 0929

FCC PART 15 SUBPART C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) 47 CFR 15C requirements for Unlicensed Radio Frequency Devices, Subpart C - Intentional Radiators.

15.247 Radiated Spurious Emissions

Test Data Sheets

Test Location: CKC Laboratories, Inc. • 22116 - 23rd Drive SE, Suite A • Bothell, WA. 98021 • (425) 402-1717

Customer: **Itron, Inc.**

Specification: **FCC15.247 Radiated Spurious Emissions**

Work Order #: **94370**

Date: 4/17/2013

Test Type: **Radiated Scan**

Time: 10:25:53

Equipment: **RF Telemetry device**

Sequence#: 3

Manufacturer: Itron, Inc.

Tested By: Steven Pittsford

Model: CCU100

S/N: 74045094

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02308	Preamp	8447D	4/3/2012	4/3/2014
T2	AN01993	Biconilog Antenna	CBL6111C	3/2/2012	3/2/2014
T3	AN03227	Cable	32026-29080-29080-84	3/29/2013	3/29/2015
T4	ANP05360	Cable	RG214	12/3/2012	12/3/2014
T5	ANP05366	Cable	RG-214	10/14/2011	10/14/2013
T6	AN02673	Spectrum Analyzer	E4446A	5/11/2012	5/11/2014
T7	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	10/19/2011	10/19/2013
T8	ANP05965	Cable	Various	8/26/2011	8/26/2013
T9	AN01271	Preamp	83017A	8/18/2011	8/18/2013
T10	AN03123	Cable	32026-2-29801-12	10/14/2011	10/14/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Telemetry device*	Itron, Inc.	CCU100	74045094

Support Devices:

Function	Manufacturer	Model #	S/N
Antenna	Antenna Products	AMR360-902-5-T0-N	0929

Test Conditions / Notes:

Temp: 21°C
 Humidity: 31%
 Pressure: 103.6kPa
 Freq: 900-3000MHz

The EUT is 80cm above the ground plane in the center of the turn table.
 EUT will be transmitting high channel 926.9MHz
 Modulations used are AM 16.5kHz, FM 12.5kHz & FM 37.5kHz

2nd and 3rd harmonics checked 3 modulations vertical and horizontal: only worst case recorded.

Ext Attn: 0 dB

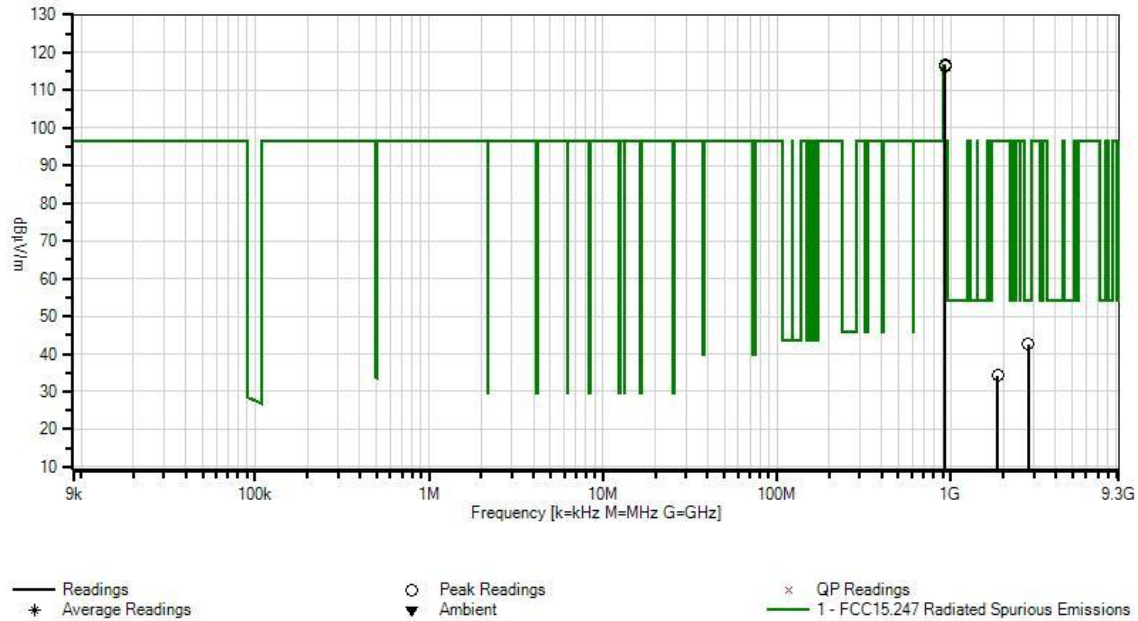
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	dB	dB	dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	926.920M	115.1	-27.3 +2.3 +0.0	+23.4 +0.0 +0.0	+1.0 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0 49	116.6	116.6	+0.0	Vert 100
2	926.920M	114.9	-27.3 +2.3 +0.0	+23.4 +0.0 +0.0	+1.0 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0 9	116.4	116.6 Peak Power FM 37.5kHz	-0.2	Vert 110
3	926.920M	114.8	-27.3 +2.3 +0.0	+23.4 +0.0 +0.0	+1.0 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0 49	116.3	116.6 Peak Power FM12.5kHz	-0.3	Vert 100
4	2780.720M	44.6	+0.0 +0.0 -33.9	+0.0 +0.0 +0.5	+1.9 +27.4	+0.0 +2.1	+0.0	42.6	54.0 Peak Power AM 16.5kHz	-11.4	Vert 113
5	1853.730M	40.1	+0.0 +0.0 -34.5	+0.0 +0.0 +0.3	+1.5 +25.2	+0.0 +1.6	+0.0 357	34.2	96.6	-62.4	Vert 120

