LS Research, LLC

ACCREDITED

Testing Cert. # 1255.01

W66 N220 Commerce Court ● Cedarburg, WI 53012 ● USA

Phone: 262.375.4400 ● Fax: 262.375.4248

www.lsr.com

LSR Job # C-588:

Compliance Testing of:

SEMS II

Test Date(s):

February 10th and 12th 2009 (RFID)

Prepared For:

SCOTT Health & Safety

4320 Goldmine Rd.

Monroe NC 28110

In accordance with:

Federal Communications Commission (FCC)

Part 15, Subpart C, Section 15.209

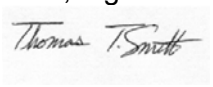
Industry Canada (IC)

RSS 210 Annex 2 and section 2.7

General Operating Requirements for Low-Power License-Exempt Transceivers

This Test Report is issued under the Authority of:

Thomas T. Smith, Mgr. EMC Test Services

Signature:  Date: April 9, 2009

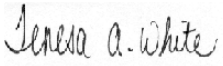
Test Report Reviewed by:	**Tested by:**
Teresa A. White, Quality Manager	Khairul Aidi Zainal, Senior EMC Engineer
Signature: 	Signature: 
Date: April 9, 2009	Date: April 9, 2009

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EXHIBIT 1. INTRODUCTION

1.1 SCOPE

References:	FCC Part 15, Subpart C, Section 15.209
Title:	Telecommunication – Code of Federal Regulations, CFR 47, Part 15
Purpose of Test:	To gain FCC Certification Authorization for Low-Power License-Exempt Transmitters.

References:	RSS 210 Annex 2
Title:	Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I equipment.
Purpose of Test:	To gain IC Certification Authorization for Low-Power License-Exempt Transmitters.

Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	• Commercial, Industrial or Business • Residential

1.2 NORMATIVE REFERENCES

Publication	Year	Title
47 CFR, Parts 0-15 (FCC)	2007	Code of Federal Regulations - Telecommunications
RSS 210 Annex 2	2007	Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I equipment.
RSS GEN	2007	General requirements and information for the certification of Radiocommunication Equipment.
ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
CISPR 16-1-1	2006 A2: 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus.
CISPR 16-2-1	2003	Specification for radio disturbance and immunity measuring apparatus and methods. Part 201: Conducted disturbance measurement.

1.3 LS Research, LLC TEST FACILITY

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025, 2005 "General Requirements for the Competence of Calibration and Testing Laboratories".

LS Research, LLC's scope of accreditation includes all test methods listed herein, unless otherwise noted. A copy of the accreditation may be accessed on our web site: www.lsr.com. Accreditation status can be verified at A2LA's web site: www.a2la2.net.

1.4 LOCATION OF TESTING

All testing was performed at LS Research, LLC, W66 N220 Commerce Court, Cedarburg, Wisconsin, 53012 USA, utilizing the facilities listed below, unless otherwise noted.

List of Facilities Located at LS Research, LLC:

- Compact Chamber
- Semi-Anechoic Chamber
- Open Area Test Site (OATS)

1.5 TEST EQUIPMENT UTILIZED

A complete list of equipment utilized in testing is provided in Appendix A of this test report. Calibration dates are indicated in Appendix A. All test equipment is calibrated in accordance with A2LA standards.

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1 CLIENT INFORMATION

Manufacturer Name:	**SCOTT Health & Safety**
Address:	**4320 Goldmine Rd. Monroe, NC 28110**
Contact Person:	**Klaus Wilkens**
Contact Phone:	**704-291-8395**
Contact Email:	**kwilkens@tycoint.com**

2.2 EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information has been supplied by the applicant.

Product Name:	RFID
Model Number:	200729-01, 200729-02 and 200729-03
Serial Number:	Engineering Unit

2.3 ASSOCIATED ANTENNA DESCRIPTION

The antenna used is a Coilcraft 5315TC-704XGL antenna coil (Refer to Appendix C for antenna specifications).

2.4 EUT'S TECHNICAL SPECIFICATIONS

Additional Information:

Frequency Range	126.0 kHz
RF Power in Watts	Could not be measured and was not provided by manufacturer.
EIRP (in mW)	N/A since no antenna gain information
Occupied Bandwidth	4.0 kHz (Calculated)
Field Strength (and at what distance)	69.5 dBuV/m at 3 meters (Near Field). Note: Fundamental buried in noise floor at 10.0 meters.
Type of Modulation	AM
Emission Designator	4K00K1DAN
Transmitter Spurious (worst case)	No spurious emissions detected above noise floor.
Receiver Spurious (worst case)	No spurious emissions detected above noise floor.
Frequency Tolerance %, Hz, ppm	> 100 ppm
Microprocessor Model # (if applicable)	PIC18F6627
EUT will be operated under FCC Rule Part(s)	15.209
Antenna Information:	
a) Antenna Type	Coilcraft RFID antenna coil.
b) Detachable/Non-Detachable	Non-Detachable
c) Antenna Gain (in dBi)	N/A
Modular Filing	☐ Yes ☒ No

2.5 PRODUCT DESCRIPTION

The RFID scanner on the SEMS II console allows a user read an RFID tag which can be programmed with unique identification information about the firefighter. This information is then transmitted to the base station. To read information from the RFID tag, the user depresses the WITHDRAWL button on the console while there is no air pressure on the system. The user is prompted by a visual indicator to scan the RFID tag and, if the read is successful, the console will display a visual identification (Flashing icon) that the programming is complete.

