

Rohrback Cosasco System

TEST REPORT FOR

**Hazardous Area Remote Data Collector
with Remote Mounted Antenna
Model: ER-200**

Tested To The Following Standards:

FCC Part 15 Subpart C Section(s)

**15.247
(DTS 2400-2483.5 MHz)**

Report No.: 100426-6

Date of issue: September 19, 2017



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:

Rohrback Cosasco System
11841 East Smith Ave
Santa Fe Springs, CA 90670

REPORT PREPARED BY:

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Mariposa, CA 95338

REPRESENTATIVE: Walt Hills
Customer Reference Number: 166526

Project Number: 100426

DATE OF EQUIPMENT RECEIPT:

September 7, 2017

DATE(S) OF TESTING:

September 7 - 8, 2017

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, reading "Steve Behm", is written over 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.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (DTS)

Test Procedure	Description	Modifications	Results
15.247(a)(2)	6dB Bandwidth	NA	Pass
15.247(b)(3)	Output Power	NA	Pass
15.247(e)	Power Spectral Density	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass

NA = Not Applicable

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)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Hazardous Area Remote Data Collector with Remote Mounted Antenna	Cosasco	ER-200	ER-200XXXXXX

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop Computer	Dell	Latitude D820	CVQW6B1
RDC-COT Test Probe	Cosasco	702044	NA
8dBi Omnidirectional Antenna	Taoglass	OMB.242.08F21	NA
20' Cable with lightning protector	L-Com	CA4NFLPNF020	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	802.15.4
Operating Frequency Range:	2401MHz to 2480MHz
Modulation Type(s):	GFSK
Maximum Duty Cycle:	>98%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Omnidirectional, +8dBi
Beamforming Type:	NA
Antenna Connection Type:	External Connector
Nominal Input Voltage:	7.2Vdc
Firmware / Software used for Test:	4.77

FCC Part 15 Subpart C

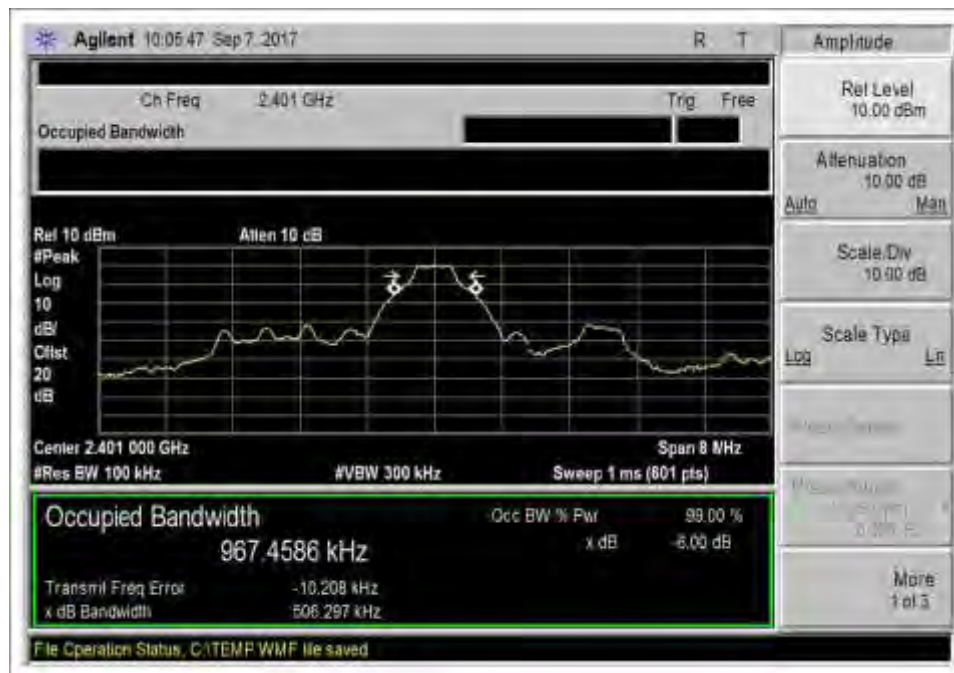
15.247(a)(2) 6dB Bandwidth

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074 v04 April 5, 2017	Test Date(s):	9/7/2017
Configuration:	1		
Test Setup:	The equipment under test (EUT) is connected to the spectrum analyzer through a coaxial cable and attenuator. The EUT is connected to a laptop computer via a cat. 5e cable. The laptop is running BlueTest3 software which is used to set the channels of the EUT. Test performed with a new battery. Temperature: 21°C, Humidity: 44%, Pressure: 100kPa Frequency Range: 2401MHz to 2480MHz Frequencies tested: 2401MHz, 2440MHz, 2479MHz Firmware power settings: Ext 255, Int 50 EUT firmware: 4.77 Protocol /MCS/Modulation: GFSK Antenna type: External Omnidirectional Antenna Gain: 8.0dBi with LM200 Cable (2.0dB loss) system. Duty Cycle: >98% Test Mode: Continuous transmit Test Setup: EUT with external antenna connector Modifications Added: None Setup: Antenna port conducted		

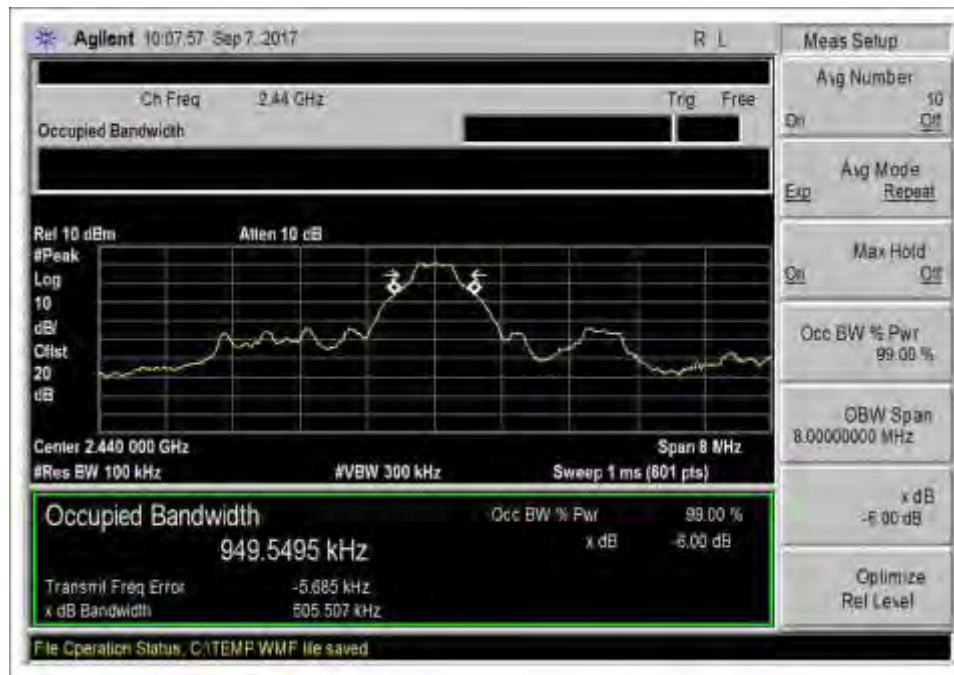
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
P06544	Cable	Astro Steel	32026-29094K- 29094K-36TC	11/2/2015	11/2/2017
03431	Attenuator	Aeroflex/Weinschel	89-20-21	11/2/2015	11/2/2017

