EMISSIONS TEST REPORT FOR A LOW POWER TRANSMITTER

I. GENERAL INFORMATION

Requirement: Federal Communications Commissions

Test Requirements: 15.205, 15.207, 15.209, 15.247

Applicant: Invensys Metering Systems

FCC ID: KCHMXU530E

II. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)

The Invensys FCC ID: **KCHMXU530E** is a digital transmission system (DTS) operating under the requirements in FCC Part 15. The product is an electric utility meter that transmits meter readings to a receiver unit owned by the utility. The product has a receiver tuned to the utility licensed transmitter operating in the 952-956 MHz band. The licensed transmitter sends the transmit command to the MXU 530E

The MXU530E operates in the U.S. ISM band between 902 and 928 MHz.

Transmitter Specification

TX Power	21.6 DBMS measured
Frequency of operation	903.8-926.2 MHz
Data Rate	15.625 kpbs in 72ms burst
6 dB bandwidth	1.18 MHz
Power source	240 VAC 60 Hz

III. TEST DATES AND TEST LOCATION

Testing was performed 14 - 15 January 2003. All tests were performed at:

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

T.N. Cokenias EMC Consultant/Agent for Invensys

16 February 2003

15.203 Antenna connector requirement

The antenna is permanently attached to the product. For antenna conducted tests, a unit was modified by disconnecting the printed circuit antenna and replacing it with a 50 ohm coaxial cable connection terminated at one end with an SMA connector.

15.204 Antenna description

The meter transceiver uses a printed circuit folded dipole antenna:

Antenna description	Gain
printed ckt antenna	2.2 dBi

TEST DATA and TEST PROCEDURES - CCS Laboratory

Radiated Emissions

Test Requirement: 15.205, 15.247

Out of Band Measurements Test Requirement: 15.247

Measurement Equipment Used:

HP 8592EM Spectrum Analyzer Miteq NSP2600-44 Microwave pre-amplifier, 1-26.5 GHz EMCO 3115 Double Ridged Horn antenna, 1 - 18 GHz

Radiated emissions generated by the transmitter portion of the EUT were measured.

1. The EUT was placed on a wooden table resting on a turntable on the open air test site. Several utility meters were connected to the appropriate ports as typical loads.

The search antenna was placed 3m from the EUT. The EUT antenna was mounted vertically as per normal installation.

- 2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.
- 3. Radiated emissions were investigated for a LOW channel, a MID channel, and HIGH channel. Emissions were investigated to the 10th harmonic.
- 4. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

Test Results: Worst case results are presented. Refer to data sheets in separate attachments. Restricted band emissions meet 54 dBuV/m. Other undesired emissions from the transmitter meet the -20 dBc requirement in 15.247(c).

Radiated Emissions Test Requirement: 15.109

Measurement Equipment Used:

HP 8593EM Spectrum Analyzer, 30-1000 MHz HP 8447D Pre-amplifier, .1 - 1300 MHz Schaffner/Chase CBL6112B Bilog Antenna, 30 - 2000 MHz

Radiated emissions generated by the digital portion of the EUT were measured.

- 1. The EUT was placed on a wooden table resting on a turntable on the open air test site. 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 on the MID channel.
- 2. The turntable was slowly rotated to locate the direction of maximum emission at each emission falling in the restricted bands of 15.205.
- 3. Once maximum direction was determined, the search antenna was raised and lowered in both vertical and horizontal polarizations. The maximum readings so obtained are recorded in the data listed below.

Test Results: EUT meets requirements. No radiated emissions were detected coming from the 952-956 MHz receiver portion of the EUT.

A plot of antenna port conducted receiver emissions is attached.

Refer to data spreadsheet below for emissions from the 902-928 MHz transceiver.



Project #: Report #: **Date& Time:** 01/14/03 4:21 PM Test Engr:

FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888

Company: Invensys

EUT Description: Electric Meter Radio Transceiver

Test Configuration: EUT Only Type of Test: FCC 15.247

Mode of Operation: Tx

A-Site

B-Site

C-Site

F-Site

6 Worst Data

Descending

Freq.	Reading			Pre-amp		Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
Hi Ch 92	26.2Mhz										
926.20	114.66	22.85	5.13	27.90	114.74	46.00	68.74	3mV	0.00	1.50	Р
926.20	116.69		5.13	27.90	116.77	46.00	70.77	3mH	0.00	1.50	Р
	nnal 915										
915.00	115.09		5.09	27.93	114.95	46.00	68.95	3mV	0.00	1.20	Р
915.00	115.83		5.09	27.93	115.69	46.00	69.69	3mH	0.00	2.00	Р
	903.8MH										
903.80	116.04	22.55	5.04	27.96	115.68	46.00	69.68	3mV	0.00	1.50	Р
903.80	117.72	22.55	5.04	27.96	117.36	46.00	71.36	3mH	0.00	1.20	Р
Total da	ta #: 6										
V.2a											
I			l								1

High Frequency Measurement

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang

Project #:

Company: Invensys
EUT Descrip.: Electric meter Radio Transceiver 902-928MHz DTS
EUT M/N: MXU4E