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 CLIMATE TEST CONDITIONS

Temperature:	71°
Humidity:	32%
Pressure:	735mmHg

3.2 APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC and IC Paragraph	Test Requirements	Compliance (yes/no)
FCC : 1.1307, 1.1310, 2.1091 & 2.1093 IC : RSS 102	RF Exposure Limit	Not Applicable
FCC : 15.209 (a) RSS 210 Annex 2	Maximum RF Output Power	Yes
15.209 (c) RSS GEN	Maximum RF Spurious Emissions	Yes
15.109 & 15.205	Transmitter General Radiated Emissions	Yes
The digital circuit portion of the EUT has been tested and verified to comply with FCC Part 15, Subpart B, Class B Digital Devices, RSS 210 and RSS GEN. The associated Radio Receiver has also been tested and found to comply with Part 15, Subpart B – Radio Receivers and RSS GEN. The Receiver Test Report is available upon request.		

3.3 MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

☒ **None** ☐ **Yes (explain below)**

3.4 DEVIATIONS & EXCLUSIONS FROM TEST SPECIFICATIONS

☒ **None** ☐ **Yes (explain below)**

EXHIBIT 4. DECLARATION OF CONFORMITY

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.209, and Industry Canada RSS-210, Issue 7 (2007), Section 2.6 for a Low-Power License-Exempt Transmitters, as well as the specification of FCC Title 47, CFR Part 15.109, and Industry Canada RSS-GEN for non-intentional radiators.

If some emissions are seen to be within 3 dB of their respective limits:
As these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

EXHIBIT 5. RADIATED EMISSIONS TEST

5.1 Test Setup

The test setup was assembled in accordance with Title 47, CFR FCC Part 15, RSS GEN and ANSI C63.4-2003. The EUT was placed on an 80cm high non-conductive pedestal, centered on a flush mounted 2-meter diameter turntable inside a 3 meter Semi-Anechoic, FCC listed Chamber. The EUT was operated in continuous transmit mode for final testing using power as provided by batteries.

The test sample was operated within the 3 meter Semi-Anechoic, FCC listed chamber located at L.S. Research LLC. in Cedarburg, WI. and also on the 10 meter Open Air Test Site located outside the L.S. Research facility. The test sample was operated with power supplied by internal batteries. The test sample was positioned upon an 80 cm high wooden table, which was positioned upon the 2 meter turntable within the chamber. The measurement antenna, mounted upon a motorized mast was then placed 3 meters from the product perimeter. This allowed the EUT to be scanned in both azimuth and elevation. For low frequency measurements, the product was operated while positioned upon the same table, positioned upon the 2 meter turntable located on the 10 meter OATS facility. The measurement antenna, an active loop antenna, was positioned 10 meters away, and oriented to give maximum signal levels. These 10 meter OATS measurements were performed for the transmitter fundamental, and harmonics up through the 10^{th} harmonic, plus various spurious emissions up to 1000 MHz.

The applicable limits apply at a 10 meter distance. Measurements were initially performed at 3.0 meters to maximize the fundamental signal. The calculations to determine these limits are detailed in the following pages. Please refer to Exhibit 18.4 for a complete list of test equipment

5.2 Test Procedure

The fundamental and spurious (harmonic) emissions of the transmitter were tested for compliance to the general limits given in Title 47 CFR, FCC Part 15.209 and RSS 210. For the calculations used to determine the limits applicable for the test sample, refer Exhibit 5.5. These limits are expressed in decibels (dB) above 1 microvolt per meter (μV/m). The samples were tested from the lowest frequency generated by the transmitter (without going below 9 kHz) to the 10th harmonic of the fundamental frequency generated by the device. The appropriate limits were also observed when the fundamental or spurious signals were located within any of the restricted bands as described in FCC 47 CFR Part 15.205a and RSS 210. These frequencies, and their associated limits, are referenced in Exhibit 5.5 . The test sample was put into continuous transmit mode (Transmission verified using a near field probe), and positioned on an 80 cm high non-conductive table. The test sample was setup in the 3 Meter FCC listed Semi-Anechoic chamber located at L. S. Research LLC, upon the 2 meter turntable in the chamber, and an antenna mast was placed 3 meters from the test object perimeter. A biconical antenna was used to measure emissions from 30 to 300 MHz, a log periodic was used to measure emissions from 300 to 1000 MHz. The test object was placed in continuous transmit, and the spurious signals were maximized by rotating the turntable 360 degrees, and by raising and lowering the antenna between 1 and 4 meters, and was tested using both horizontal and vertical antenna polarities. ***Brief scans below 30 MHz were also performed in the 3m chamber, using an active loop antenna as the sensing antenna. Information from this 3 meter test was used to identify frequencies for further investigation, during the emissions tests on the 10 meter OATS.*** For measurement of the transmitter fundamental, harmonics, and low frequency spurious signals, a magnetic loop antenna was used,

which was placed at a separation distance of 10 meters upon an FCC listed OATS located at the L. S. Research LLC. facility in Cedarburg , WI. The fixture was set up on top of the 2 meter flush mounted turntable installed at the 10 meter OATS. The orientation of the loop and fixture were then varied to obtain the maximum signal levels and then readings were taken. Orientation of the loop antenna includes its plane vertical, horizontal and rotated about its vertical axis. Above 30 MHz, suspect frequencies were also measured using the biconical or log periodic antennas, mounted on a 4 meter adjustable mast, at 10 meters separation on the OATS. The results are tabulated in the charts found in Appendix B.