Test Data Summary					
Frequency (MHz)	Antenna Port	Modulation	Measured (kHz)	Limit (kHz)	Results
2401	1	GFSK	506.3	≥500	Pass
2440	1	GFSK	505.5	≥500	Pass
2479	1	GFSK	505.2	≥500	Pass

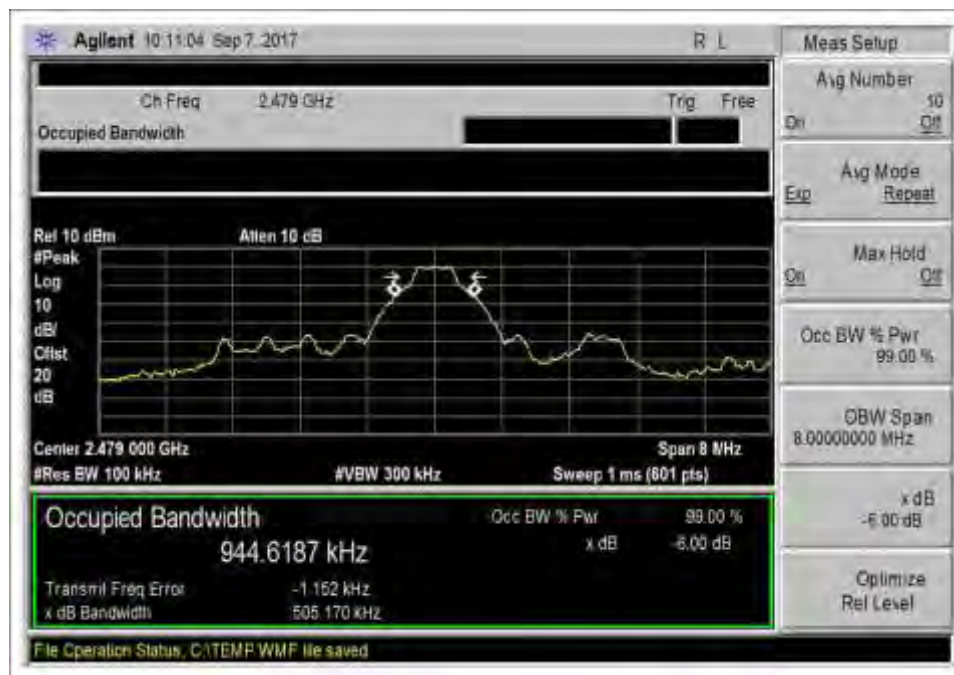
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo



15.247(b)(3) Output Power

Test Setup / Conditions			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074 v04 April 5, 2017	Test Date(s):	9/7/2017
Configuration:	1		
Test Setup:	The equipment under test (EUT) is connected to the spectrum analyzer through a coaxial cable and attenuator. The EUT is connected to a laptop computer via a cat. 5e cable. The laptop is running BlueTest3 software which is used to set the channels of the EUT. Test performed with a new battery. Temperature: 21°C, Humidity: 44%, Pressure: 100kPa Frequency Range: 2401MHz to 2480MHz Frequencies tested: 2401MHz, 2440MHz, 2479MHz Firmware power settings: Ext 255, Int 50 EUT firmware: 4.77 Protocol /MCS/Modulation: GFSK Antenna type: External Omnidirectional Antenna Gain: 8.0dBi with LM200 Cable (2.0dB loss) system. Duty Cycle: >98% Test Mode: Continuous transmit Test Setup: EUT with external antenna connector Modifications Added: None Setup: Antenna port conducted		

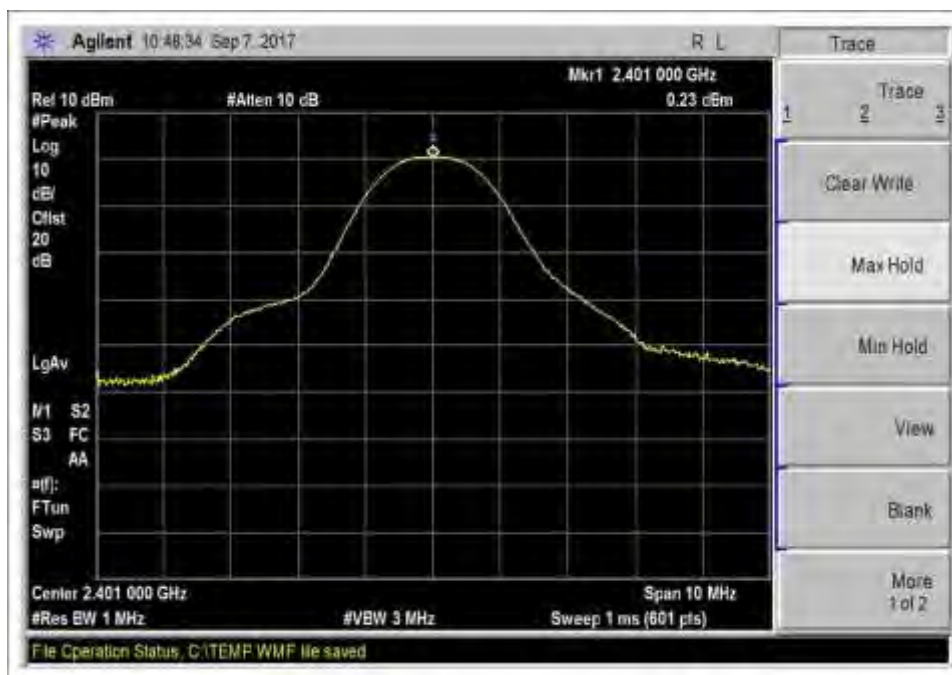
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
P06544	Cable	Astro Steel	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
03431	Attenuator	Aeroflex/Weinschel	89-20-21	11/2/2015	11/2/2017