Test Target: FCC 15.247 Mode Oper: TX

Test Equipment:

EMCO Horn 1-18GHz Cable (feet) T72; S/N: 6739 15

Pre-amplifer 1-26GHz Miteq NSP2600-44 ▼

Spectrum Analyzer 8593EM Analyzer Horn > 18GHz

Peak Measurements:

1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:

1 MHz Resolution Bandwidth
10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
1.807	3.3	86.0	85.1	27.1	3.4	-36.4	-9.5	1.0	71.5	70.6	74.0	54.0	-2.5	16.6	V
2.711	3.3	54.2	47.0	29.9	4.0	-36.3	-9.5	1.0	43.3	36.2	74.0	54.0	-30.7	-17.8	V
3.615	3.3	46.5	38.6	32.5	4.8	-36.2	-9.5	1.0	39.0	31.1	74.0	54.0	-35.0	-22.9	V
4.519	3.3	61.3	55.4	33.0	5.5	-36.1	-9.5	1.0	55.2	49.3	74.0	54.0	-18.8	-4.7	V
5.423	3.3	52.2	49.0	35.2	6.2	-36.1	-9.5	1.0	48.9	45.7	74.0	54.0	-25.1	-8.3	V
6.326	3.3	53.6	46.7	35.5	6.8	-36.3	-9.5	1.0	51.0	44.1	74.0	54.0	-23.0	-9.9	V
7.230	3.3	49.9	44.4	37.0	7.2	-36.3	-9.5	1.0	49.3	43.8	74.0	54.0	-24.7	-10.2	V
8.134	3.3	43.2	33.7	37.7	7.7	-35.8	-9.5	1.0	44.4	34.9	74.0	54.0	-29.6	-19.1	V
9.037	3.3	44.1	31.5	38.4	8.2	-35.3	-9.5	1.0	46.9	34.3	74.0	54.0	-27.1	-19.7	V
0.904	3.3			1.0	2.2	-1.5	-9.5	1.0			74.0	54.0			Н
1.807	3.3	79.2	77.1	27.1	3.4	-36.4	-9.5	1.0	64.7	62.6	74.0	54.0	-9.3	8.6	Н
2.711	3.3	51.3	43.3	29.9	4.0	-36.3	-9.5	1.0	40.5	32.5	74.0	54.0	-33.5	-21.5	Н
3.615	3.3	47.7	42.3	32.5	4.8	-36.2	-9.5	1.0	40.3	34.8	74.0	54.0	-33.7	-19.2	H
4.519	3.3	60.7	52.7	33.0	5.5	-36.1	-9.5	1.0	54.5	46.6	74.0	54.0	-19.5	-7.4	H
5.423	3.3	51.4	48.9	35.2	6.2	-36.1	-9.5	1.0	48.1	45.6	74.0	54.0	-25.9	-8.4	H
6.326	3.3	55.2	48.3	35.5	6.8	-36.3	-9.5	1.0	52.6	45.7	74.0	54.0	-21.4	-8.3	H
7.230	3.3	49.5	44.3	37.0	7.2	-36.3	-9.5	1.0	48.8	43.7	74.0	54.0	-25.2	-10.3	Н
8.134	3.3	48.8	39.5	37.7	7.7	-35.8	-9.5	1.0	50.0	40.6	74.0	54.0	-24.0	-13.4	Н
9.037	3.3	45.9	38.4	38.4	8.2	-35.3	-9.5	1.0	48.7	41.2	74.0	54.0	-25.3	-12.8	Н
								1.0			74.0	54.0			H
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			H

Measurement Frequency Preamp Gain Amp Distance Correct to 3 meters Average Field Strength @ 3 m Dist Distance to Antenna D Corr Read Analyzer Reading Avg Calculated Peak Field Strength AF Antenna Factor Peak CLCable Loss HPF High Pass Filter

Avg Lim Average Field Strength Limit Pk Lim Peak Field Strength Limit Avg Mar Margin vs. Average Limit Pk Mar Margin vs. Peak Limit

High Frequency Measurement

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang

Project #:

Company: Invensys
EUT Descrip.: Electric meter Radio Transceiver 902-928MHz DTS
EUT M/N: MXU4E

Test Target: FCC 15.247 Mode Oper: TX

Test Equipment:









Peak Measurements:

1 MHz Resolution Bandwidth 1MHz Video Bandwidth

Average Measurements:

1 MHz Resolution Bandwidth
10Hz Video Bandwidth

Mid Channe										1					
f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
1.830	3.3	86.8	86.1	27.2	3.4	-36.4	-9.5	1.0	72.5	71.7	74.0	54.0	-1.5	17.7	v
2.745	3.3	51.7	44.1	30.0	4.0	-36.3	-9.5	1.0	41.0	33.4	74.0	54.0	-33.0	-20.6	v
3.660	3.3	47.1	42.4	32.6	4.8	-36.2	-9.5	1.0	39.7	35.1	74.0	54.0	-34.3	-18.9	v
4.575	3.3	61.2	55.0	33.1	5.5	-36.1	-9.5	1.0	55.3	49.1	74.0	54.0	-18.7	-4.9	v
5.490	3.3	49.9	45.5	35.3	6.2	-36.2	-9.5	1.0	46.7	42.3	74.0	54.0	-27.3	-11.7	v
6.405	3.3	55.0	48.3	35.5	6.8	-36.3	-9.5	1.0	52.5	45.8	74.0	54.0	-21.5	-8.2	v
7.320	3.3	51.7	41.1	37.1	7.3	-36.3	-9.5	1.0	51.3	40.8	74.0	54.0	-22.7	-13.2	v
8.235	3.3	44.3	34.7	37.8	7.8	-35.7	-9.5	1.0	45.7	36.0	74.0	54.0	-28.3	-18.0	v
9.150	3.3	45.6	37.1	38.4	8.3	-35.3	-9.5	1.0	48.4	39.9	74.0	54.0	-25.6	-14.1	v
0.915	3.3			3.7	2.2	-5.5	-9.5	1.0			74.0	54.0			Н
1.830	3.3	80.9	80.3	27.2	3.4	-36.4	-9.5	1.0	66.6	65.9	74.0	54.0	-7.4	11.9	Н
2.745	3.3	51.0	42.6	30.0	4.0	-36.3	-9.5	1.0	40.3	31.9	74.0	54.0	-33.7	-22.1	Н
3.660	3.3	47.0	42.5	32.6	4.8	-36.2	-9.5	1.0	39.7	35.1	74.0	54.0	-34.3	-18.9	Н
4.575	3.3	58.8	52.5	33.1	5.5	-36.1	-9.5	1.0	52.9	46.6	74.0	54.0	-21.1	-7.4	Н
5.480	3.3	48.0	43.8	35.3	6.2	-36.1	-9.5	1.0	44.9	40.7	74.0	54.0	-29.1	-13.3	Н
6.405	3.3	58.0	52.3	35.5	6.8	-36.3	-9.5	1.0	55.5	49.7	74.0	54.0	-18.5	-4.3	Н
7.320	3.3	53.9	51.6	37.1	7.3	-36.3	-9.5	1.0	53.6	51.3	74.0	54.0	-20.4	-2.7	Н
8.235	3.3	46.9	37.9	37.8	7.8	-35.7	-9.5	1.0	48.3	39.2	74.0	54.0	-25.7	-14.8	Н
9.150	3.3	45.1	38.7	38.4	8.3	-35.3	-9.5	1.0	47.9	41.5	74.0	54.0	-26.1	-12.5	Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н

Measurement Frequency Preamp Gain Amp Distance Correct to 3 meters Average Field Strength @ 3 m Dist Distance to Antenna D Corr Read Analyzer Reading Avg AF Antenna Factor Peak Calculated Peak Field Strength CLCable Loss HPF

High Pass Filter

Avg Lim Average Field Strength Limit Peak Field Strength Limit Pk Lim Avg Mar Margin vs. Average Limit Pk Mar Margin vs. Peak Limit

High Frequency Measurement

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang

Project #:

Company: Invensys
EUT Descrip.: Electric meter Radio Transceiver 902-928MHz DTS
EUT M/N: MXU4E

Test Target: FCC 15.247 Mode Oper: TX

Test Equipment:









Peak Measurements:

1 MHz Resolution Bandwidth
1MHz Video Bandwidth

Average Measurements:

1 MHz Resolution Bandwidth
10Hz Video Bandwidth

High Chann f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes
				l I	- 1			шт							Notes
GHz	feet	dBuV	dBuV	dB/m	dB	dB	dB		dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	
1.852	3.3	86.7		27.3	3.4	-36.4	-9.5	1.0	72.4		74.0	54.0	-1.6		V
2.779	3.3	51.1	44.2	30.2	4.1	-36.3	-9.5	1.0	40.5	33.6	74.0	54.0	-33.5	-20.4	V
3.705	3.3	45.5	35.5	32.7	4.8	-36.2	-9.5	1.0	38.3	28.4	74.0	54.0	-35.7	-25.6	V
4.631	3.3	57.9	51.8	33.3	5.6	-36.1	-9.5	1.0	52.1	46.1	74.0	54.0	-21.9	-7.9	V
5.557	3.3	49.1	44.3	35.3	6.3	-36.2	-9.5	1.0	46.0	41.2	74.0	54.0	-28.0	-12.8	V
6.483	3.3	55.3	46.2	35.5	6.9	-36.3	-9.5	1.0	52.8	43.8	74.0	54.0	-21.2	-10.2	V
7.409	3.3	49.9	43.1	37.3	7.3	-36.2	-9.5	1.0	49.9	43.1	74.0	54.0	-24.1	-10.9	V
8.336	3.3	44.3	33.5	37.9	7.8	-35.7	-9.5	1.0	45.9	35.1	74.0	54.0	-28.1	-18.9	V
9.262	3.3	44.2	36.3	38.4	8.3	-35.3	-9.5	1.0	47.1	39.2	74.0	54.0	-26.9	-14.8	V
0.926	3.3	116.7		6.4	2.3	-9.6	-9.5	0.0	106.3						Н
1.852	3.3	83.9		27.3	3.4	-36.4	-9.5	1.0	69.7		77.3		-7.6		Н
2.779	3.3	49.5	39.4	30.2	4.1	-36.3	-9.5	1.0	39.0	28.9	74.0	54.0	-35.0	-25.1	Н
3.705	3.3	47.8	39.1	32.7	4.8	-36.2	-9.5	1.0	40.7	31.9	74.0	54.0	-33.3	-22.1	Н
4.631	3.3	56.3	49.9	33.3	5.6	-36.1	-9.5	1.0	50.6	44.2	74.0	54.0	-23.4	-9.8	Н
5.557	3.3	48.7	43.9	35.3	6.3	-36.2	-9.5	1.0	45.6	40.8	74.0	54.0	-28.4	-13.2	Н
6.483	3.3	58.5	48.3	35.5	6.9	-36.3	-9.5	1.0	56.0	45.8	74.0	54.0	-18.0	-8.2	Н
7.409	3.3	55.3	51.8	37.3	7.3	-36.2	-9.5	1.0	55.3	51.8	74.0	54.0	-18.7	-2.2	Н
8.336	3.3	50.9	40.2	37.9	7.8	-35.7	-9.5	1.0	52.5	41.8	74.0	54.0	-21.5	-12.2	Н
9.262	3.3	44.4	33.9	38.4	8.3	-35.3	-9.5	1.0	47.2	36.8	74.0	54.0	-26.8	-17.2	Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			H
								1.0			74.0	54.0			H
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н
								1.0			74.0	54.0			Н

Measurement Frequency Preamp Gain Avg Lim Average Field Strength Limit Amp Distance Correct to 3 meters Average Field Strength @ 3 m Peak Field Strength Limit Pk Lim Dist Distance to Antenna D Corr Read Analyzer Reading Avg Avg Mar Margin vs. Average Limit AF Antenna Factor Peak Calculated Peak Field Strength Pk Mar Margin vs. Peak Limit CLCable Loss HPF High Pass Filter



FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP

Project #: 02U1775-1 **Report #:** 030115A1 **Date & Time:** 01/15/03 9:59 AM

Test Engr: Chin Pang

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888

Company: Invensys

EUT Description: Invensys 902-928MHz DTS device

Test Configuration: EUT Only

Type of Test: FCC 15.247

Mode of Operation: Tx

A-Site

B-Site

C-Site

F-Site

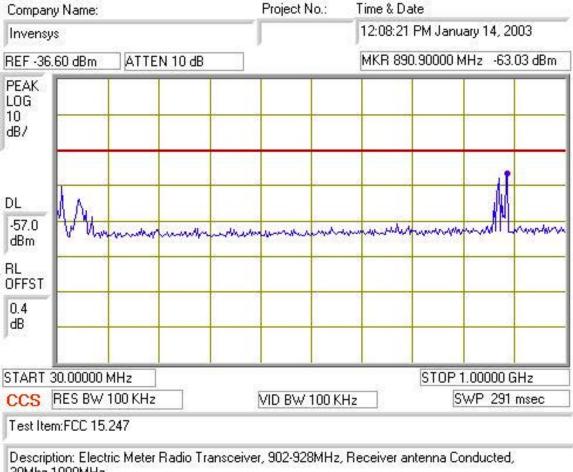
6 Worst Data

Descending

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
32.768K	Hz & 8M	Hz Cloc	k								
32.00	44.82	12.59	0.89	27.04	31.26	40.00	-8.74	3mV	0.00	1.20	Р
39.93	49.80	12.88	0.95	27.02	36.61	40.00	-3.39	3mV	0.00	1.50	Р
47.53	43.65	11.53	1.07	27.03	29.22	40.00	-10.78	3mV	0.00	1.20	Р
56.00	46.50	8.91	1.18	27.02	29.56	40.00	-10.44	3mV	0.00	1.00	Р
71.73	53.13	6.06	1.35	27.01	33.52	40.00	-6.48	3mV	0.00	1.50	Р
79.53	45.25	7.30	1.37	27.02	26.90	40.00	-13.10	3mV	0.00	1.30	Р
145.23	47.30	15.63	1.88	26.86	37.95	43.50	-5.55	3mV	0.00	1.20	Р
70.80	50.70	5.91	1.34	27.01	30.94	40.00	-9.06	3mH	0.00	2.00	Р
80.28	44.20	7.45	1.37	27.02	26.00	40.00	-14.00	3mH	0.00	2.00	Р
120.60	42.90	10.50	1.71	26.93	28.18	43.50	-15.32	3mH	0.00	2.00	Р
160.85	43.50	16.91	1.98	26.78	35.61	43.50	-7.89	3mH	0.00	2.00	Р
223.73	48.24	10.82	2.37	26.60	34.83	46.00	-11.17	3mV	0.00	1.20	Р
416.00	45.21	16.00	3.32	27.34	37.18	46.00	-8.82	3mV	0.00	1.20	Р
488.00	42.00	17.69	3.63	27.66	35.66	46.00	-10.34	3mH	0.00	2.00	Р
583.78	42.30	18.87	4.00	27.93	37.24	46.00	-8.76	3mV	0.00	1.00	Р
432.50	44.50	16.38	3.39	27.41	36.86	46.00	-9.14	3mH	0.00	2.00	Р
Complet	ed Scan	from 30-	1000MF	Iz, Vert 8	Horiz						
Total da	ta #: 16										
V.2a											

I						I

Receiver antenna conducted emissions



30Mhz-1000MHz

AC Line Conducted Emissions Test Requirement: 15.107, 15.207

Measurement Equipment Used:

Rhode & 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.