The unit was scanned for emissions in both transmit and standby modes, over the range 10.0 kHz to 1000 MHz to establish compliance with Part FCC 47 CFR 15.209 and RSS 210 for the transmitter. Also, the scans were performed to evaluate the digital controller section of the product, which is subject to verification as a Class B digital device.

5.3 Test Equipment Utilized

A list of the test equipment and antennas utilized for the Radiated Emissions test can be found in Exhibit 18.4. This list includes calibration information and equipment descriptions. All equipment is calibrated and used according to the operation manuals supplied by the manufacturers. All calibrations of the antennas used were performed at an N.I.S.T. traceable site. In addition, the Connecting Cables were measured for losses using a calibrated Signal Generator and a HP 8546A EMI Receiver. The resulting correction factors and the cable loss factors from these calibrations were entered into the HP 8546A EMI Receiver database. As a result, the data taken from the HP 8546A EMI Receiver accounts for the antenna correction factor as well as cable loss or other corrections, and can therefore be entered into the database as a corrected meter reading. The HP 8546A EMI Receiver was operated with resolution bandwidths as prescribed in ANSI C63.4 (2003). The HP 8546A EMI receiver was operated with a bandwidth of 9 kHz when receiving signals below 30 MHz, a bandwidth of 120 kHz when receiving signals at 30 MHz-1 GHz. The Peak, Quasi-peak, and Average detector functions were used.

Test Equipment List

Test Equipment	Manufacturer	Model No.	Serial No.
EMI Receiver	HP	8546A	3617A00320
EMI Receiver Pre-Select.	HP	85460A	3448A00296
Spectrum Analyzer	Agilent	E4446A	US45300564
Log Periodic Antenna	EMCO	93146	9701-4855
Bicon Antenna	EMCO	93110B	9702-2918
Pre-Amp	Adv. Microwave	WLA612	1145A04094
Horn Antenna – Std. Gain	EMCO	3160-09	9809-1120
Active loop Antenna	EMCO	6502	2753

5.4 Test Results

The EUT was found to **MEET** the Radiated Emissions requirements of Title 47 CFR, FCC Part 15.209 for a Low-Power License-Exempt transmitter [Canada RSS-210, Issue 7 (2007), section 2.6]. The frequencies with significant RF signal strength were recorded and plotted as shown in the Data Charts and Graphs.

5.5 CALCULATION OF RADIATED EMISSIONS LIMITS

Transmitter Limits

The maximum peak output power of an intentional radiator in the 9-490 kHz band, as specified in Title 47 CFR 15.209 and RSS 210 section 2.7, is calculated in a formula as described below. The harmonic and spurious RF emissions, with appropriate receiver bandwidths, as specified in 15.209 (c) and section 2.7 of RSS 210, shall be below the measured power of the desired signal, and must also meet the requirements described in 15.205(c) for FCC and table 1 of RSS 210 where applicable.

The following table depicts the general radiated emission limits. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements and is comparable to that of table 3 in RSS 210 section 2.7 . These limits were applied to the fundamental emission of the intentional radiator as well as all other significant spurious signals.

Frequency (MHz)	Limit μV/m	Limit (dBμV/m)	Measurement Distance (m)
0.009-0.490	2400/F (kHz)	Note 1	300
0.490-1.705	24000/F (kHz)		30
1.705-30.0	30		30
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
960-24,000	500	54.0	3

Note 1: Sample calculation for the Fundamental Emission of the transmitter:

Given the transmitter operates at a fundamental frequency of 126 kHz, the emission limit may be calculated:

2400/F = 2400/126 = 19.0 μV/m if measured at 300 meters separation.

Expressed in decibels: 20 $\log_{10}$ (19.0) = 25.6 dBμV/m at 300 m separation.

At 3 meters separation, the limit may be extrapolated by the addition of 40 dB/decade per 47CFR 15.31(f)(2)

Limit for the fundamental emission = 25.6 dBμV/m + 80 dB = 105.6 dB/μV/m at 3 meters

At 10 meters separation, the limit may be extrapolated by the addition of 40 dB/decade per 47CFR 15.31(f)(2)

Limit for the fundamental emission = 25.6 dBμV/m + 59.1 dB = 84.7 dB/μV/m at 10 meters

Sample conversion from field strength μV/m to dBμV/m:

dBμV/m = 20 $\log_{10}$ (100)

= 40 dBμV/m (from 30-88 MHz)

500μV/m or 54.0 dB/μV/m at 3 meters

54.0 + 20 = 74 dB/μV/m at 0.3 meters

5.6 RADIATED EMISSIONS DATA CHART

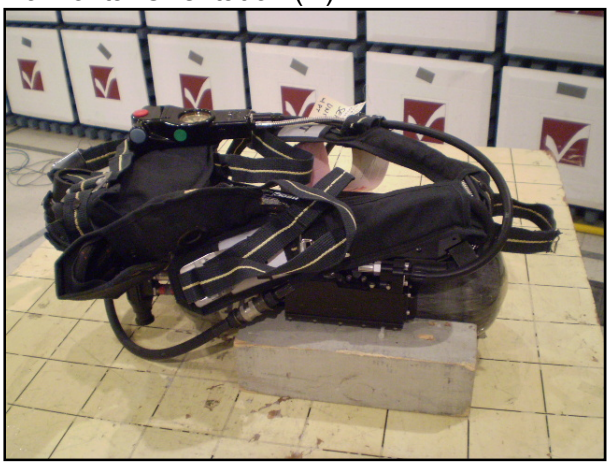
3 Meter Measurements of Electromagnetic Radiated Emissions
Test Standard: 47CFR, Part 15.209. RSS 210 section 2.7
Frequency Range Inspected: 10 kHz to 1000 MHz