Test Data Summary - Voltage Variations

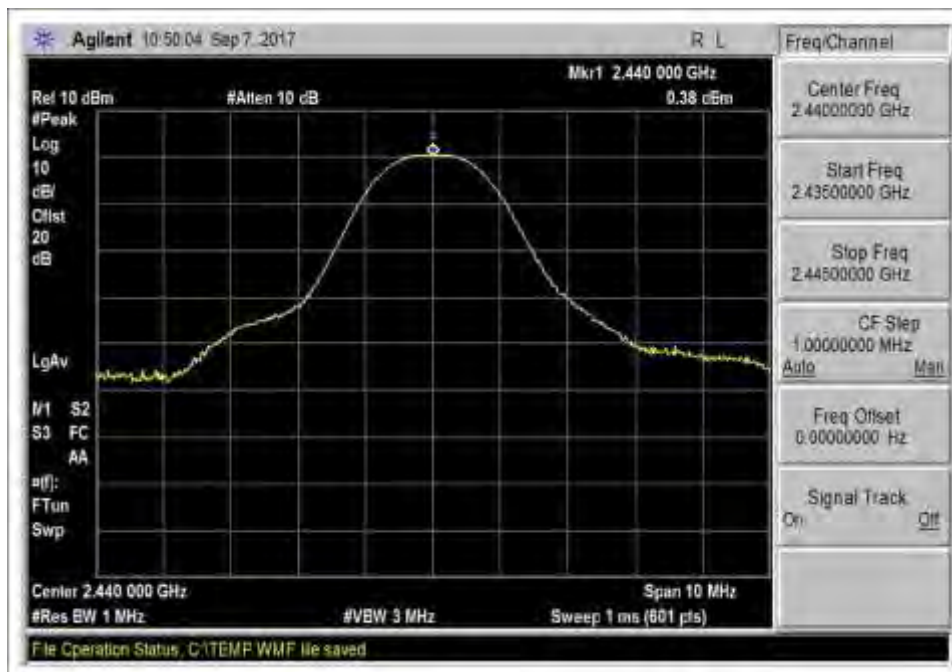
This equipment is battery powered. Power output tests were performed using a fresh battery.

Power Output Test Data Summary - RF Conducted Measurement					
Measurement Option: RBW > DTS Bandwidth					
Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
2401	GFSK	External / 8	0.2	≤28	Pass
2440	GFSK	External / 8	0.4	≤28	Pass
2479	GFSK	External / 8	0.1	≤28	Pass

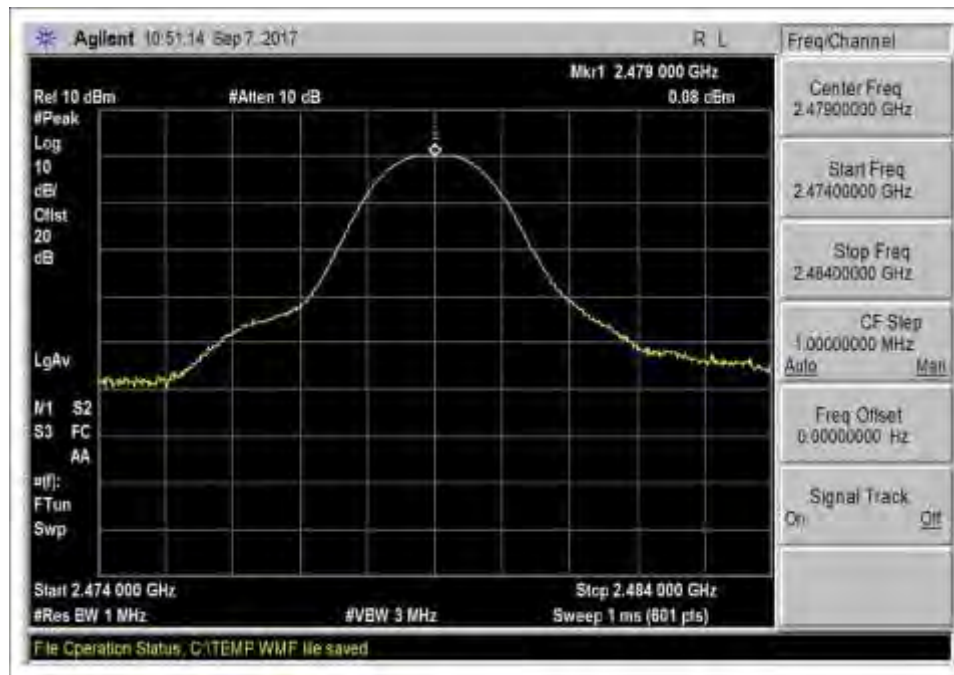
Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo



15.247(e) Power Spectral Density

Test Setup / Conditions / Data			
Test Location:	Brea Lab A	Test Engineer:	S. Yamamoto
Test Method:	ANSI C63.10 (2013), KDB 558074 v04 April 5, 2017	Test Date(s):	9/7/2017
Configuration:	1		
Test Setup:	The equipment under test (EUT) is connected to the spectrum analyzer through a coaxial cable and attenuator. The EUT is connected to a laptop computer via a cat. 5e cable. The laptop is running BlueTest3 software which is used to set the channels of the EUT. Test performed with a new battery. Temperature: 21°C, Humidity: 44%, Pressure: 100kPa Frequency Range: 2401MHz to 2480MHz Frequencies tested: 2401MHz, 2440MHz, 2479MHz Firmware power settings: Ext 255, Int 50 EUT firmware: 4.77 Protocol /MCS/Modulation: GFSK Antenna type: External Omnidirectional Antenna Gain: 8.0dBi with LM200 Cable (2.0dB loss) system. Duty Cycle: >98% Test Mode: Continuous transmit Test Setup: EUT with external antenna connector Modifications Added: None Setup: Antenna port conducted.		

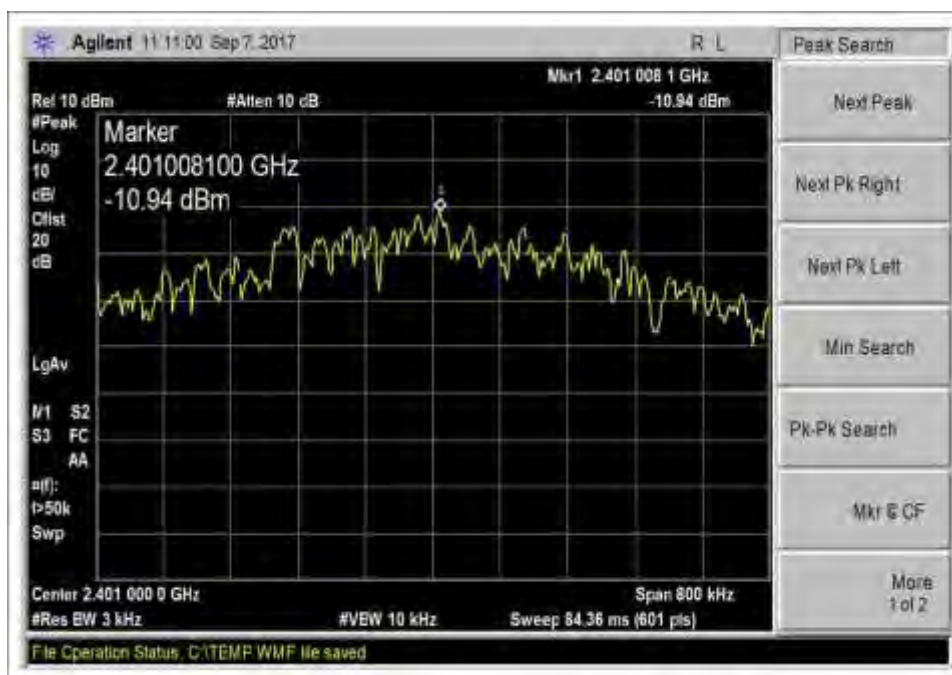
Test Equipment					
Asset#	Description	Manufacturer	Model	Cal Date	Cal Due
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
P06544	Cable	Astro Steel	32026-29094K- 29094K-36TC	11/2/2015	11/2/2017
03431	Attenuator	Aeroflex/Weinschel	89-20-21	11/2/2015	11/2/2017

