

EMISSIONS TEST REPORT FOR A LOW POWER TRANSMITTER**I. GENERAL INFORMATION**

Requirement: Federal Communications Commissions
Industry Canada
Test Requirements: 15.205, 15.207, 15.209, 15.247
RSS-210
Applicant: Invensys Metering Systems
FCC ID: KCH-XEMICS-BAT
Original Grant Date: 31 December 2003

II. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

The Invensys FCC ID: KCH-XEMICS-BAT is a limited modular hybrid FHSS/DTS transceiver operating at 902-928 MHz, used with Invensys power meters and other energy management products.

Transmitter Specification

Supply Voltage	2.4v – 3.6v
Current	69mA
TX Power	13dBm (nom.)
Frequency Deviation (FSK)	+/- 40 kHz (narrow band) +/- 250 kHz (wide band)
Centre Frequency Error	+15 / -25 kHz
Frequency of operation	905.2 – 924.8 MHz
Data Rate	19.2 kbps
Data Format	NRZ
Number of channels (see hop tables)	50 (narrow band) 4 (wide band)
Channel Separation	400 kHz (narrow band) 5 MHz (wide band)
20dB occupied bandwidth	130 kHz (narrow band) 620 kHz (wide band)
6dB occupied bandwidth	550 kHz (wide band)
Temperature Range	-40°C to +85°C

This report is presented in support of a class 2 permissive change. The originally granted product has been modified as follows

- 1) Controller TI MSP430 running at 4.875 MHz replaced with Atmel MEGA128L running at 7.3738 MHz.
- 2) 32k x 8 external memory has been added.
- 3) A voltage regulator has been added, radio supply can be 2.6v to 12v d.c.

No changes were made to the RF transmitter section, only to the control and power supply sections.

III . TEST PROCEDURE REFERENCE

Testing was performed in accordance to the requirements of the following published test procedures /standards, unless otherwise indicated:

ANSI C63.4

Radiated emissions, 30 – 40,000 MHz
AC line conducted emissions, 0.150 – 30 MHz

IV. TEST LOCATION

All tests were performed at

Compliance Certification Services
561F Monterey Road
Morgan Hill, CA 95037

T.N. Cokenias
EMC Consultant/Agent for Invensys

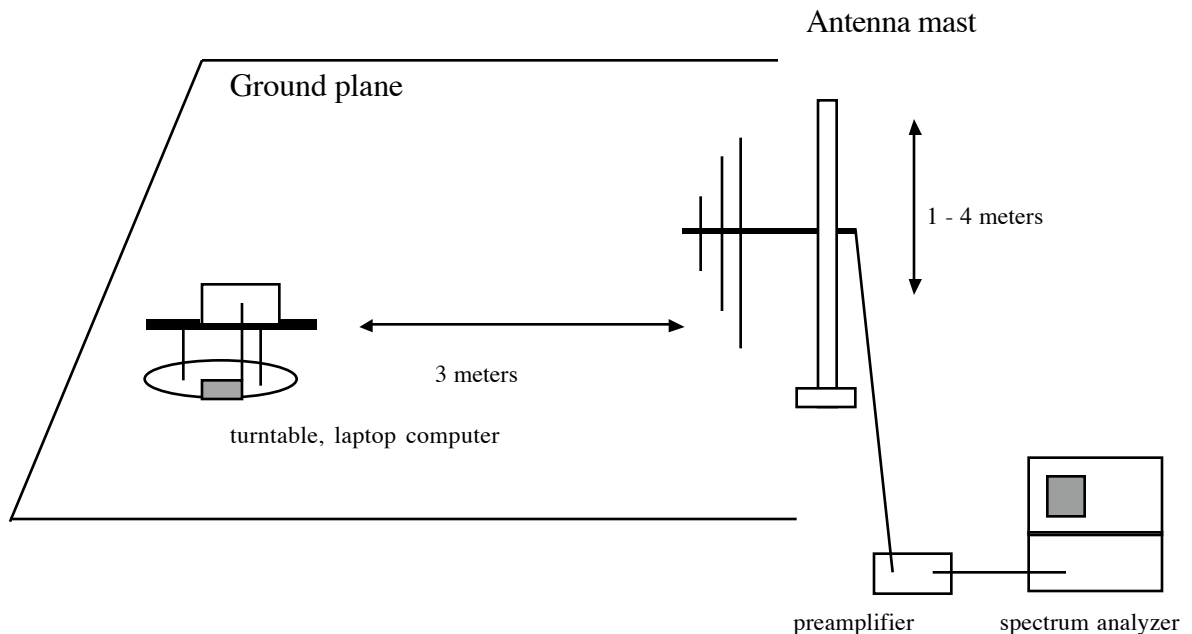
8 January 2004

Radiated Emissions Test Requirement: 15.109

Measurement Equipment Used:

HP 8542E EMI Receiver, 9kHz-2.9 GHz
Schaffner/Chase CBL6112B Bilog Antenna, 30 - 2000 MHz

Radiated Test Set-up, 30 - 1000 MHz



Test Procedures, 30 -1000 MHz

The EUT was set to RECEIVE/TRANSMIT mode. Radiation emissions from the digital portion of the EUT were measured according to the dictates of ANSI C63.4.

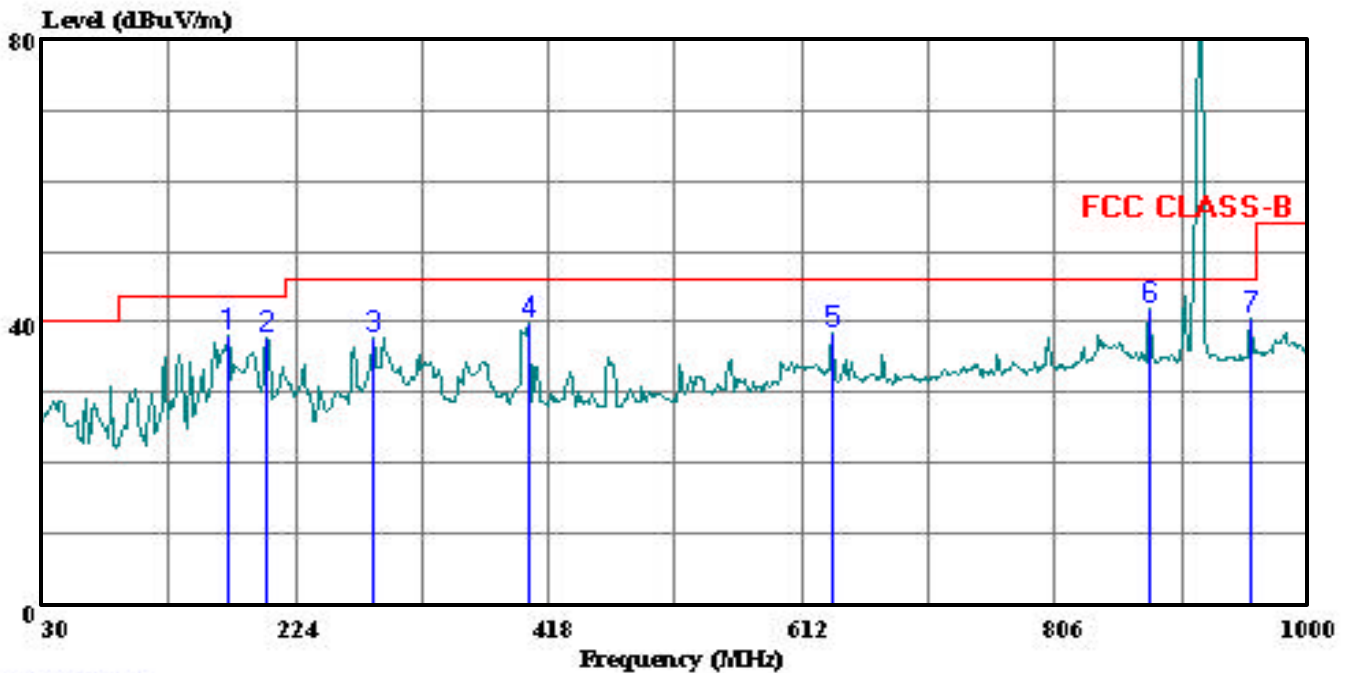
Test Results

Radiated emissions below 1 GHz and those generated by the digital portion of the EUT were measured.

1. The EUT was placed on a wooden table resting on a turntable in the anechoic chamber. The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation. The EUT was set to transmit continuously .
2. Measurement software was activated and results plotted.

Test Results: Worst case results are presented. Refer to data sheets in separate attachment.