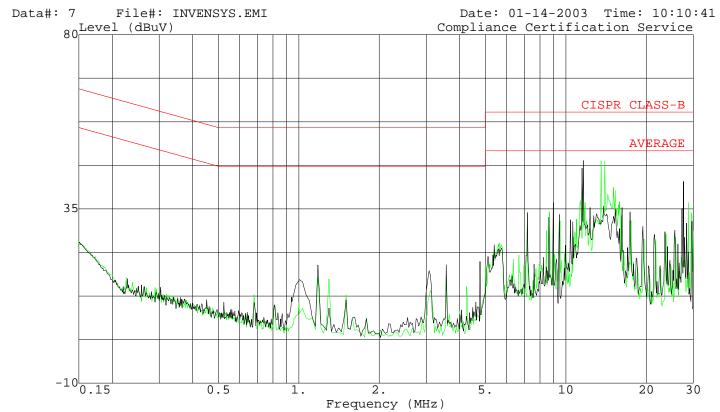
Test Results

PASS. Refer to data sheets below.



561F Monterey Road, San Jose, CA 95037 USA Tel: (408) 463-0885

Fax: (408) 463-0888



Ref Trace: Trace: 3

Project #

Test Engineer : Chin Pang Company : Invensys

: 902-928MHz DTS, electric Meter Radio EUT

: Transceiver

: MXU4E Model Name Test Config. : EUT Only Test of Target: FCC, Class B

Mode of Op. : Tx

: 240VAC/60Hz

: L1: Peak (Black), L2: Peak (Green)

6dB Bandwidth for DTS Test Requirement: 15.247

Measurement Equipment Used:

HP 8593EM Spectrum Analyzer 2ft test coaxial cable from antenna connector (test purposes only)

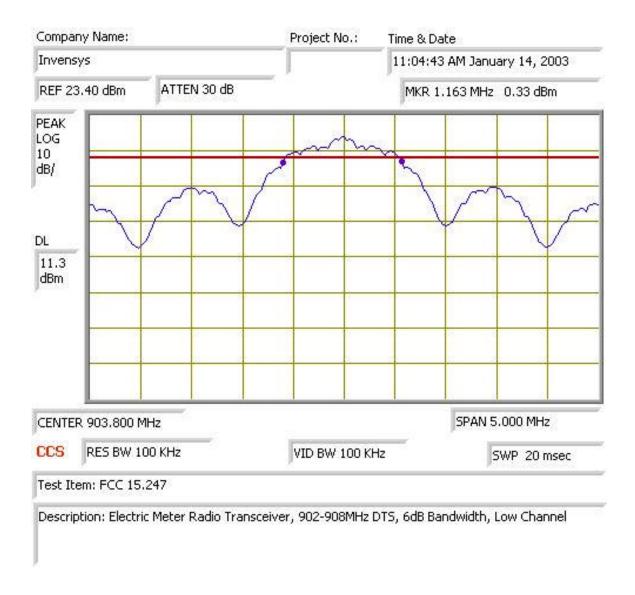
Test Procedures

A modified EUT with a coaxial cable attached to the radio antenna port was configured on a test bench. The cable's SMA connector was connected to the spectrum analyzer. The EUT transmission was continuous at 903.8 MHz (LOW channel). While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission occupied bandwidth.

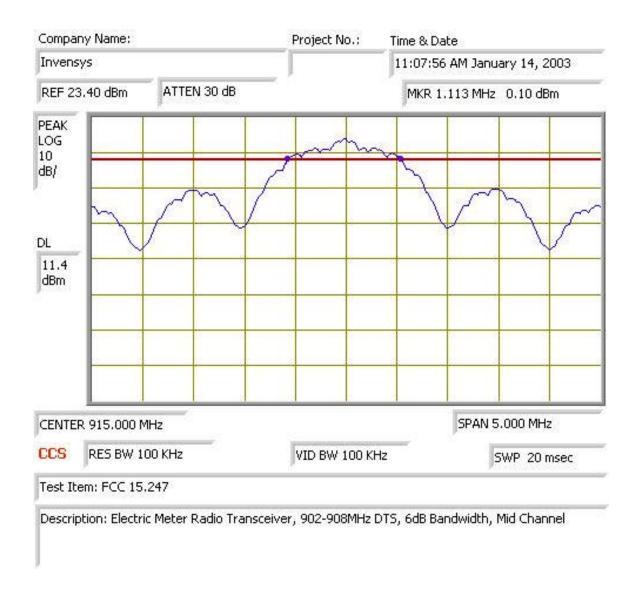
Test was repeated for MID and HIGH channels.