PSD Test Data Summary - RF Conducted Measurement

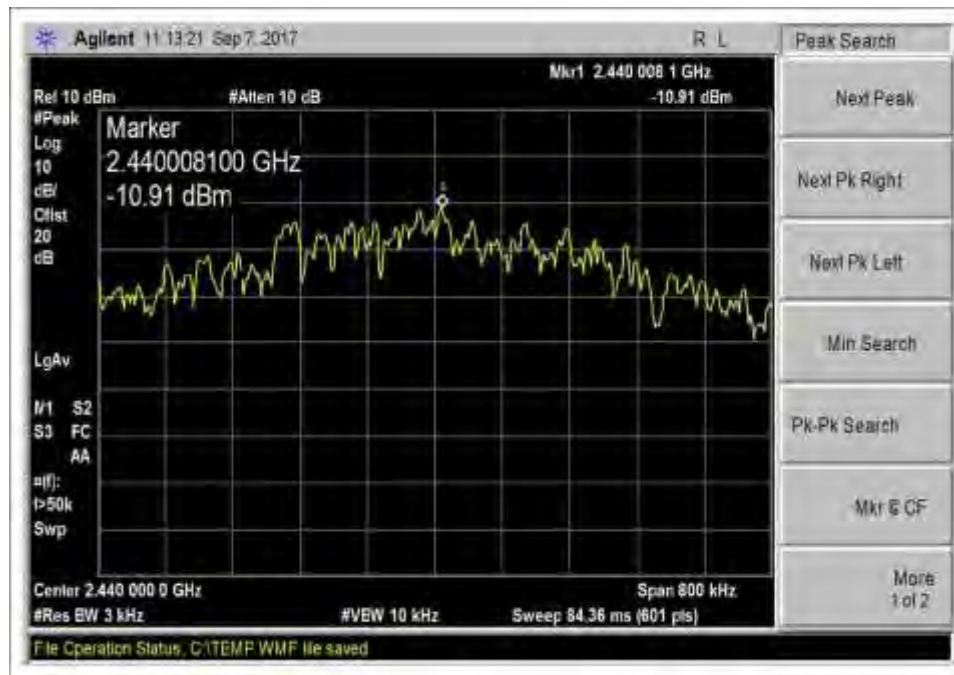
Measurement Method: PKPSD

Frequency (MHz)	Modulation	Measured (dBm/3kHz)	Limit (dBm/3kHz)	Results
2401	GFSK	-10.9	≤ 8	Pass
2440	GFSK	-10.9	≤ 8	Pass
2479	GFSK	-11.5	≤ 8	Pass

Plots



Low Channel



Middle Channel



High Channel

Test Setup Photo



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Rohrback Cosasco Systems**
 Specification: **15.247(d) Conducted Spurious Emissions**
 Work Order #: **100426** Date: 9/7/2017
 Test Type: **Conducted Emissions** Time: 15:45:49
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02 7.2Vdc Battery

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is connected to the spectrum analyzer through a coaxial cable and attenuator. The EUT is connected to a laptop computer via a cat. 5e cable. The laptop is running BlueTest3 software which is used to set the channels of the EUT.

Test performed with a new battery.

Temperature: 21°C, Humidity: 48%, Pressure: 100kPa

Frequency Range: 9kHz to 25GHz

Frequencies tested: 2401MHz, 2440MHz, 2479MHz

Firmware power settings: Ext 255, Int 50

EUT firmware: 4.77

Protocol /MCS/Modulation: GFSK

Antenna type: External Omnidirectional

Antenna Gain: 8.0dBi with LM200 Cable (2.0dB loss) system.

Duty Cycle: >98%

Test Method: ANSI C63.10 2013

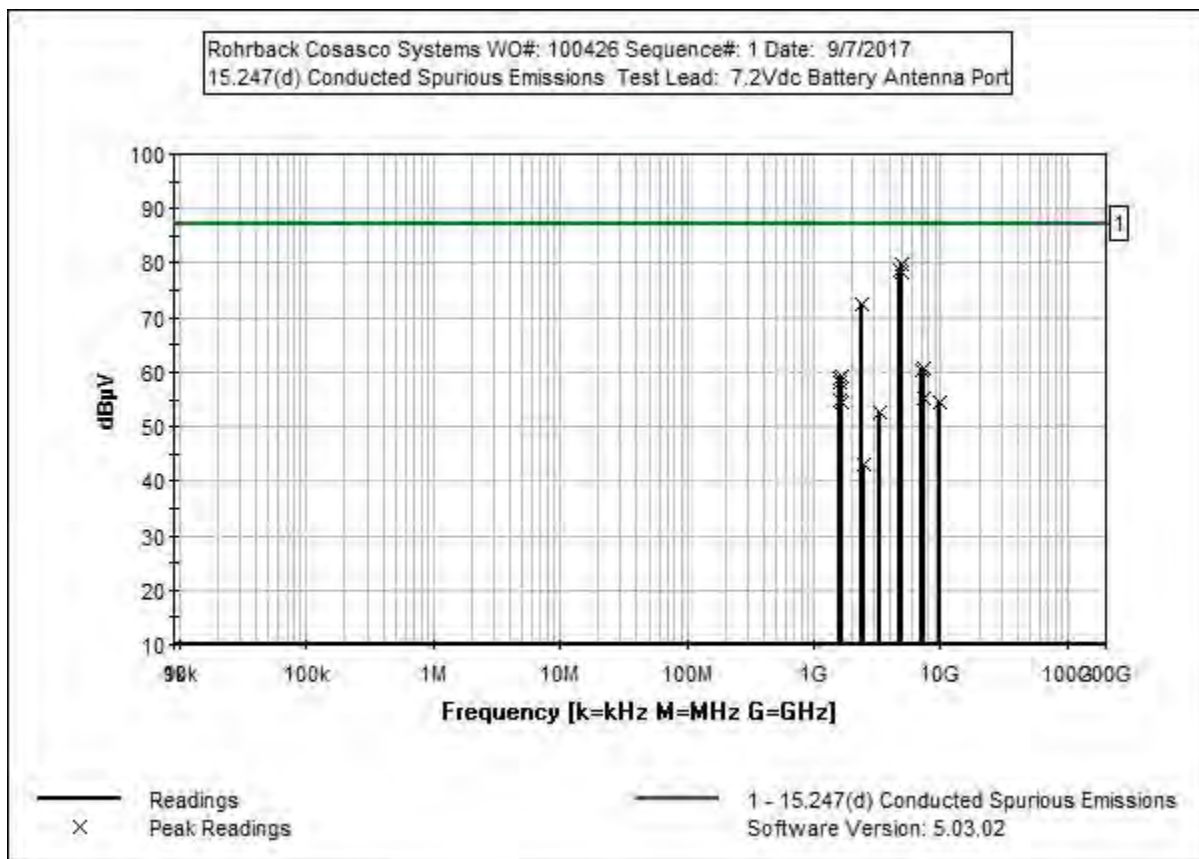
Test Mode: Continuous transmit

Test Setup: EUT with external antenna connector

Modifications Added: None

Setup: Antenna port conducted

Site A.