CKC Laboratories, Inc. Date: 4/17/2013 Time: 10:25:53 Itron, Inc. WO#: 94370
 FCC15.247 Radiated Spurious Emissions Test Distance: 3 Meters Sequence#: 3
 Itron, Inc RF Telemetry device P/N: CCU100 S/N: 74045094 Vert Temp: 21°C Humidity: 31% Pressure: 103.6kPa
 Freq: 900-3000MHz The EUT is 80cm above the groundplane in the center of the turn table. EUT will be
 transmitting high channel 926.85MHz Modulations used are AM 16.5kHz, FM 12.5kHz & FM 37.5kHz 2nd and 3rd
 harmonics checked 3 modulations vert and horz: only worst case recorded.



Test Location: CKC Laboratories, Inc. • 22116 - 23rd Drive SE, Suite A • Bothell, WA. 98021 • (425) 402-1717

Customer: **Itron, Inc.**
 Specification: **RSS-210 Radiated Spurious Emissions**
 Work Order #: **94370**
 Test Type: **Radiated Scan**
 Equipment: **RF Telemetry device**
 Manufacturer: **Itron, Inc.**
 Model: **CCU100**
 S/N: **74045094**

Date: 4/17/2013
 Time: 10:25:53
 Sequence#: 3
 Tested By: Steven Pittsford

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02308	Preamp	8447D	4/3/2012	4/3/2014
T2	AN01993	Biconilog Antenna	CBL6111C	3/2/2012	3/2/2014
T3	AN03227	Cable	32026-29080-29080-84	3/29/2013	3/29/2015
T4	ANP05360	Cable	RG214	12/3/2012	12/3/2014
T5	ANP05366	Cable	RG-214	10/14/2011	10/14/2013
T6	AN02673	Spectrum Analyzer	E4446A	5/11/2012	5/11/2014
T7	AN01467	Horn Antenna-ANSI C63.5 Calibration	3115	10/19/2011	10/19/2013
T8	ANP05965	Cable	Various	8/26/2011	8/26/2013
T9	AN01271	Preamp	83017A	8/18/2011	8/18/2013
T10	AN03123	Cable	32026-2-29801-12	10/14/2011	10/14/2013

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
RF Telemetry device*	Itron, Inc.	CCU100	74045094

Support Devices:

Function	Manufacturer	Model #	S/N
Antenna	Antenna Products	AMR360-902-5-T0-N	0929

Test Conditions / Notes:

Temp: 21°C Humidity: 31% Pressure: 103.6kPa Freq: 900-3000MHz The EUT is 80cm above the ground plane in the center of the turn table. EUT will be transmitting high channel 926.9MHz Modulations used are AM 16.5kHz, FM 12.5kHz & FM 37.5kHz 2nd and 3rd harmonics checked 3 modulations vertical and horizontal: only worst case recorded.

