TEST REPORT

Report Number: 08KFE009820-001
Project Number: 08KFE009820

Testing performed on the
ECC100S-US, Wireless Sensor Unit
FCC ID: RNT-ECC100S-US

to
47 CFR Part 15.249:2007

For
eQ-3 Entwicklung GmbH

Test Performed by:	Test Authorized by:
Intertek Deutschland GmbH	eQ-3 Entwicklungn GmbH
Innovapark 20	Maiburger Str. 36
87600 Kaufbeuren, Germany	26789 Leer, Germany
I	

Prepared by: _____ Date: December 5, 2008
Yuriy Litvinov

Reviewed by: _____ Date: December 5, 2008
Uri Spector

TABLE OF CONTENTS

1.0 GENERAL DESCRIPTION

Model:	ECC100S-US
Type of EUT:	Wireless Sensor Unit
Serial Number:	N/A
FCC ID:	FCC ID: RNT-ECC100S-US
Industry Canada ID:	N/A
Related Submittal(s) Grants:	None
Company:	eQ-3 Entwicklung GmbH
Customer:	Mr. Gerd Busboom
Address:	Maiburger Str. 36 26789 Leer, Germany
Phone:	+49(0)491 6008 735
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Test Standards:	☒ FCC Part 15.249 ☐ RSS–210, Issue 7, 2007 ☐ RSS-Gen, Issue 2, 2005 ☒ 47 CFR, Part 15:2005, §15.107 and §15.109, Class B ☐ Other
Type of radio:	☒ Stand -alone ☐ Module ☐ Hybrid
Date Sample Submitted:	December 1, 2008
Test Work Started:	December 3, 2008
Test Work Completed:	December 4, 2008
Test Sample Conditions:	☐ Damaged ☐Poor (Usable) ☒ Good

1.1 Product Description

Product Description:	Energy Measurement System
Operating Frequency	916.5MHz
Modulation:	FSK
Antenna(s) Info:	Type: Loop on PCB
Antenna Installation:	☐ User ☐ Professional ☒ Factory
Transmitter power configuration:	☐ Internal battery ☐ External power source ☒ 120VAC ☐ 230VAC ☐ 400VAC ☒ 4.5 VDC ☐ Other: Amp. ☐ 50Hz ☒ 60Hz
Test Methodology:	Emission measurements were performed according to the procedures in ANSI C63.4-2003. All field strength radiated emissions measurements were performed in the semi-anechoic chamber, and for each scan, the procedure for maximizing emissions in were followed. All field strength radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application
Special Test Arrangement:	The EUT was tested with continuous modulated or un-modulated mode.
Justification:	None

1.2 EUT Configuration

The equipment under test was operated during the measurement under the following conditions:

☒ - Standby
☒ - Continuous modulated
☒ - Continuous un-modulated
☐ - Continuous receiving mode
☐ - Test program (customer specific)

Operating modes of the EUT:

No.	Description
1	
2	

Cables:

No.	Type	Length	Designation	Note
1	2-wire cable	0.3m	AC Power	

Support equipment/Services:

No.	Item	Description
1	None	
2		

1.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

☒ **Normal**

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

1.4 Measurement uncertainty

The expanded uncertainty (k = 2) for radiated emissions from 30 to 1000 MHz has been determined to be: ±4 dB at 10m and ±5.4 dB at 3m

The expanded uncertainty (k = 2) for conducted emissions from 150 kHz to 30 MHz has been determined to be: ±2.6 dB

1.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.
The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

Where: FS = Field Strength in dB(μV/m)
RA = Receiver Amplitude in dB(μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(m^{-1})
AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(μV) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(μV/m).

RA = 48.1 dB(μV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(μV/m)

General notes: None

2.0 TEST SUMMARY

Referring to the performance criteria and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards.