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03431	Attenuator	89-20-21	11/2/2015	11/2/2017
T2	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019

Measurement Data:

Reading listed by margin.

Test Lead: Antenna Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB		Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	4879.650M	59.2	+19.5	+1.0		+0.0	79.7	87.1	-7.4	Anten
2	4802.000M	58.1	+19.5	+1.0		+0.0	78.6	87.1	-8.5	Anten
3	4957.650M	57.8	+19.5	+1.0		+0.0	78.3	87.1	-8.8	Anten
4	2400.000M	52.4	+19.3	+0.7		+0.0	72.4	87.1	-14.7	Anten
5	7319.943M	39.8	+19.6	+1.2		+0.0	60.6	87.1	-26.5	Anten
6	7202.467M	39.5	+19.6	+1.2		+0.0	60.3	87.1	-26.8	Anten
7	1650.992M	39.6	+19.3	+0.5		+0.0	59.4	87.1	-27.7	Anten
8	1599.333M	39.0	+19.3	+0.5		+0.0	58.8	87.1	-28.3	Anten
9	1625.333M	38.2	+19.3	+0.5		+0.0	58.0	87.1	-29.1	Anten
10	7436.967M	34.4	+19.6	+1.2		+0.0	55.2	87.1	-31.9	Anten
11	1627.317M	35.1	+19.3	+0.5		+0.0	54.9	87.1	-32.2	Anten
12	1601.308M	35.0	+19.3	+0.5		+0.0	54.8	87.1	-32.3	Anten
13	1653.317M	34.7	+19.3	+0.5		+0.0	54.5	87.1	-32.6	Anten
14	9759.300M	33.4	+19.5	+1.4		+0.0	54.3	87.1	-32.8	Anten
15	3306.670M	32.4	+19.4	+0.8		+0.0	52.6	87.1	-34.5	Anten
16	2483.500M	22.9	+19.3	+0.7		+0.0	42.9	87.1	-44.2	Anten

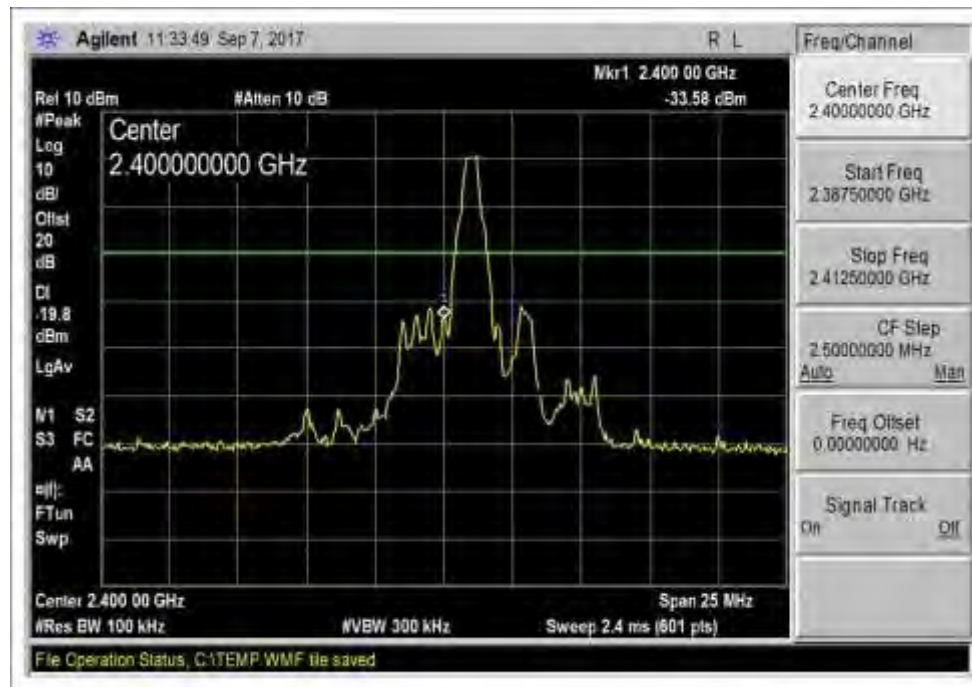
Band Edge

Band Edge Summary

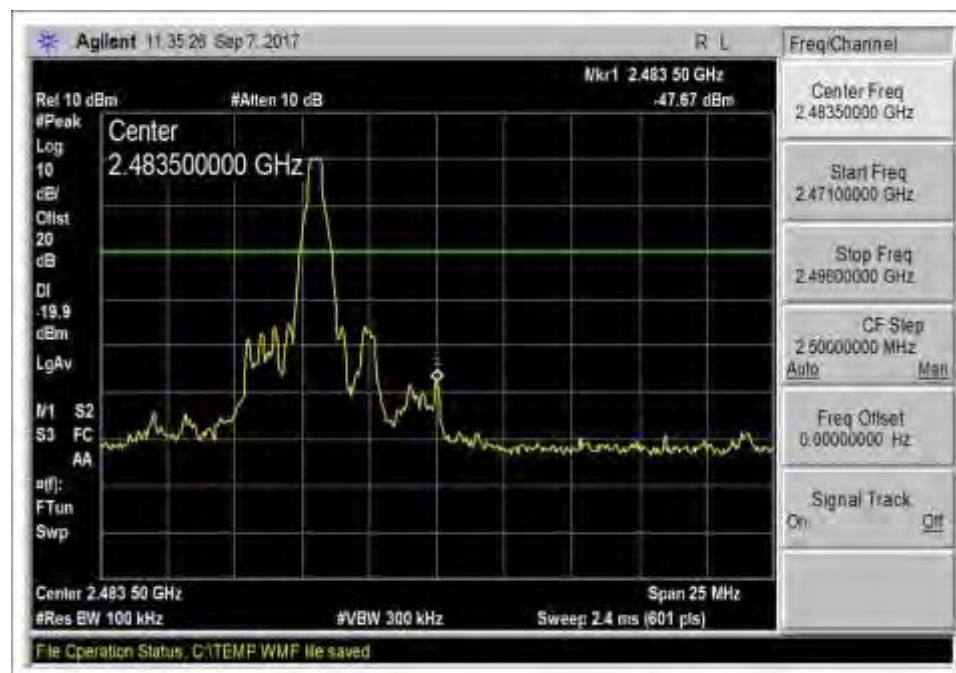
Limit applied: Max Power/100kHz - 20dB.