Data#: 4 File#: Emi.emi Date: 12-18-2003 Time: 15:49:14



(Audix ATC)

Trace: 3

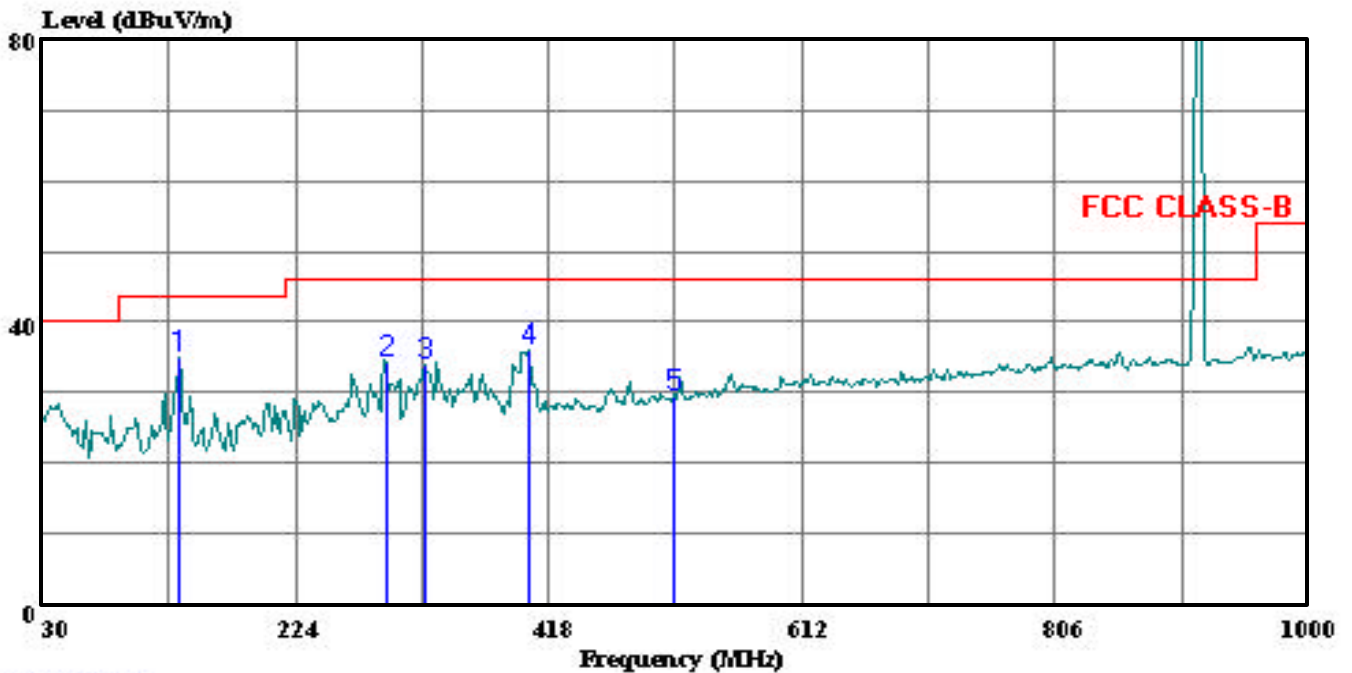
Ref Trace:

Condition: FCC CLASS-B CHAMBER 030306 1185 VERTICAL
Test Eng: William Zhuang
Project #:
Company: Invensys metering
EUT: 902-928 Mhz DTS
Model No: U89707RX2 with Atmel MEGA128L
Configuration: EUT only
Target of Test: FCC Class B
Mode of Operation: Transmit

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			Read		Limit	Over
Freq	Remark	Level	Factor	Level	Line	Limit
MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	172.590 Peak	27.84	10.16	38.00	43.50	-5.50
2	202.660 Peak	27.12	10.54	37.66	43.50	-5.84
3	284.140 Peak	24.00	13.64	37.64	46.00	-8.36
4	402.480 Peak	23.31	16.51	39.82	46.00	-6.18
5	635.280 Peak	17.68	20.66	38.34	46.00	-7.66
6	877.780 Peak	18.38	23.59	41.97	46.00	-4.03
7	955.380 Peak	16.13	24.34	40.47	46.00	-5.53

Data#: 2 File#: EMI.EMI Date: 12-18-2003 Time: 15:38:06



(Audix ATC)

Trace: 1

Ref Trace:

Condition: FCC CLASS-B CHAMBER 030306 1185 HORIZONTAL
Test Eng: William Zhuang
Project #:
Company: Invensys metering
EUT: 902-928 Mhz DTS
Model No: U89707RX2 with Atmel MEGA128L
Configuration: EUT only
Target of Test: FCC Class B
Mode of Operation: Transmit

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			Read		Limit	Over
Freq	Remark	Level	Factor	Level	Line	Limit
MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	135.730 Peak	24.63	10.36	34.99	43.50	-8.51
2	293.840 Peak	20.49	13.74	34.23	46.00	-11.77
3	322.940 Peak	19.50	14.48	33.98	46.00	-12.02
4	402.480 Peak	19.68	16.51	36.19	46.00	-9.81
5	515.000 Peak	10.45	19.05	29.50	46.00	-16.50

AC Line Conducted Emissions

Test Requirement: 15.107, 15.207

Measurement Equipment Used:

Rohde & Schwarz EMI Receiver ESHS-20

Fischer Custom Communication LISN, FCC-LISN-50/250-25-2

Test Procedure

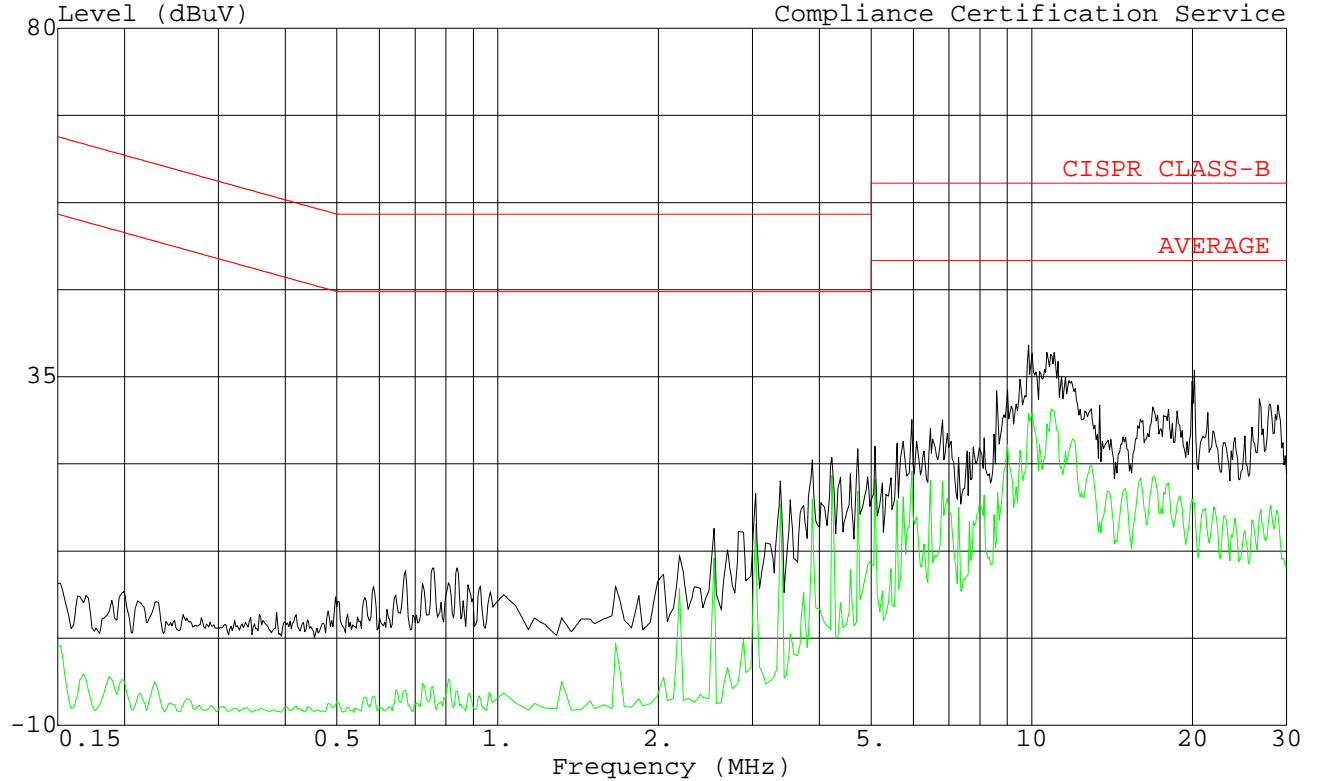
1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in normally.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

Test Results

PASS. Refer to data sheet below.