TEST SPECIFICATION	TEST PARAMETERS	RESULT
15.249(a)	Field strength of fundamental	Pass
15.249(a)	Field strength of harmonics	Pass
15.249(d)	Field strength of spurious emissions	Pass
15.207	Transmitter Power Line conducted emissions	Pass

3.0 TEST CONDITIONS AND RESULTS

3.1 Field strength of fundamental, harmonics and spurious emissions

Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test distance: ☐ 10 meters ☒ 3 meters

Frequency range of measurements: 30MHz-10GHz

Test result: **Pass**

Max. Emissions margin at fundamental: 0.7 dB below the limits

Max. margin of harmonics and spurious emissions: 2.1 dB below the FCC 15.209 limits

Notes: Table 3.1.1 shows field strength of fundamentals.
Table 3.1.2 and Graphs 3.1.1 to 3.1.3 show field strength of harmonics and spurious emissions.
No emissions above ambient noise were detected at band edges of 902.0 and 928.0MHz and above the third harmonic.

Test Setup Photos

Date:	December 5, 2008	**Result:** **Pass**
Standard:	FCC 15.249(a)	
Tested by:	Yuriy Litvinov	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Emissions at fundamentals	

Table 3.1.1

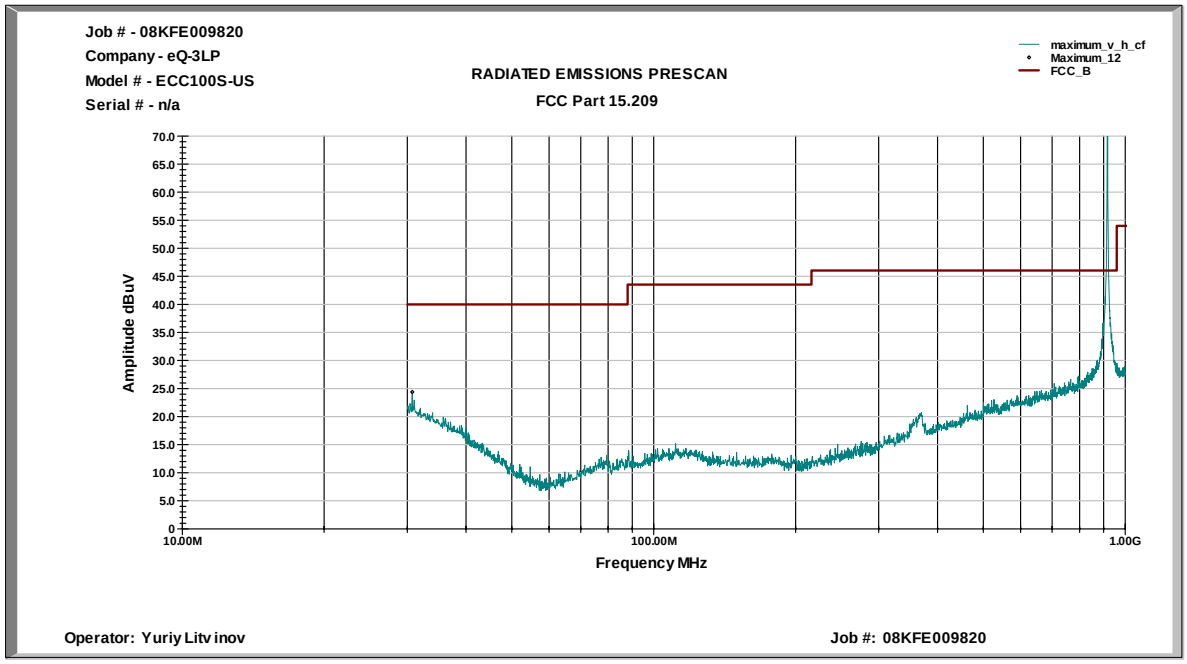
Antenna Polarity	Antenna Hts (m)	Frequency MH	Peak Reading dBuV/m	AF+CF dB	Net at 3m. dBuV/m	Limit dBuV/m	Margin dB	Comments
H	1.0	916.50	68.8	22.8	91.6	94	-2.4	
V	1.3	916.50	70.5	22.8	93.3	94	-0.7	