Ext Attn: 0 dB

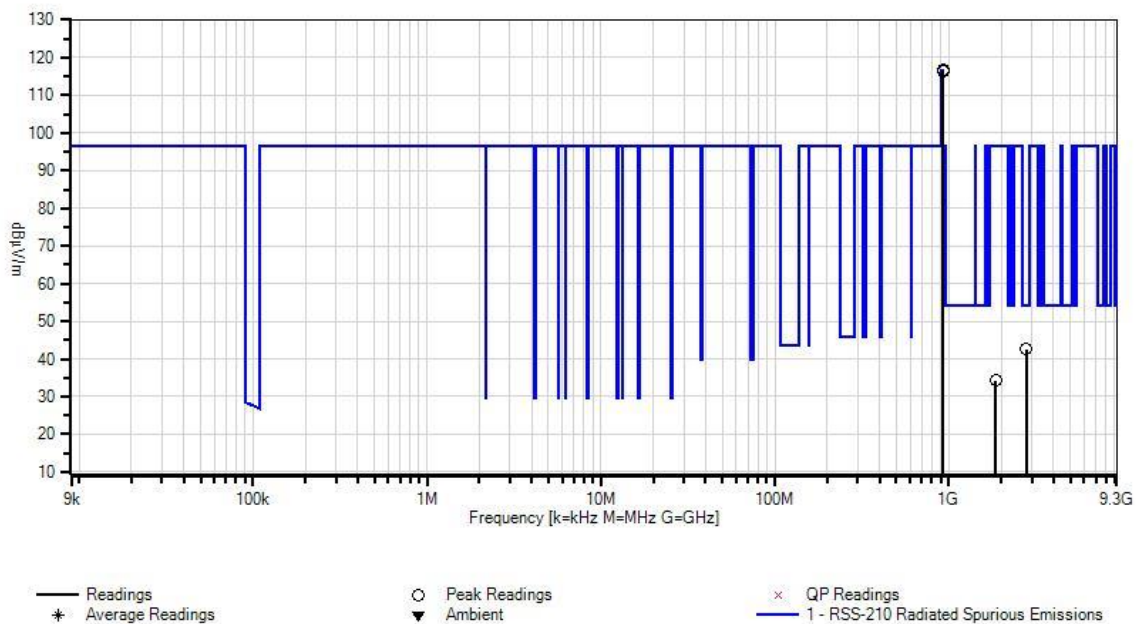
Measurement Data:

Reading listed by margin.

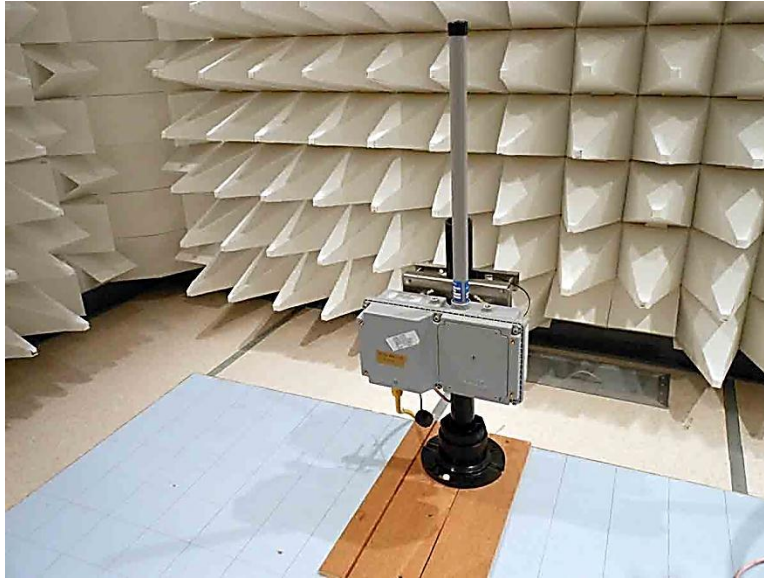
Test Distance: 3 Meters

#	Freq	Rdng	T1 T5 T9	T2 T6 T10	T3 T7	T4 T8	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	926.920M	115.1	-27.3 +2.3 +0.0	+23.4 +0.0 +0.0	+1.0 +0.0 +0.0	+2.1 +0.0 +0.0	+0.0 49	116.6	116.6	+0.0	Vert 100
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5	1853.730M	40.1	+0.0 +0.0 -34.5	+0.0 +0.0 +0.3	+1.5 +25.2	+0.0 +1.6	+0.0 357	34.2	96.6	-62.4	Vert 120