Data#: 7 File#: LC.EMI

Date: 12-18-2003 Time: 16:26:28
Compliance Certification Service

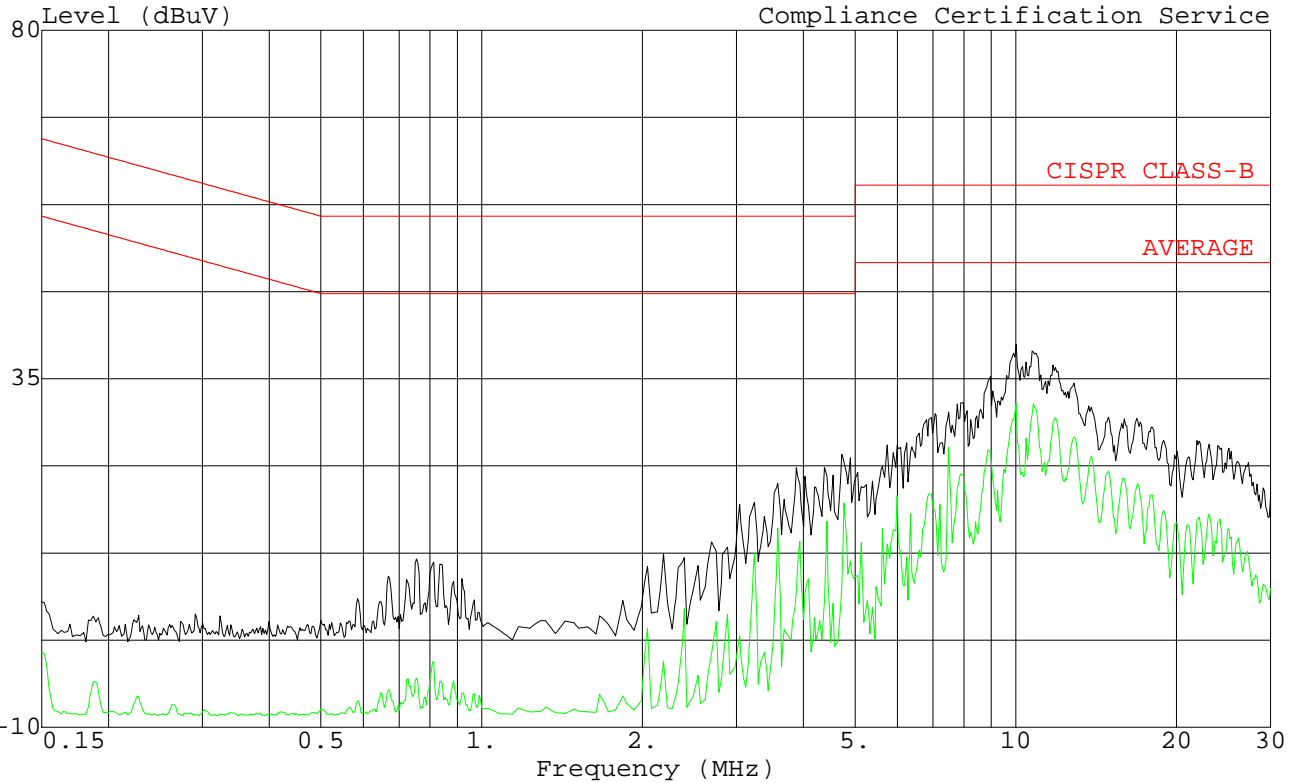


Trace: 5
Project # :
Test Operator : William Zhuang
Company : Invensys
EUT : 902-928 MHz DTS
Model : U89707RX2 with Atmel MEGA128L
Configuration : EUT/power supply
Mode of Operation: Transmit
Target of Test : FCC CLASS B
Voltage : 110V/60Hz
: LINE 1 (PEAK;BLACK AVG:GREEN)

Ref Trace:

Data#: 14 File#: LC.EMI

Date: 12-18-2003 Time: 16:35:48



Trace: 12

Ref Trace:

Project # :
Test Operator : William Zhuang
Company : Invensys
EUT : 902-928 MHz DTS
Model : U89707RX2 with Atmel MEGA128L
Configuration : EUT/power supply
Mode of Operation: Transmit
Target of Test : FCC CLASS B
Voltage : 110V/60Hz
: LINE 2 (PEAK;BLACK AVG:GREEN)