Frequency (MHz)	Modulation	Measured (dBm)	Limit (dBm)	Results
2400.0	GFSK	-33.6	<-19.9	Pass
2483.5	GFSK	-47.7	<-19.9	Pass

Band Edge Plots



Low Channel



High Channel

Test Setup Photo



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location: CKC Laboratories • 100 North Olinda Place • Brea CA 92823 • 714 993-6112
 Customer: **Rohrback Cosasco Systems**
 Specification: **15.247(d) / 15.209 Radiated Spurious Emissions**
 Work Order #: **100426** Date: 9/8/2017
 Test Type: **Radiated Scan** Time: 11:53:07
 Tested By: S. Yamamoto Sequence#: 1
 Software: EMITest 5.03.02

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is connected to the spectrum analyzer through a coaxial cable and attenuator. The EUT is connected to a laptop computer via a cat. 5e cable. The laptop is running BlueTest3 software which is used to set the channels of the EUT.

Test performed with a new battery.

Temperature: 23°C, Humidity: 47%, Pressure: 100kPa

Frequency Range: 9kHz to 25GHz

Frequencies tested: 2401MHz, 2440MHz, 2479MHz

Firmware power settings: Ext 255, Int 50

EUT firmware: 4.77

Protocol /MCS/Modulation: GFSK

Antenna type: External Omnidirectional

Antenna Gain: 8.0dBi with LM200 Cable (2.0dB loss) system.

Duty Cycle: >98%

Test Method: ANSI C63.10 2013

Test Mode: Continuous transmit

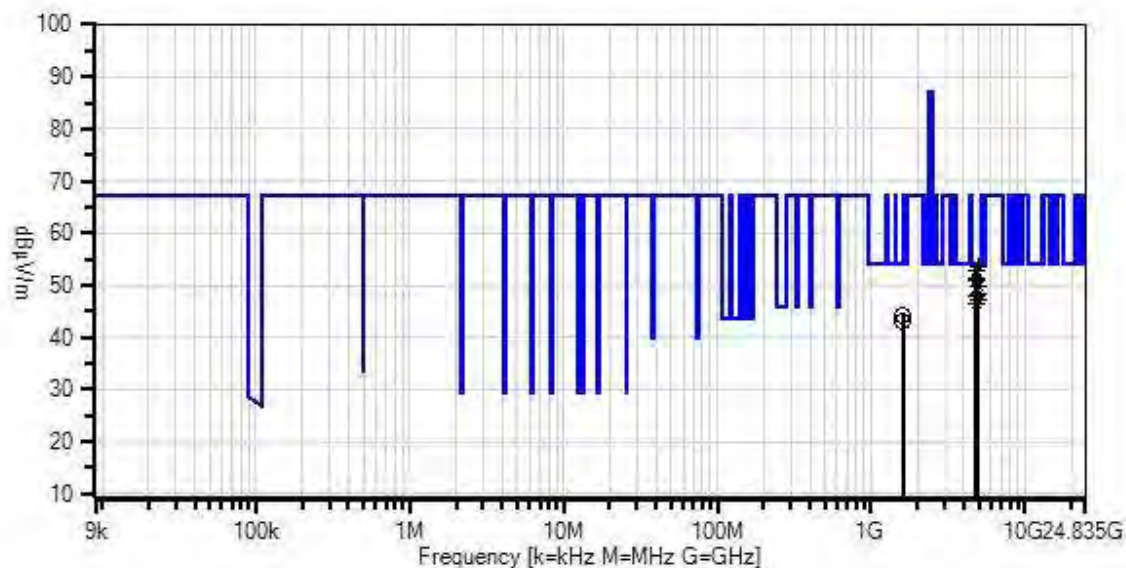
Test Setup: EUT with external antenna connector

Modifications added: None

Setup: EUT on OATS.

Site A.

Rohrbach Cosasco Systems V/O#: 100426 Sequence#: 1 Date: 9/8/2017
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert



— Readings
× QP Readings
▼ Ambient
— 1 - 15.247(d) / 15.209 Radiated Spurious Emissions

○ Peak Readings
* Average Readings
Software Version: 5.03.02

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T1	ANP06661	Cable	LDF1-50	5/6/2016	5/6/2018
T2	AN00786	Preamp	83017A	5/9/2016	5/9/2018
T3	ANP06544	Cable	32026-29094K-29094K-36TC	11/2/2015	11/2/2017
T4	AN00849	Horn Antenna	3115	3/4/2016	3/4/2018
T5	AN03385	High Pass Filter	11SH10-3000/T10000-O/O	6/2/2017	6/2/2019
T6	AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
	AN01413	Horn Antenna	84125-80008	10/7/2016	10/7/2018
	ANP05050	Cable	RG223/U	1/20/2017	1/20/2019
	AN00309	Preamp	8447D	3/14/2016	3/14/2018
	ANP05198	Cable-Amplitude +15C to +45C (dB)	8268	12/7/2016	12/7/2018
	AN01995	Biconilog Antenna	CBL6111C	5/10/2016	5/10/2018
	ANP05275	Attenuator	1W	5/5/2016	5/5/2018
	AN00314	Loop Antenna	6502	5/20/2016	5/20/2018

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	4958.000M Ave	54.2	+5.9 +0.3	-37.6 +0.0	+1.0	+29.9	+0.0	53.7	54.0	-0.3	Vert
2	4802.000M Ave	53.8	+5.8 +0.3	-37.6 +0.0	+1.0	+29.6	+0.0	52.9	54.0	-1.1	Horiz
^	4802.000M	65.1	+5.8 +0.3	-37.6 +0.0	+1.0	+29.6	+0.0	64.2	54.0	+10.2	Horiz
4	4880.000M Ave	52.2	+5.9 +0.3	-37.7 +0.0	+1.0	+29.7	+0.0	51.4	54.0	-2.6	Vert
^	4880.000M	63.5	+5.9 +0.3	-37.7 +0.0	+1.0	+29.7	+0.0	62.7	54.0	+8.7	Vert
6	4801.623M Ave	51.8	+5.8 +0.3	-37.6 +0.0	+1.0	+29.6	+0.0	50.9	54.0	-3.1	Horiz
^	4801.623M	65.1	+5.8 +0.3	-37.6 +0.0	+1.0	+29.6	+0.0	64.2	54.0	+10.2	Horiz
8	4958.000M Ave	50.3	+5.9 +0.3	-37.6 +0.0	+1.0	+29.9	+0.0	49.8	54.0	-4.2	Vert
9	4958.000M Ave	49.0	+5.9 +0.3	-37.6 +0.0	+1.0	+29.9	+0.0	48.5	54.0	-5.5	Vert
^	4958.000M	65.5	+5.9 +0.3	-37.6 +0.0	+1.0	+29.9	+0.0	65.0	54.0	+11.0	Vert
^	4958.000M	61.3	+5.9 +0.3	-37.6 +0.0	+1.0	+29.9	+0.0	60.8	54.0	+6.8	Vert
^	4958.000M	60.1	+5.9 +0.3	-37.6 +0.0	+1.0	+29.9	+0.0	59.6	54.0	+5.6	Vert

