Excellence in Compliance Testing

Certification Exhibit

FCC ID: SDBZIGELS01
IC: 2220A-ZIGELS01

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Project Number: 12-2033

Manufacturer: Sensus Metering Systems, Inc.
Model: ZIGELS01

RF Exposure

General Information:

Applicant: Sensus Metering Systems, Inc.
ACS Project: 12-2033
Device Category: Mobile
Environment: General Population/Uncontrolled Exposure

Technical Information – Standalone Configuration:

Antenna Type: Inverted-F
Antenna Gain: 0 dBi
Maximum Transmitter Conducted Power: 12.08 dBm
Maximum System EIRP: 12.08 dBm, 16.14 mW
Exposure Conditions: Greater than 20 centimeters

MPE Calculation – Standalone Configuration

The Power Density (mW/cm^2) is calculated as follows:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Table 1: MPE Calculations – Standalone Configuration

MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure*							
Transmit Frequency (MHz)	**Radio Power (dBm)**	**Power Density Limit (mW/Cm2)**	**Radio Power (mW)**	**Antenna Gain (dBi)**	**Antenna Gain (mW eq.)**	**Distance (cm)**	**Power Density (mW/cm^2)**
2405	12.08	1.00	16.14	0	1.000	20	0.003
2440	10.58	1.00	11.43	0	1.000	20	0.002
2480	10.03	1.00	10.07	0	1.000	20	0.002

Collocated Configuration

The ZIGELS01 2.4 GHz radio module can be collocated with the FLEXELS 900 MHz telemetry module (FCC ID: SDBFLEXELS) inside of the Elster CL200 Meter.

Technical Information – Collocated Configuration (Elster CL200 Meter, FLEXELS Radio):

	ZIGELS01	FLEXELS
Antenna Type	Inverted-F	Dipole
Antenna Gain	0 dBi	0 dBi
Maximum Transmitter Conducted Power	12.08 dBm	29.99 dBm
Maximum System EIRP	12.08 dBm 16.14 mW	29.99 dBm 997.7 mW
Exposure Conditions	Greater than 20 centimeters	Greater than 20 centimeters

MPE Calculation – Collocated Configuration (Elster CL200 Meter, FLEXELS Radio)

The Power Density (mW/cm^2) is calculated as follows:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Table 2: MPE Calculations – Collocated Configuration

MPE Calculator for Mobile Equipment Limits for General Population/Uncontrolled Exposure*							
Transmit Frequency (MHz)	**Radio Power (dBm)**	**Power Density Limit (mW/Cm2)**	**Radio Power (mW)**	**Antenna Gain (dBi)**	**Antenna Gain (mW eq.)**	**Distance (cm)**	**Power Density (mW/cm^2)**
2405	12.08	1.00	16.14	0	1.000	20	0.003
900	29.99	0.60	997.70	0	1.000	20	0.198

Summation of Power Densities – Simultaneous Transmissions

This Elster CL200 Meter contains multiple transmitters which can operate simultaneously and therefore the maximum RF exposure is determined by the summation of power densities. The limit utilized is the lower limit specified for all simultaneous transmitters. The limit used to show compliance to the 20cm separation distance is 0.6mW/cm^2.

The maximum power density as calculated by a summation of power densities for each simultaneous transmission combination as follows:

2.4 GHz and 900 MHz Modules operating simultaneously:

900 MHz (LAN):	0.198	(mW/cm^2)
2.4 GHz (Zigbee):	0.003	(mW/cm^2)
TOTAL:	**0.201**	**(mW/cm^2)**

Installation Guidelines

The installation manual should contain text similar to the following advising how to install the equipment to maintain compliance with the FCC RF exposure requirements:

RF Exposure

In accordance with FCC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20 centimeters will be maintained.

Conclusion

This device complies with the MPE requirements by providing adequate separation between the device, any radiating structure and the general population.