Manufacturer:	TYCO/SCOTT Health & Safety						
Date(s) of Test:	February 10th and 12th 2009						
Test Engineer(s):	Aidi Zainal						
Voltage:	9.0 VDC						
Operation Mode:	continuous transmit, modulated.						
Environmental Conditions in the Lab:	Temperature: 20 – 25° C Relative Humidity: 30 – 60 %						
EUT Power:		Single Phase ___VAC		3 Phase ___VAC			
		Battery		Other:			
EUT Placement:	√	80cm non-conductive table		10cm Spacers			
EUT Test Location:	√	3 Meter Semi-Anechoic FCC Listed Chamber	√	3/10m OATS			
Measurements:		Pre-Compliance		Preliminary	√	Final	
Detectors Used:		Peak	√	Quasi-Peak	√	Average	

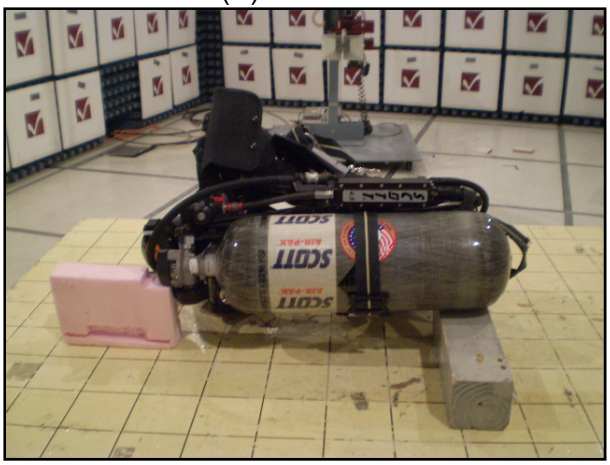
5.7 Test Setup Photo(s) – Radiated Emissions Test

Vertical Orientation (V)

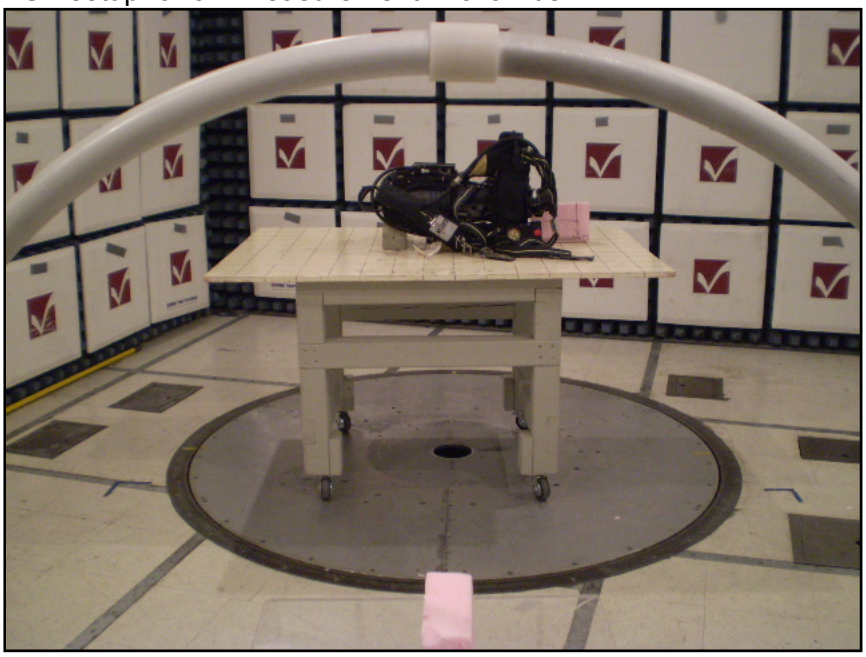
Horizontal Orientation (H)



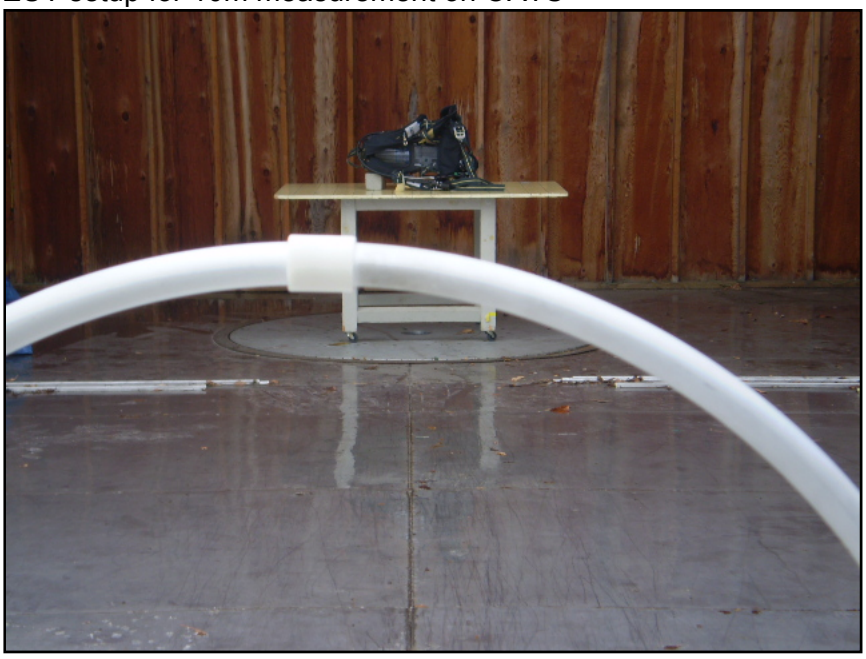
Side Orientation (S)