Date:	December 5, 2008	**Result:** **Pass**
Standard:	FCC 15.249(a) and (d)	
Tested by:	Yuriy Litvinov	
Test Point:	Enclosure with antenna	
Operation mode:	See Page 5	
Note:	Harmonics and spurious emissions	

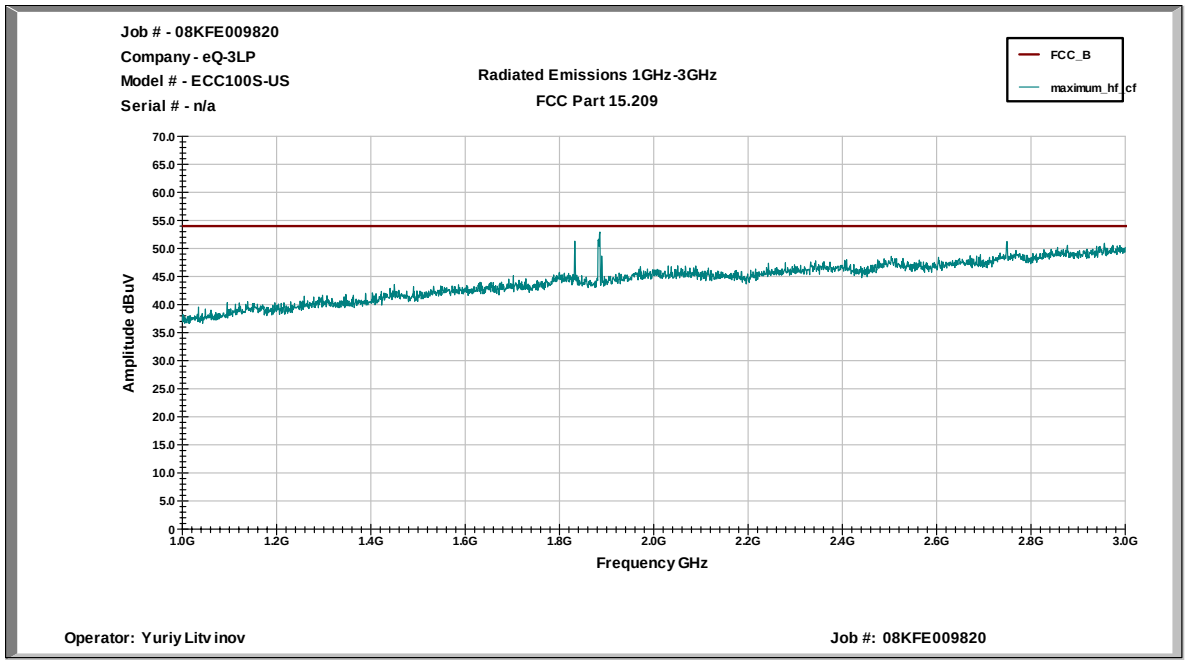
Table 3.1.2

Antenna Polarity	Antenna Hts (m)	Frequency MH	Peak Reading dBuV/m	AF+CF dB	Net at 3m. dBuV/m	Limit dBuV/m	Margin dB	Comments
H	1.0	1833.00	18.2	29.0	47.2	54	-6.8	
V	1.2	1833.00	20.5	29.0	49.5	54	-4.5	
H	1.0	2749.00	18.1	33.8	51.9	54	-2.1	
V	1.4	2749.00	16.0	33.8	49.8	54	-4.2	