Test Results: Measured approximately 1.1 MHz 6 dB BW. Refer to data sheets below.

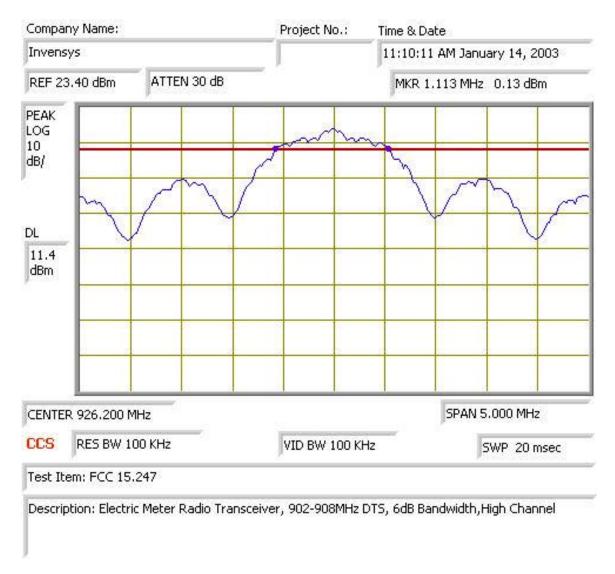
15.247 6dB Channel Bandwidth LOW channel



15.247 6 dB Channel Bandwidth MID channel



15.247 6 dB Channel Bandwidth HIGH channel



RF Power Output

Test Requirement: 15.247

Measurement Equipment Used:

Agilent E4416A power meter Agilent E9327A RF sensor 20 dB attenuator

Test Procedures

- 1. The EUT was configured on a test bench. The power meter was zeroed and calibrated. The control software was activated and power was set to produce highest output level.
- 2. The 20 dB attenuator was connected to the antenna port of the EUT. The power meter head was connected to the other end of the attenuator. Peak power was read directly off the meter, accounting for the 20 dB attenuator.
- 3. The process in (1) and (2) was repeated for MID channel and HIGH channel.

Test Results

Power level readings converted to dBm are shown below. Refer also to spectrum analyzer graphs. Reference level offset corrects for external attenuation and cable loss.

Channel	Frequency, MHz	Output Power, dBm
LOW	903.8	21.5
MID	915	21.5
HIGH	926.2	21.6

Spurious Emissions, Conducted Test Requirement: 15.247(c)

Measurement Equipment Used:

HP 8593EM Spectrum Analyzer 20 dB attenuator 3 ft length low loss A coaxial RF cable

Test Procedure

1. The EUT was configured on a test bench. The cable was connected between the EUT antenna port and the spectrum analyzer input port.

Spectrum analyzer RES BW was set to 100 kHz. While the transmitter broadcast a steady stream of digital data, the analyzer MAX HOLD function was used to capture the envelope of the transmission.

Readings were taken out to 10fo.

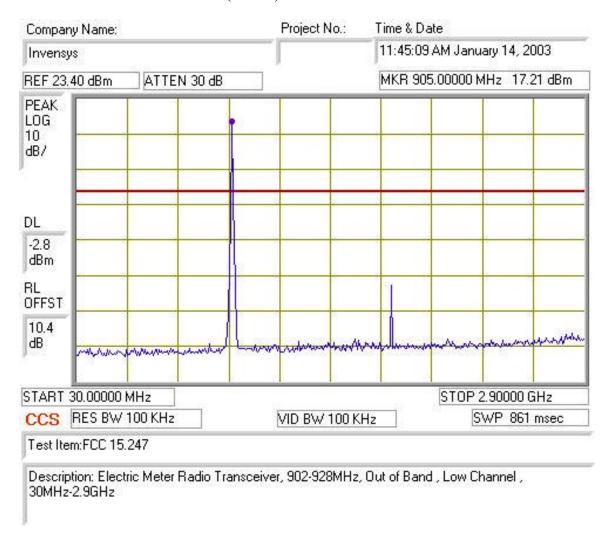
2. The process in (1) was repeated for MID channel and HIGH channel.

Test Results

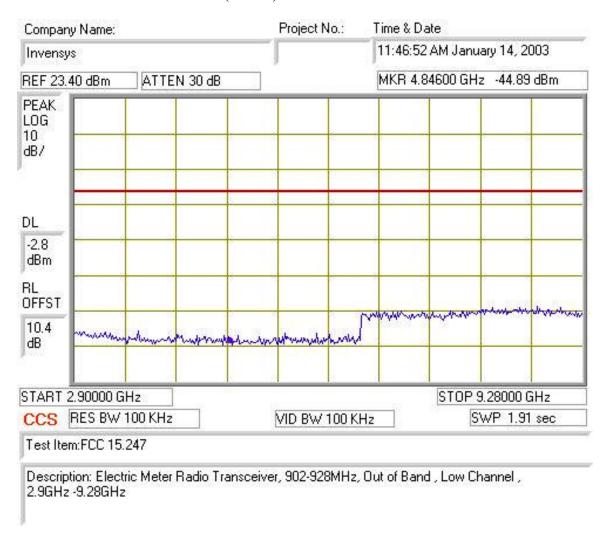
Refer to attached data sheets. Data shows out of band emissions are suppressed well below the -20 dBc minimum required by the Rules.