EUT setup for 3m measurement in chamber



EUT setup for 10m measurement on OATS



The following table depicts the level of significant radiated RF fundamental emission :

Frequency (kHz)	Ant./EUT	Height (meters)	Azimuth (0° - 360°)	Measured Peak (dBμV/m)	Measured Average (dBμV/m)	15.209 Average Limit (dBμV/m)	Margin (dB)
126.0 Note 1,2,8	Loop with its plane vertical / S	1.00	76	71.7	69.5	105.6	36.1
126.0 Note 3,6,7	All combination of loop antenna and EUT orientation	1.00	0° - 360°	Note 4	Note 4	84.7	Not Available

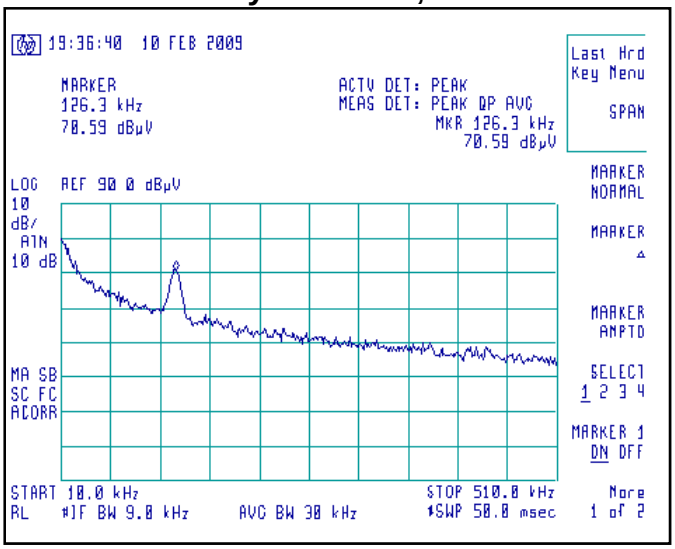
Notes:

1) An average Detector was used in measurements.
2) Measurement was made at 3 meters of separation from the EUT (3m Chamber).
3) Measurement was made at 10 meters of separation from the EUT (OATS).
4) Signal buried within noise floor
5) No spurious emissions above noise floor up to 1GHz in the 3m chamber as well as on the OATS.
6) Transmitter functionality was verified using a near field probe. At near field, the fundamental signal could be seen.
7) Emissions were measured with the loop plane vertical, horizontal and rotated about its vertical axis.
8) Maximum emission with the loop plane normal to the direction of propagation.

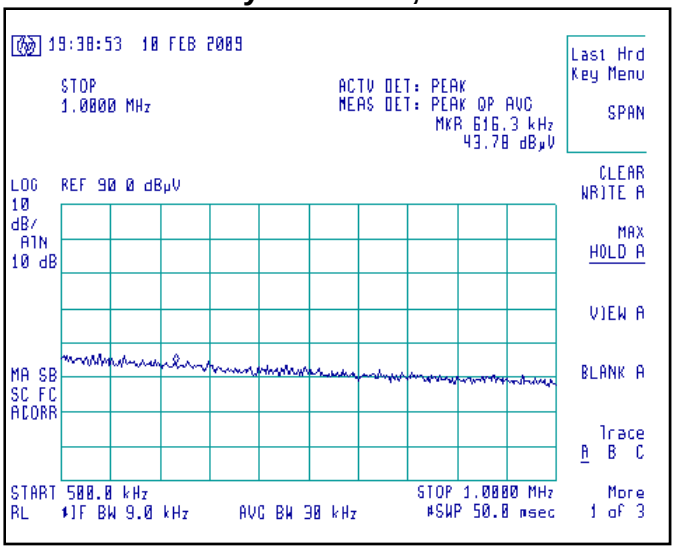
5.8 Screen Captures - Radiated Emissions Testing

These screen captures represent Peak Emissions.
The signature scans shown here are from worst-case emissions with the sense antenna both in vertical and horizontal polarity for worst case presentations.

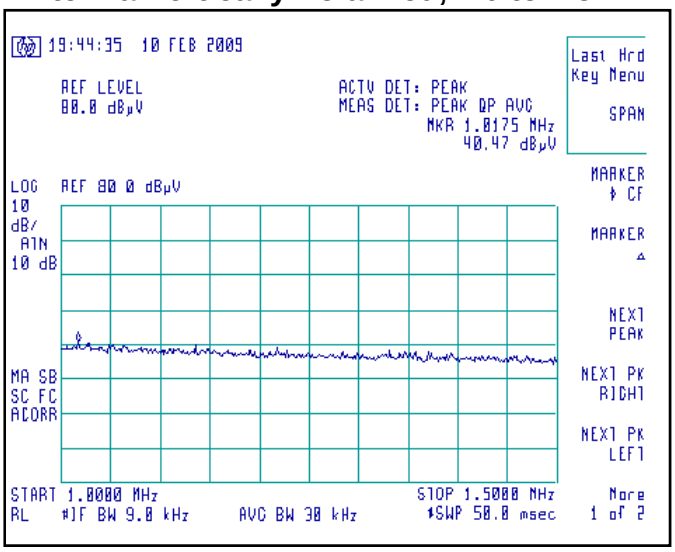
Antenna Vertically Polarized, 10.0 to 510.0 kHz