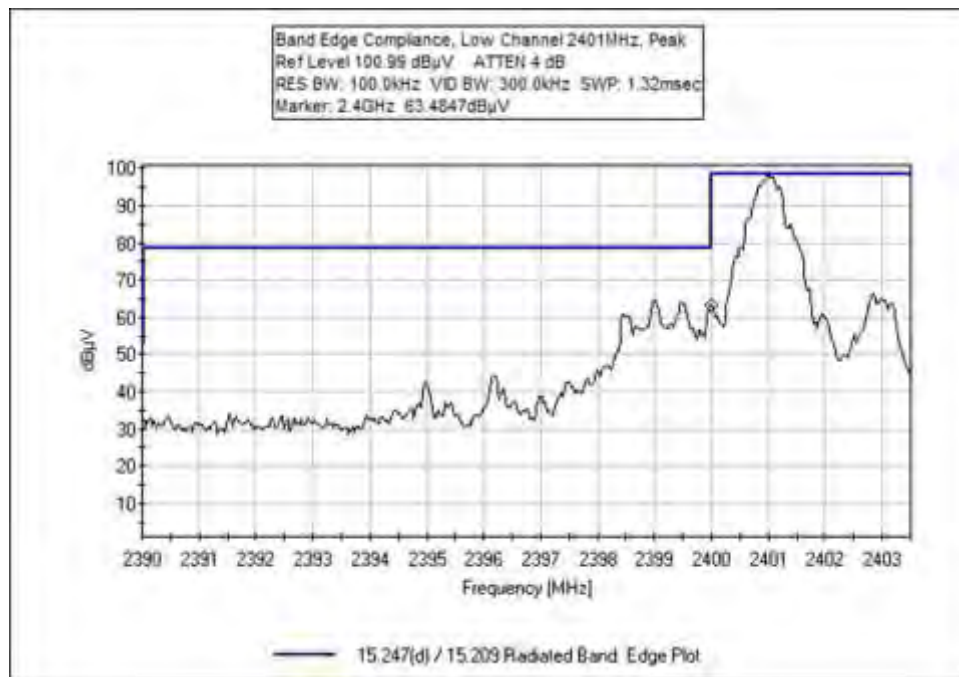
13	4801.643M	48.9	+5.8	-37.6	+1.0	+29.6	+0.0	48.0	54.0	-6.0	Vert
	Ave		+0.3	+0.0							
^	4801.643M	61.9	+5.8	-37.6	+1.0	+29.6	+0.0	61.0	54.0	+7.0	Vert
			+0.3	+0.0							
15	4958.000M	47.8	+5.9	-37.6	+1.0	+29.9	+0.0	47.3	54.0	-6.7	Horiz
	Ave		+0.3	+0.0							
^	4958.000M	58.5	+5.9	-37.6	+1.0	+29.9	+0.0	58.0	54.0	+4.0	Horiz
			+0.3	+0.0							
17	4880.000M	47.3	+5.9	-37.7	+1.0	+29.7	+0.0	46.5	54.0	-7.5	Horiz
	Ave		+0.3	+0.0							
^	4880.000M	58.5	+5.9	-37.7	+1.0	+29.7	+0.0	57.7	54.0	+3.7	Horiz
			+0.3	+0.0							
19	1601.283M	45.8	+3.4	-38.6	+0.5	+23.1	+0.0	44.3	54.0	-9.7	Horiz
			+0.0	+10.1							
20	1601.324M	44.5	+3.4	-38.6	+0.5	+23.1	+0.0	43.0	54.0	-11.0	Vert
			+0.0	+10.1							

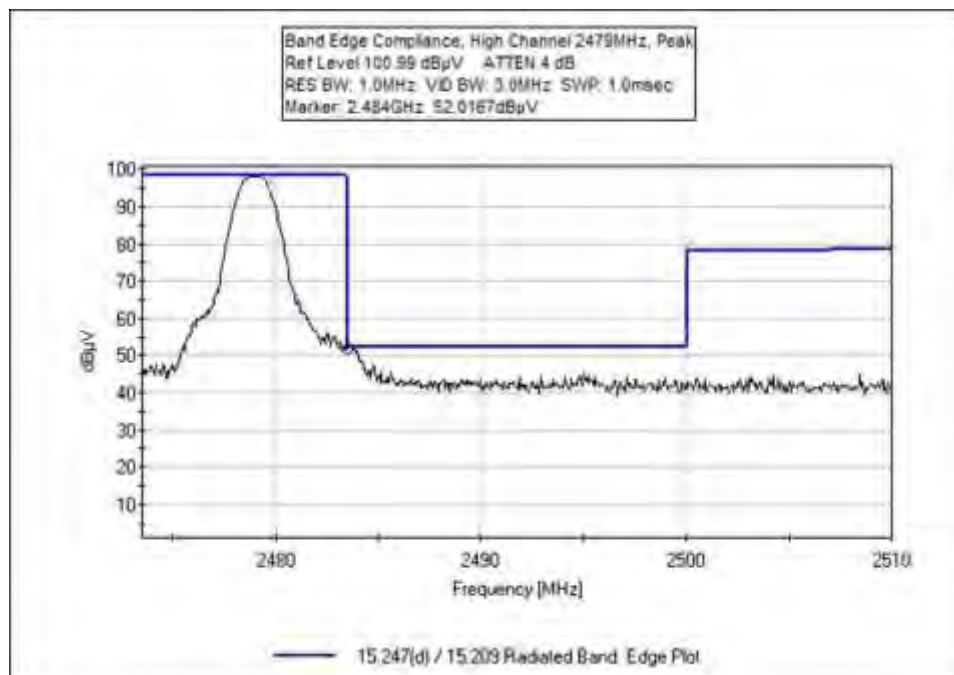
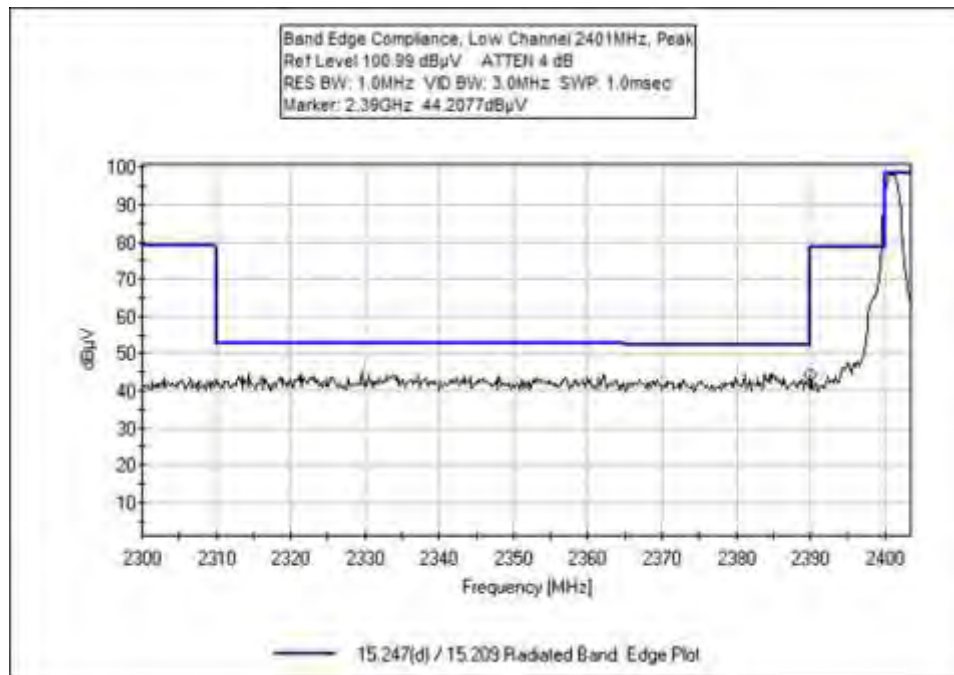
Band Edge