CKC Laboratories, Inc. Date: 4/17/2013 Time: 10:25:53 Itron, Inc. WO#: 94370
RSS-210 Radiated Spurious Emissions Test Distance: 3 Meters Sequence#: 3
Itron, Inc RF Telemetry device P/N: CCU100 S/N: 74045094 Vert Temp: 21°C Humidity: 31% Pressure: 103.6kPa
Freq: 900-3000MHz The EUT is 80cm above the groundplane in the center of the turn table. EUT will be
transmitting high channel 926.85MHz Modulations used are AM 16.5kHz, FM 12.5kHz & FM 37.5kHz 2nd and 3rd
harmonics checked 3 modulations vert and horz: only worst case recorded.



Test Setup Photos



Bandedge

Test Conditions / Setup Conducted

The EUT's Antenna port is directly connected to the spectrum analyzer through an attenuator. The EUT will be transmitting high channel 926.9MHz.

Modulations used are AM 16.5kHz, FM 12.5kHz & FM 37.5kHz.

Temp: 21°C

Humidity: 31%

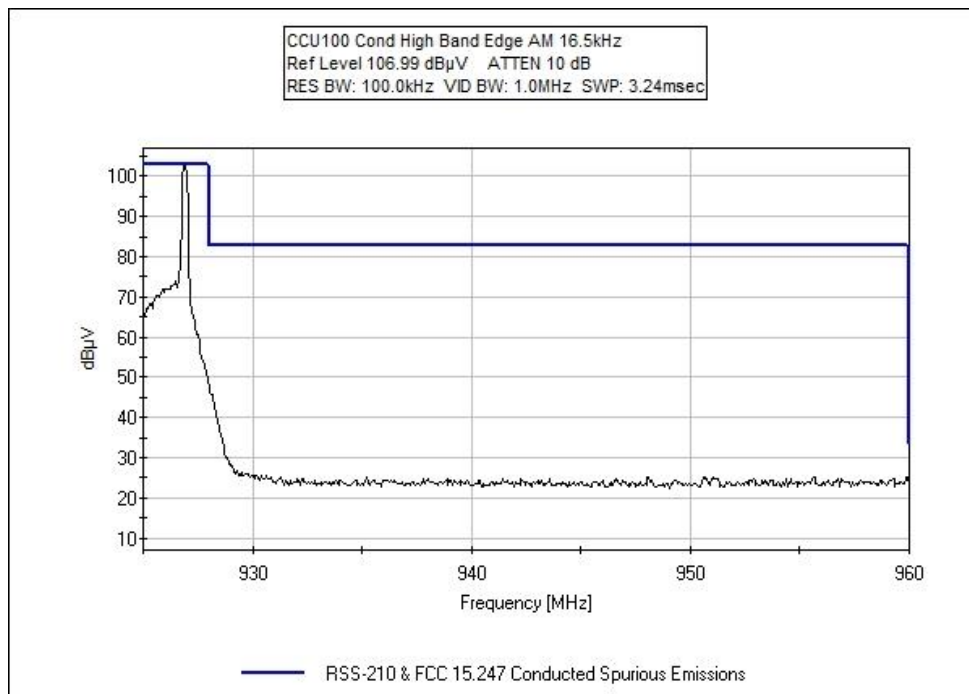
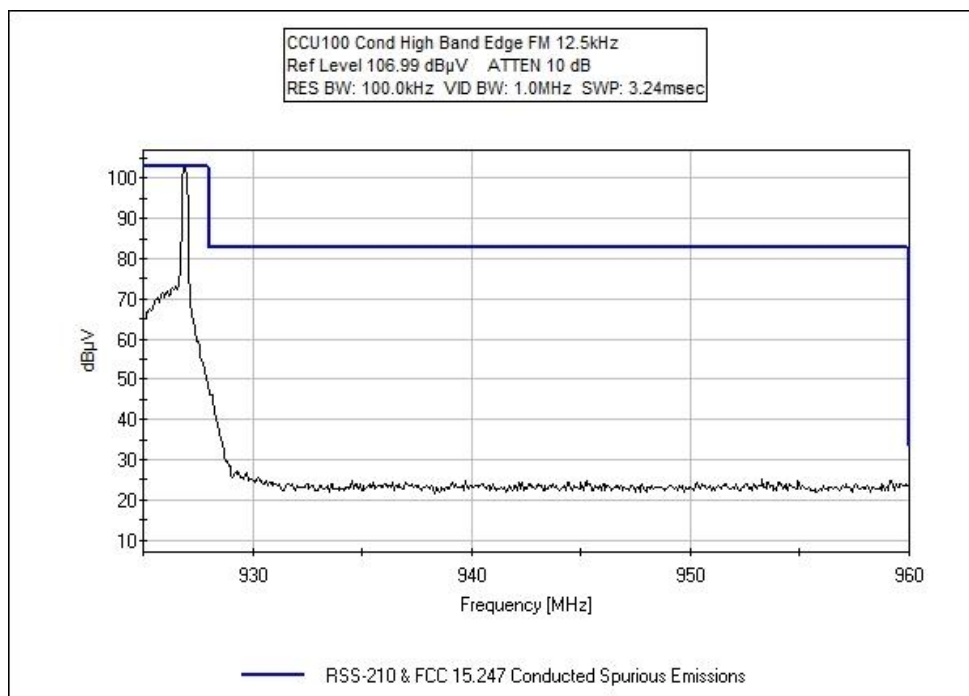
Pressure: 103.6kPa