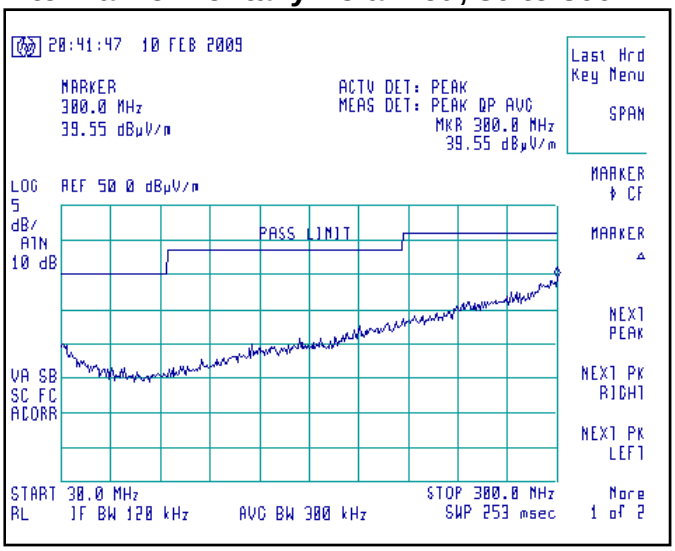
Antenna Vertically Polarized, 500.0 to 1000 kHz



Antenna Vertically Polarized, 1.0 to 1.5 MHz

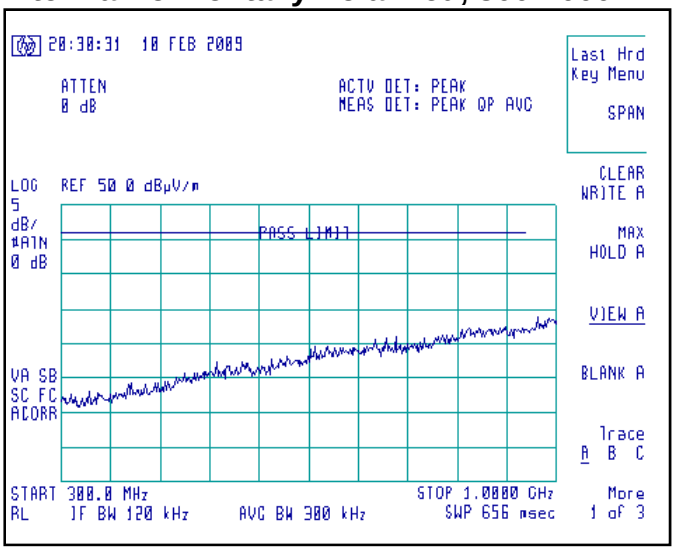


Antenna Horizontally Polarized, 30 to 300 MHz



Screen Captures - Radiated Emissions Testing *(continued)*

Antenna Horizontally Polarized, 300-1000 MHz



Antenna Vertically Polarized, RFID Fundamental at OATS

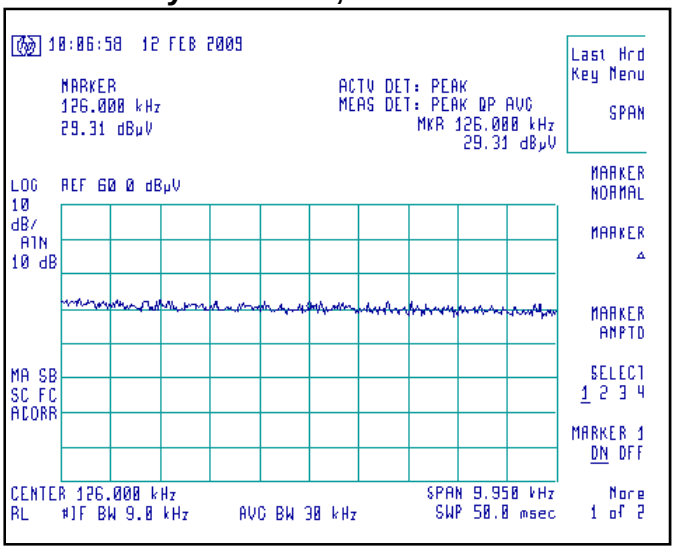


EXHIBIT 6. CONDUCTED EMISSIONS TEST, AC POWER LINE:

This test was not performed since the EUT is battery powered.

EXHIBIT 7. OCCUPIED BANDWIDTH

7.1 Limits

There are no stated limits for the occupied bandwidth for devices operating under 47CFR Part 15.209 or RSS 210.

7.2 Method of Measurements and Result.

There was no practical way of measuring the bandwidth of the device. Conducted measurement is not an option while the IF bandwidth of the spectrum analyzer dictates the measurements via radiated.