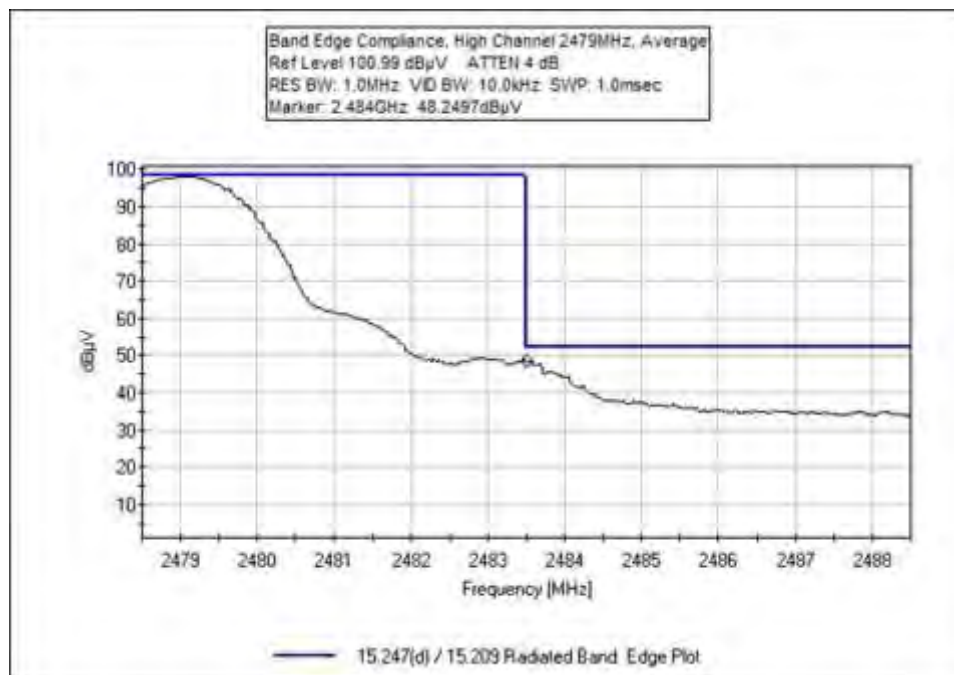
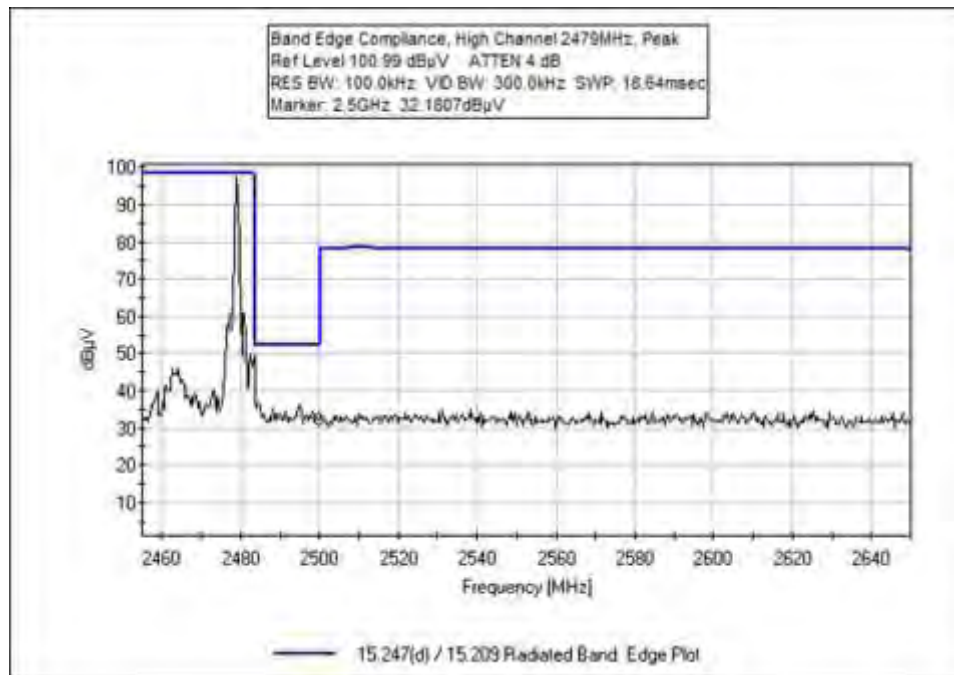
Band Edge Summary

Frequency (MHz)	Modulation	Ant. Type	Field Strength (dBuV/m @3m)	Limit (dBuV/m @3m)	Results
2390.0	GFSK	External	45.9	<54	Pass
2400.0	GFSK	External	65.2	<80.2	Pass
2483.5	GFSK	External	53.9	<54	Pass

Band Edge Plots







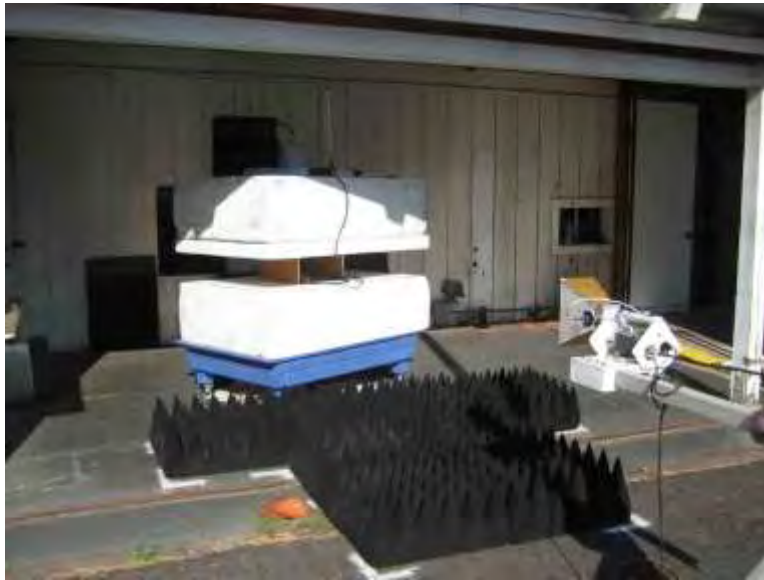
Test Setup Photos



Below 1GHz



Below 1GHz



Above 1GHz



Above 1GHz

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

Uncertainties reported are worst case for all CKC Laboratories' sites and 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 $\text{dB}\mu\text{V}/\text{m}$, the spectrum analyzer reading in $\text{dB}\mu\text{V}$ was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	($\text{dB}\mu\text{V}$)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	($\text{dB}\mu\text{V}/\text{m}$)

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 caret ("^") 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.