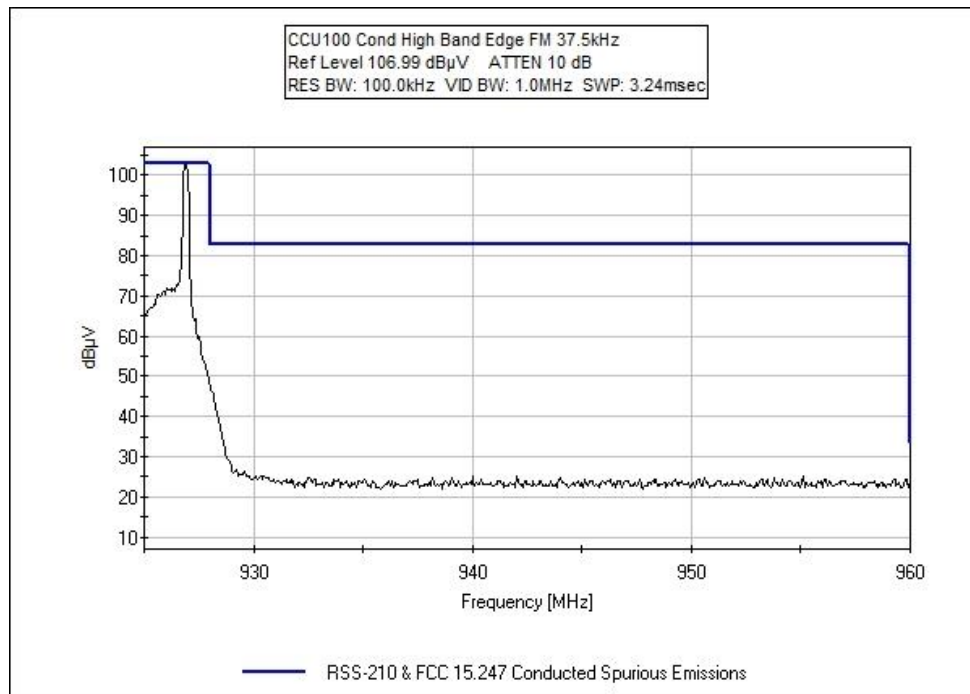
Freq: 925-975MHz

Engineer Name: S. Pittsford

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
03227	Cable	32026-29080-29080-84	Astrolab	3/29/2013	3/29/2015
02673	Spectrum Analyzer	E4446A	Agilent	5/11/2012	5/11/2014
03181	Attenuator	PE7015-20	Pasternack	1/4/2012	1/4/2014