However, using values in the data sheet of the chip, the bandwidth of the device was calculated to be:

Bandwidth = 4.0 kHz

Calculation:

Occupied Bandwidth

Data modulation signal = 2 kHz
Modulation = AM

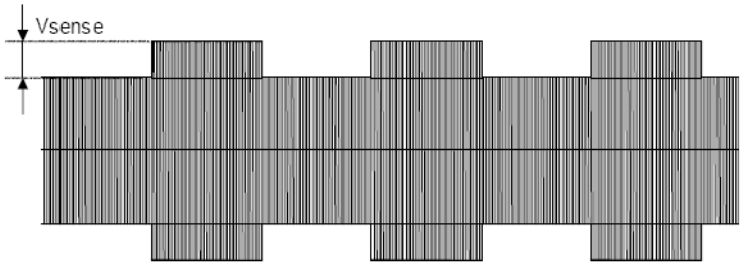
BW = 2*M = 2 * 2 kHz = **4 kHz**

EM MICROELECTRONIC - MARIN SA
A COMPANY OF THE SWATCH GROUP

EM4095

Read/Write analog front end for 125kHz RFID Basestation

Note 1: A_{GND} is a EM4095 internal reference point. Any external connection except specified capacitor to V_{SS} may lead to device malfunction.
Note 2: Modulating signal 2Khz square wave on 125 kHz carrier, total signal inside V_{CM}



APPENDIX A

Test Equipment List

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date : 10-Feb-2009 Type Test : Radiated Emissions Job # : C-588

Prepared By: Customer : Tyco Fire and Security Quote #: 309116

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	aa 960078	Log Periodic Antenna	EMCO	93146	9701-4855	10/20/2008	10/20/2009	Active Calibration
2	aa 960077	Bicon Antenna	EMCO	93110B	9702-2918	11/24/2008	11/24/2009	Active Calibration
3	ee 960013	EMI Receiver	HP	8546A System	3617A00320;3448A	9/23/2008	9/23/2009	Active Calibration
4	ee 960014	EMI Receiver-filter section	HP	85460A	3448A00296	9/23/2008	9/23/2009	Active Calibration
5	aa 960081	Double Ridge Horn Antenna	EMCO	3115	6907	9/26/2008	9/26/2009	Active Calibration
6	ee 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	9/26/2008	9/26/2009	Active Calibration
7	aa 960006	Active Loop Antenna	EMCO	6502	9205-2753	9/23/2008	9/23/2009	Active Calibration

Note 1 - Equipment calibrated within a traceable system.

Uncertainty Statement

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k=2.

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	Particular Configuration	Uncertainty Values
Radiated Emissions	3 – Meter chamber, Biconical Antenna	4.24 dB
Radiated Emissions	3-Meter Chamber, Log Periodic Antenna	4.8 dB
Radiated Emissions	10-Meter OATS, Biconical Antenna	4.18 dB
Radiated Emissions	10-Meter OATS, Log Periodic Antenna	3.92 dB
Conducted Emissions	Shielded Room/EMCO LISN	1.60 dB
Radiated Immunity	3 Volts/Meter in 3-Meter Chamber	1.128 Volts/Meter
Conducted Immunity	3 Volts level	1.0 V

APPENDIX B

TEST STANDARDS – CURRENT PUBLICATION DATES RADIO

STANDARD #	DATE	Am. 1	Am. 2
ANSI C63.4	2003		
CISPR 11	2003-03	2004-05	2006-06
CISPR 14-1	2005-11		
CISPR 14-2	2001-11	2001-11	2008-05
CISPR 16-1-1 Note 1	2006-03	2006-09	2007-07
CISPR 16-1-2 Note 1	2003	2004-04	2006-07
CISPR 22	2005	2005-07	2006-01
CISPR 24	1997-09	2001-07	2002-10
EN 55011	2007-05		
EN 55014-1	2006		
EN 55014-2	1997		
EN 55022	2006		
EN 60601-1-2	2007		
EN 61000-3-2	2006-05		
EN 61000-3-3	1994	1995	
EN 61000-4-2	2001	1998	2001
EN 61000-4-3	2006-07	2008-05	
EN 61000-4-4	2004		
EN 61000-4-5	2006-12		
EN 61000-4-6	2007-08		
EN 61000-4-8	1993	1994-01	
EN 61000-4-11	2004-10		
EN 61000-6-1	2007-02		
EN 61000-6-2	2005-12		
EN 61000-6-3	2007-02		
EN 61000-6-4	2007-02		
FCC 47 CFR, Parts 0-15, 18, 90, 95	2007		
FCC Public Notice DA 00-1407	2000		
FCC ET Docket # 99-231	2002		
FCC Procedures	2007		
ICES 001	2006-06		
ICES 002	2007-02		
ICES 003	2004-02		
IEC 60601-1-2 Note 1	2007-03		
IEC 61000-3-2	2005	2008-03	
IEC 61000-3-3	2008-06		
IEC 61000-4-2	2001-04	1998	2000
IEC 61000-4-3	2006-02	incl in 2006	
IEC 61000-4-4	2004-07		

STANDARD #	DATE	Am. 1	Am. 2
IEC 61000-4-5	2005-11		
IEC 61000-4-6	2008-07		
IEC 61000-4-8	2001-03	2000	
IEC 61000-4-11	2004-03		
IEC 61326-1	2005-12		
ISO 14082	1998-07		
MIL Std. 461E	1999-08		
RSS GEN	2007-06		
RSS 119	2007-06		
RSS 123	1999-11		
RSS 125	2000-03		
RSS 131	2003-07		
RSS 136	2002-10		
RSS 137	1999-09		
RSS 210	2007-06		
RSS 213	2005-12		
RSS 243	2005-11		
RSS 310	2007-06		
Note 1: Test not on LSR Scope of Accreditation.			