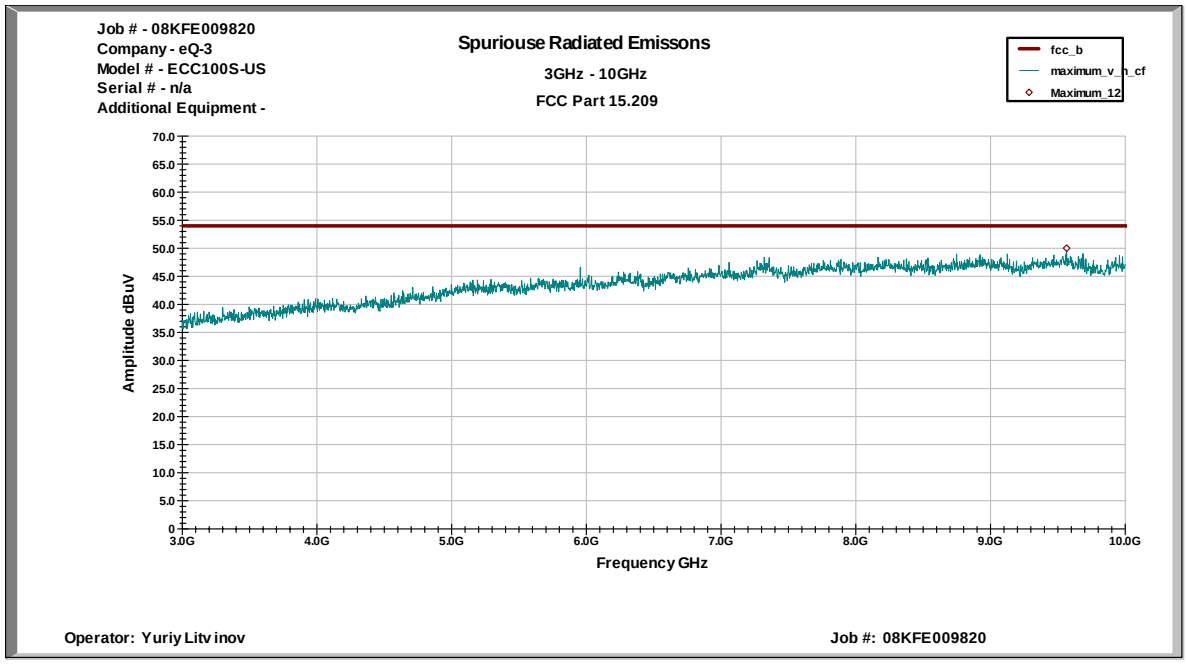
Graph 3.1.1



Graph 3.1.2



Graph 3.1.3


Job # - 08KFE009820
Company - eQ-3
Model # - ECC100S-US
Serial # - n/a
Additional Equipment -
Spuriouse Radiated Emissons
3GHz - 10GHz
FCC Part 15.209
fcc_b
maximum_v_h_cf
Maximum_12
Amplitude dBuV
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0
3.0G
4.0G
5.0G
6.0G
7.0G
8.0G
9.0G
10.0G
Frequency GHz
Operator: Yuriy Litvinov
Job #: 08KFE009820

3.2 Bandwidth of Emissions

Channel	Measured 20dB bandwidth kHz	Measured 99% bandwidth kHz

Notes: N/A

3.3 Transmitter power line conducted emissions

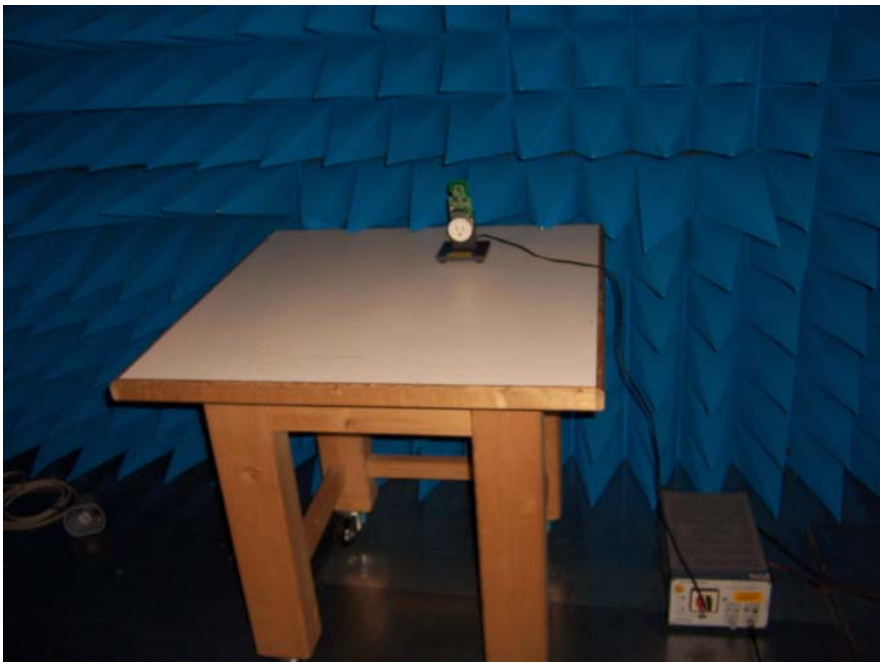
Test location: ☐ OATS ☒ Anechoic Chamber ☐ Other