Channel	Frequency, MHz
LOW	903.8
MID	915
HIGH	926.2

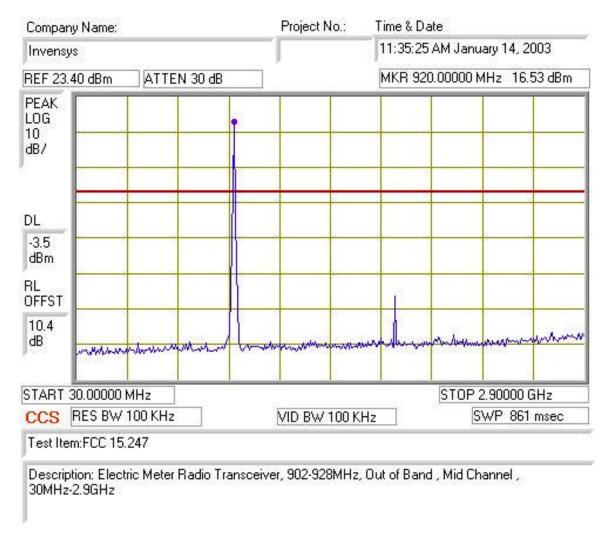
Out of Band Low Channel (1 of 2)



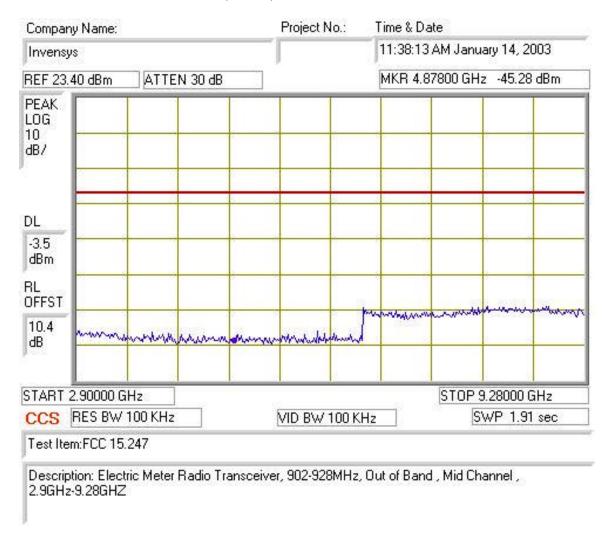
Out of Band Low Channel (2 of 2)



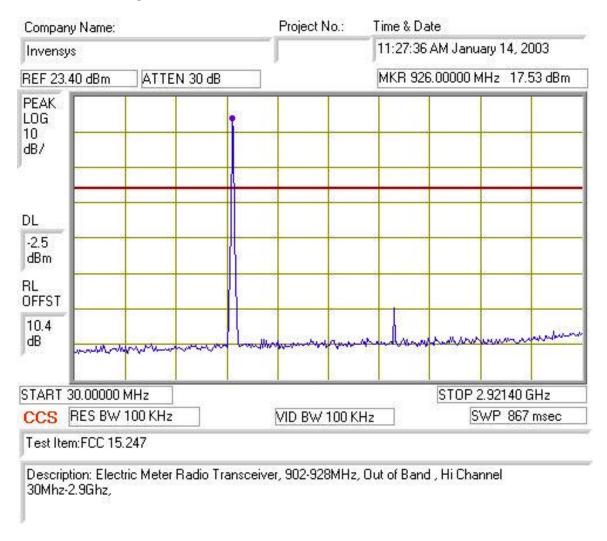
Out of Band Mid Channel (1 of 2)



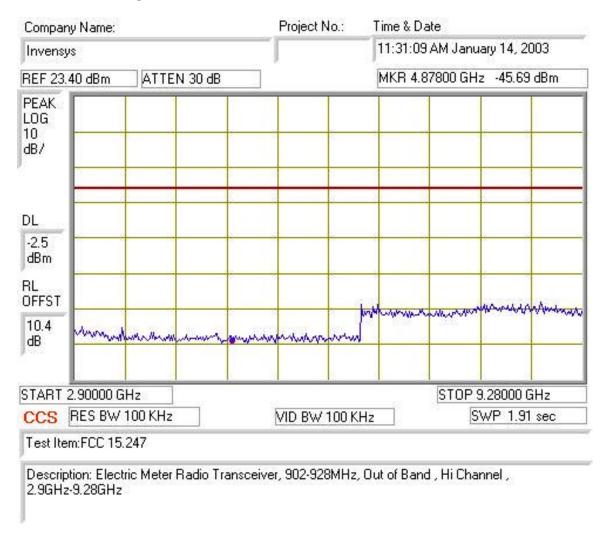
Out of Band Mid Channel (2 of 2)



Out of Band High Channel (1 of 2)



Out of Band High Channel (2 of 2)



Power Spectral Density

Test Requirement: 15.247(d)

Measurement Equipment Used:

HP 8593EM Spectrum Analyzer

2 ft length low loss A coaxial RF cable connected on EUT pcb at antenna connection **Test Procedure**

For the LOW channel, the emission peak was set to the center of the display. The SPAN was set to 300 kHz, the RES BW and VID BW were set to 3 kHz, and SWEEP TIME was set to 100 seconds. The maximum trace was recorded and compared to the 8 dBm limit.