Test Data





Test Setup Photo



Test Conditions / Setup
Radiated

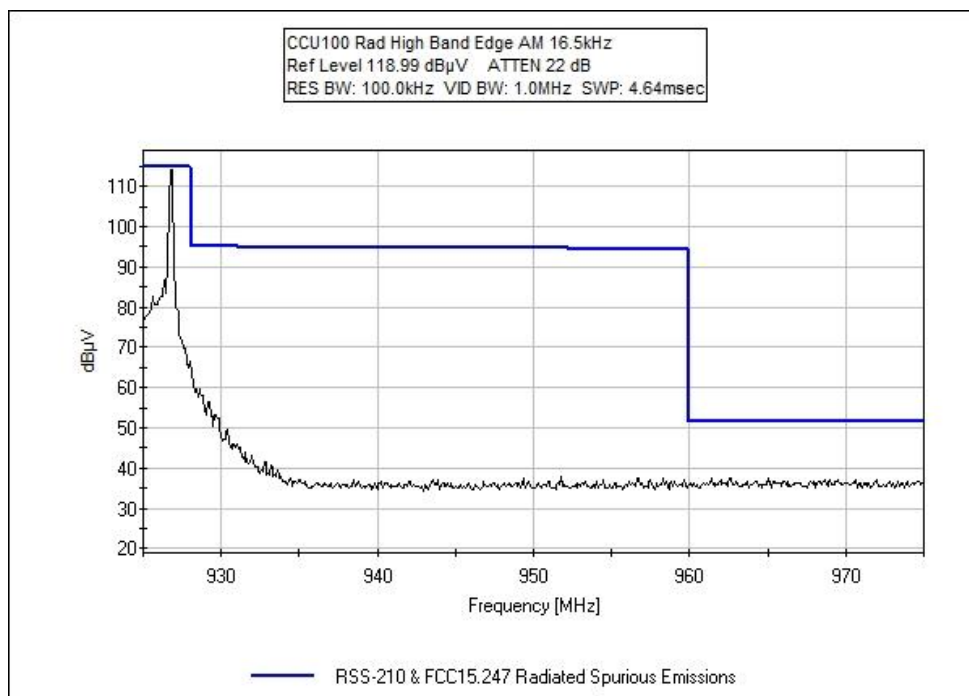
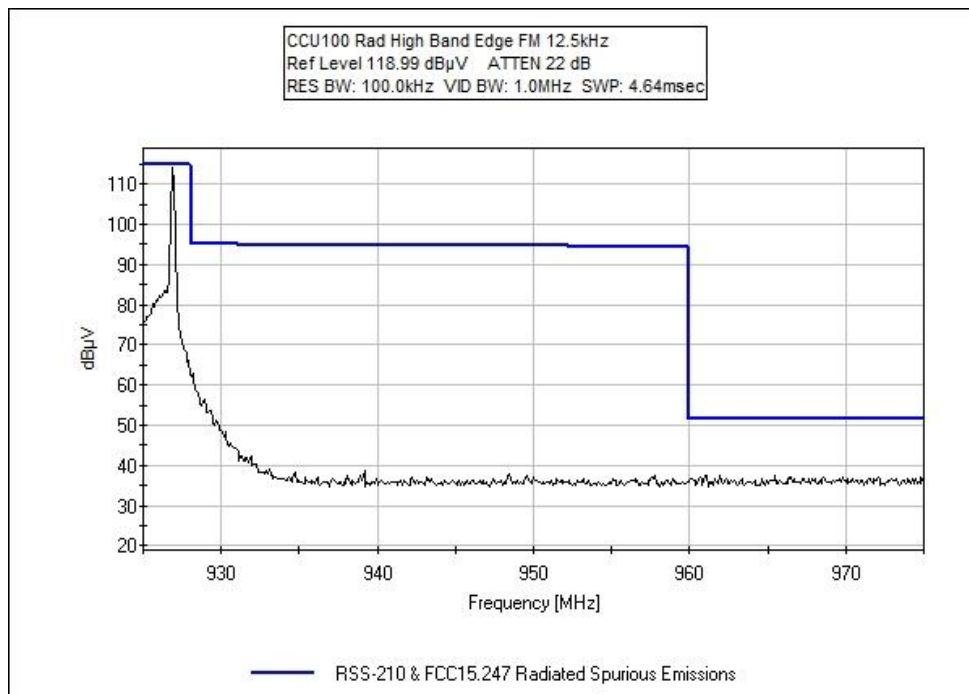
The EUT is 80cm above the ground plane in the center of the turn table. The EUT will be transmitting high channel 926.9MHz. Modulations used are AM 16.5kHz, FM 12.5kHz & FM 37.5kHz.