Test result: **Pass**

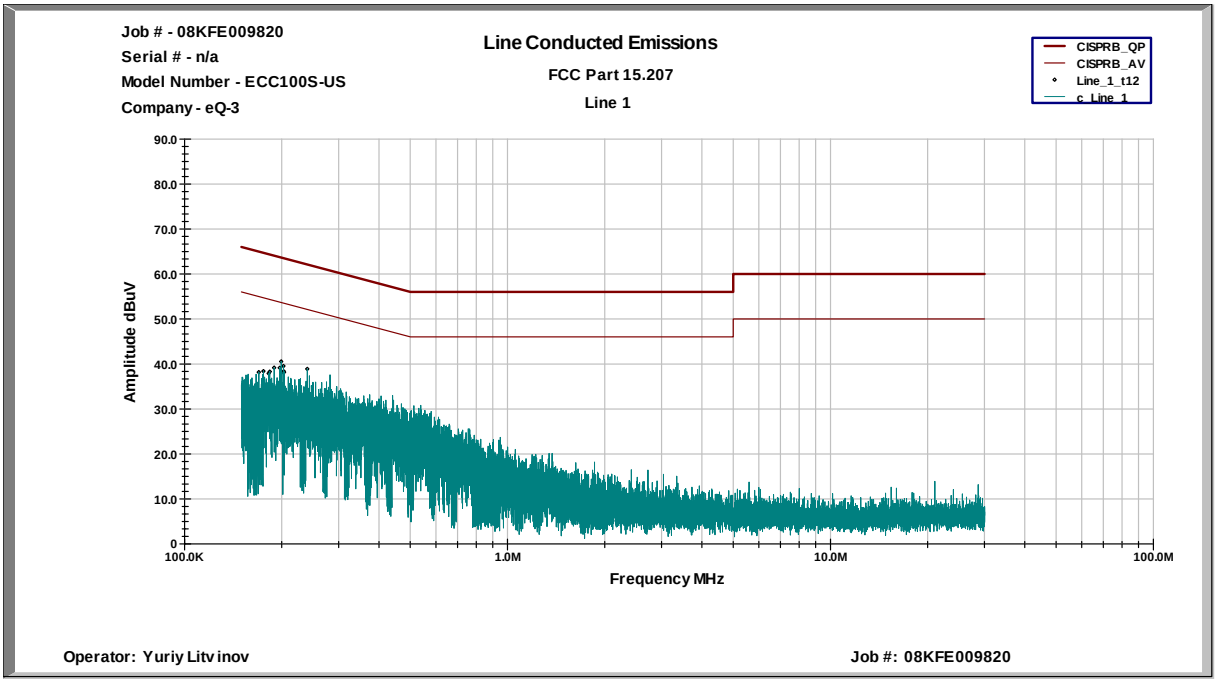
Frequency range: 0.15MHz-30MHz

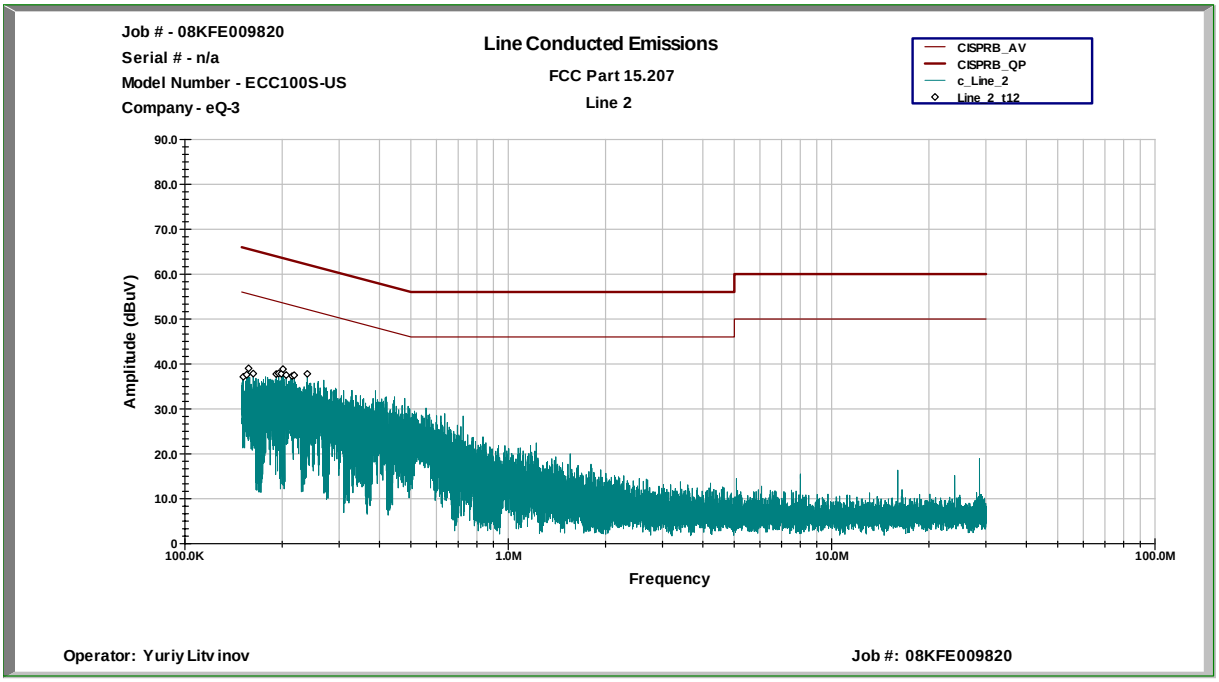
Max. Emissions margin: 20 dB below the limits

Notes:



Test Setup Photos


Job # - 08KFE009820
Serial # - n/a
Model Number - ECC100S-US
Company - eQ-3
Line Conducted Emissions
FCC Part 15.207
Line 1
CISPRB_QP
CISPRB_AV
Line_1_t12
c_Line_1
Amplitude dBuV
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
100.0K
1.0M
10.0M
100.0M
Frequency MHz
Operator: Yuriy Litvinov
Job #: 08KFE009820


Job # - 08KFE009820
Serial # - n/a
Model Number - ECC100S-US
Company - eQ-3
Line Conducted Emissions
FCC Part 15.207
Line 2
CISPRB_AV
CISPRB_QP
c_Line_2
Line_2_t12
Amplitude (dBuV)
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
100.0K
1.0M
10.0M
100.0M
Frequency
Operator: Yuriy Litvinov
Job #: 08KFE009820

4.0 TEST EQUIPMENT

DESCRIPTION	MANUFACTURER	MODEL	SERIAL NO.	LAST CAL.	USED
Spectrum Analyzer	R & S	ESIB 26	100150	03/07	☒
Bicono-Log Antenna	R & S	HL562	100354	04/07	☒
Horn Antenna	R & S	HF906	100331	09/07	☒
Pre-Amplifier	Bonn Elektronik	BLMA 0118	076604	09/07	☒
LISN	R & S	ESH3-Z51	838576	03/07	☒
System	TILE! Instrument Control		Ver. 3.4.K.29	VBU	☒