Appendix C

Antenna Specification(s)

RFID Transponder Coils – 5315TC

The 5315TC is Coilcraft's most rugged and lowest cost antenna coil designed for RFID applications at 125 kHz. The wrap-around terminals have large mounting surfaces to ensure excellent board adhesion. The coil is wound on a plastic base, providing great durability and allowing this part to withstand harsh mechanical shock.

Their robust construction and 125°C rating make these parts suitable for use in the most severe environments. They were developed for automotive applications, including tire pressure monitoring systems.

In addition to the standard models shown, Coilcraft can design transponder coils to operate at other frequencies.

Coilcraft **Designer's Kit C369** contains four samples each of the standard parts shown. To order, contact Coilcraft or visit **http://order.coilcraft.com**.

Part number[1]	Inductance[2] at 125 kHz ±2% (mH)	Q min[2]	Read distance[3] (inches/cm)	Sensitivity[4] (mV/µT)	Matching capacitor[5] (pF)	DCR max[6] (Ohms)	SRF typ[7] (kHz)
5315TC-374XGL_	0.37	8	16/40.6	8.32	4380	24	7100
5315TC-404XGL_	0.40	8	17/43.2	8.67	4050	25	7300
5315TC-704XGL_	0.70	12	21/53.3	11.43	2320	33	4500
5315TC-904XGL_	0.90	12	21/53.3	13.35	1800	38	3800
5315TC-105XGL_	1.00	12	23/58.4	14.07	1600	40	2500
5315TC-115XGL_	1.08	13	23/58.4	14.65	1500	40	2300
5315TC-205XGL_	1.97	14	25/63.5	21.28	820	70	2300
5315TC-245XGL_	2.38	12	26/66.0	23.97	680	80	2400
5315TC-335XGL_	3.30	14	27/68.6	29.70	490	95	1800
5315TC-415XGL_	4.15	15	29/73.7	34.95	390	103	1260
5315TC-495XGL_	4.90	15	28/71.1	40.00	330	150	1550
5315TC-685XGL_	6.80	13	30/76.2	53.87	240	180	1350
5315TC-715XGL_	7.10	14	30/76.2	55.41	220	176	890
5315TC-725XGL_	7.20	17	30/76.2	56.74	220	165	880

1. When ordering, please specify packaging code:

   5315TC-715XGL D

   Packaging: D = 13" machine-ready reel. EIA-481 embossed plastic tape (3000 parts per full reel).
   B = Less than full reel. In tape, but not machine ready. To have a leader and trailer added ($25 charge), use code letter D instead.
2. Inductance and Q measured using Agilent/HP 4192A impedance analyzer at 125 kHz. For recommended test procedures, contact Coilcraft.
3. Read distance measured using the KEELOQ® Transponder Evaluation Kit part number DM303005 from Microchip. Distance was recorded as the voltage across the resonant circuit dropped below 10 mV.
4. Sensitivity measured in accordance with Coilcraft application note "Measuring Sensitivity of Transponder Coils."
5. Matching capacitor value required for parallel resonant circuit operating at 125 kHz.
6. DCR measured on micro-ohmmeter.
7. SRF measured using Agilent/HP 8753D network analyzer.
8. Ambient temperature range: –40°C to +125°C
9. Storage temperature range: Component: –40°C to +125°C
   Packaging: –40°C to +80°C
10. Resistance to soldering heat: Three reflows at >217°C for 90 seconds (+260°C ±5°C for 20 – 40 seconds), allowing parts to cool to room temperature between.
11. Electrical specifications at 25°C.
12. Temperature coefficient of inductance: +300 to +1100 ppm/°C.

Refer to Doc 362 "Soldering Surface Mount Components" before soldering.

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Specifications subject to change without notice.
Please check our website for latest information. Document 311-1 Revised 02/19/09

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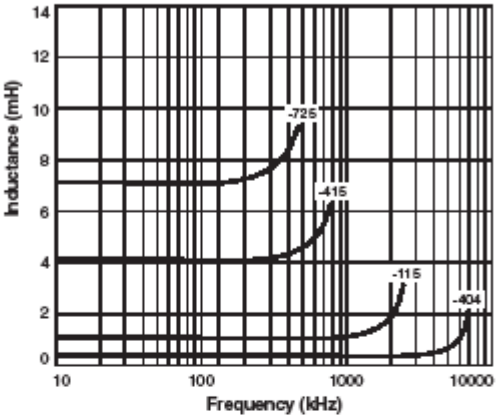
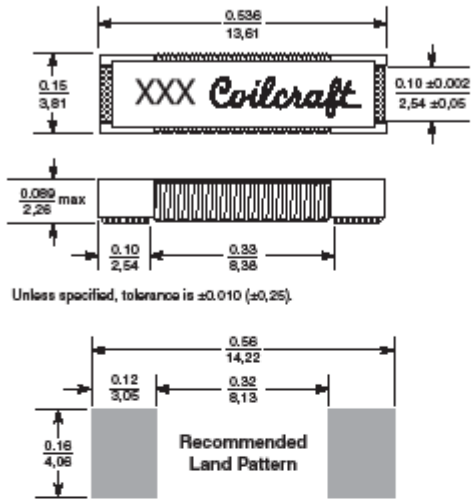
RFID Transponder Coils – 5315TC

Typical L vs Frequency



Dimensions



Terminations Gold over nickel over phos bronze
Weight 260 – 300 mg
Packaging 3000/13" reel; Plastic tape: 24 mm wide, 0.3 mm thick, 8 mm pocket spacing, 2.74 mm pocket depth

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Please check our website for latest information. Document 311-2 Revised 02/19/09

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