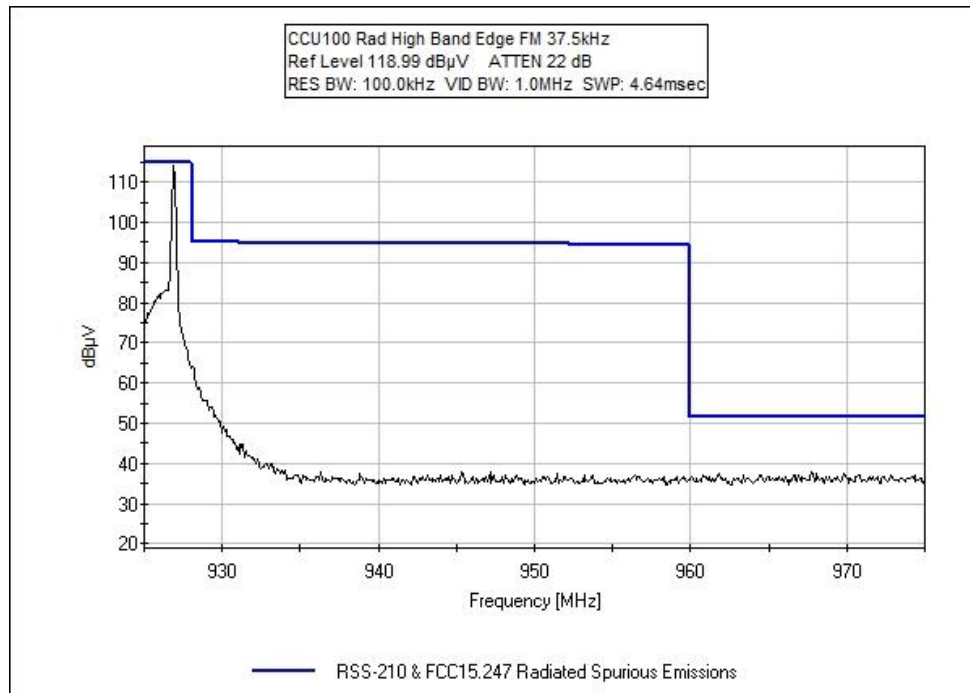
Temp: 21°C
Humidity: 31%
Pressure: 103.6kPa
Freq: 925-975MHz

Engineer Name: S. Pittsford

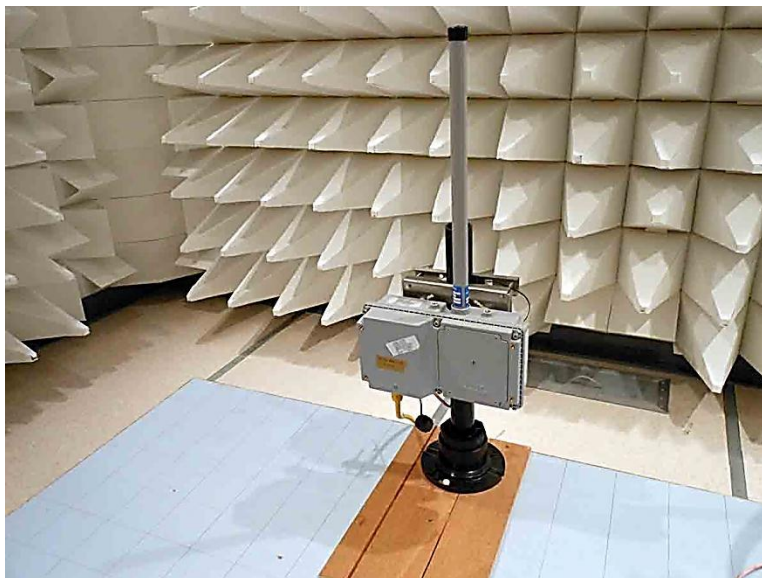
Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
02308	Preamp	8447D	HP	4/3/2012	4/3/2014
01993	Biconilog Antenna	CBL6111C	Chase	3/2/2012	3/2/2014
03227	Cable	32026-29080-29080-84	Astrolab	3/29/2013	3/29/2015
P05360	Cable	RG214	Belden	12/3/2012	12/3/2014
P05366	Cable	RG-214	Belden	10/14/2011	10/14/2013
02673	Spectrum Analyzer	E4446A	Agilent	5/11/2012	5/11/2014

Test Data





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.