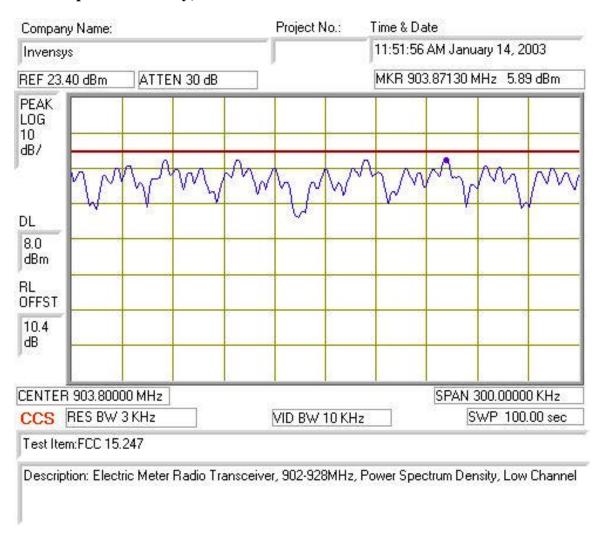
The test was repeated for MID and HIGH channel.

Test Results

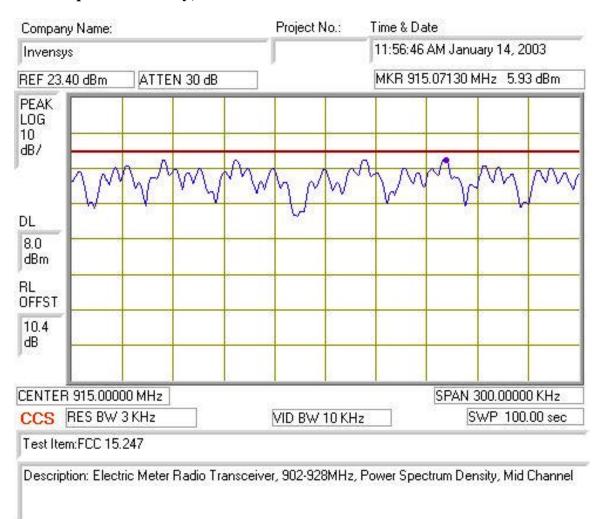
Maximum measured PSD was approximately 5.9 dBm. Refer to attached spectrum analyzer charts.

Channel	Frequency, MHz
LOW	903.8
MID	915
HIGH	926.2

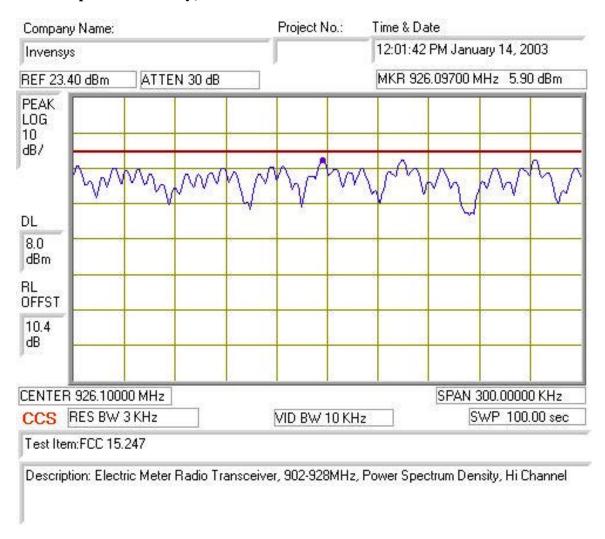
Power Spectral Density, LOW Channel



Power Spectral Density, MID Channel



Power Spectral Density, HIGH Channel



RF Exposure (MPE) Calculations

905 - 924.6 MHz DTS Radio

Applicant: Invensys Metering Systems

FCC ID: KCHMXU530E

RF Hazard Distance Calculation (worst case)

mW/cm2 from Table1: 0.60

Max RF Power TX Antenna MPE

P, dBm G, dBi Safe Distance, cm

21.6 2.2 5.6

Basis of Calculations:

 $E^2/3770 = S, \ mW/cm2 \\ E, \ V/m = (Pwatts*Ggain*30)^.5/d, \ meters \\ d = ((Pwatts*G*30)/3770*S))^0.5 \\ Pwatts*Ggain = 10^(PdBm-30+GdBi)/10)$