Excellence in Compliance Testing

Transceiver Certification Test Report

FCC ID: SDBIDTB001
IC: 2220A-IDTB1

FCC Rule Part: CFR 47 Part 24 Subpart D, Part 90 Subpart I, Part 101 Subpart C
IC Standards Specification: RSS-119, RSS-134

ACS Report Number: 08-0134-LD

Applicant: Sensus Metering Systems
Model: IDTB001

Test Begin Date: April 9, 2008
Test End Date: April 11 2008

Report Issue Date: April 23, 2008

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

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This report contains 16 pages

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Additional Exhibits Included

Test Setup Photographs
Internal Photographs
External Photographs

1.1 Purpose

The purpose of this report is to demonstrate compliance with FCC Part 2 Subpart J, Part 24 Subpart D, Part 90 Subpart I, and Part 101 Subpart C of the FCC's Code of Federal Regulations and IC RSS-119 and RSS-134 for Class II Permissive Change.

The permissive change is based on the addition of a 2S meter with remote disconnect functions.

1.2 Product Description

The Sensus AMDS Integrated Display Transceiver (IDTB) is a printed circuit board that provides wireless communication capability to the Sensus iCon family of electric utility meters. The device mounts into existing iCon meters and acts as the "Integrated Communications Device". The device monitors meter reading and diagnostic information via an interface to the Sensus Sensor board, which is also housed and operational in the included equipment. The IDTB communicates via the AMDS fixed wireless telemetry network to provide electric meter readings and diagnostic data from the meter to the utility provider via a two-way radio link. The device utilizes a printed circuit board antenna that is integral to the IDTB circuit board.

The Sensus AMDS Integrated Display Transceiver (IDTB) operates on 901-902 MHz, 930-931 MHz, and 940-941 MHz in accordance to Part 24 Narrowband PCS; on 896-901 MHz and 935-940 MHz in accordance to Part 90; and on 928.85-929 MHz, 932-932.5 MHz, 941-941.5 MHz, and 959.85-960 MHz in accordance to Part 101.

Manufacturer Information:
Sensus Metering Systems
8601 six forks Road
Raleigh, NC 27615

Factory Contact:
Bob Davis
Sensus Metering Systems
114 Northpark Blvd
Suite 10
Covington, LA 70433
985-773-1236

Test Sample Condition:
All samples supplied were in good working condition with no visible defects.

Test Sample Serial Number(s): 101, 202

1.3 Test Methodology

1.3.1 General

No RF changes were made to the device therefore only radiated emissions were performed to measure the affects of the mechanical changes from the originally certified device. Additionally, Part 15 unintentional radiated emissions and AC power line conducted emissions were also performed.

Characteristics not presented in this report have not changed or have improved when compared to what was originally reported.

1.3.2 In-Band Testing Methodology

For testing in accordance with 47 CFR 2.1046-2.1057, OET/Lab recommends that the following be used to select test frequencies for licensed devices:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
10 to 100 MHz	3	1 near top, 1 near middle and 1 near bottom

The IDTB001 transceiver is designed to operate in multiple bands under the requirements of CFR 47 Parts 24, 90, and 101. The following is a list of the frequency bands of operation sorted based on the FCC rule parts in which the band is associated.

CFR Title 47 Rule Part	Frequency Band of Operation (MHz)
24D	901.0 - 902.0
24D	930.0 - 931.0
24D	940.0 - 941.0
90	896.0 - 901.0
90	935.0 - 940.0
101	928.85 - 929.0
101	932.0 - 932.5
101	941.0 - 941.5
101	959.85 - 960.0

Based on the requirements set forth in accordance 47 CFR 2.1046-2.1057 as stated above, the methodology in selecting the places to test in the available bands of operation is outlined in the following table.

CFR Title 47 Rule Part	Frequency Band of Operation (MHz)	Location in the Range of Operation
90	896.0 - 901.0	1 near top and 1 near bottom
24D	901.0 - 902.0	
101	928.85 - 929.0	Middle
24D	930.0 - 931.0	Middle
101	932.0 - 932.5	Middle
90	935.0 - 940.0	1 near top and 1 near bottom
24D	940.0 - 941.0	
101	941.0 - 941.5	
101	959.85 - 960.0	Middle

The data provided in this report is sorted based on the rule part.

1.4 Emission Designators

The IDTB001 transmitter produces/supports six distinct modulation formats.
The emissions designators for the modulation formats for the IDTB001 are as follows:

EMISSIONS DESIGNATORS:

Normal Mode:	9K60F2D (7-FSK)
Half-Baudrate Mode:	4K80F2D (7-FSK)
Boost Mode:	1K10F2D
MPass Mode:	5K90F1D
Priority Mode:	4K80F2D (13-FSK)
Double Density Mode:	9K60F2D (13-FSK)

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 894540
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831
- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

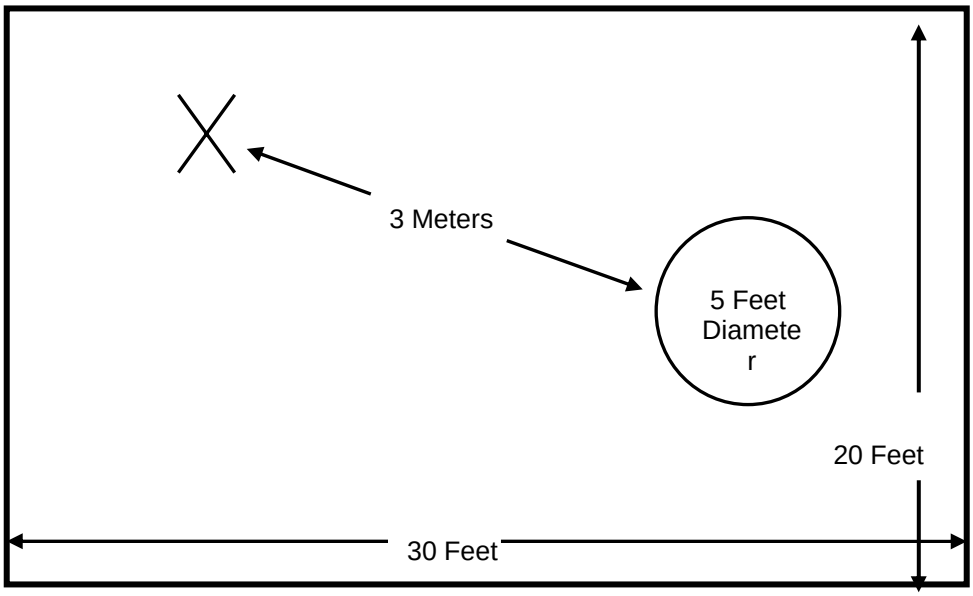

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

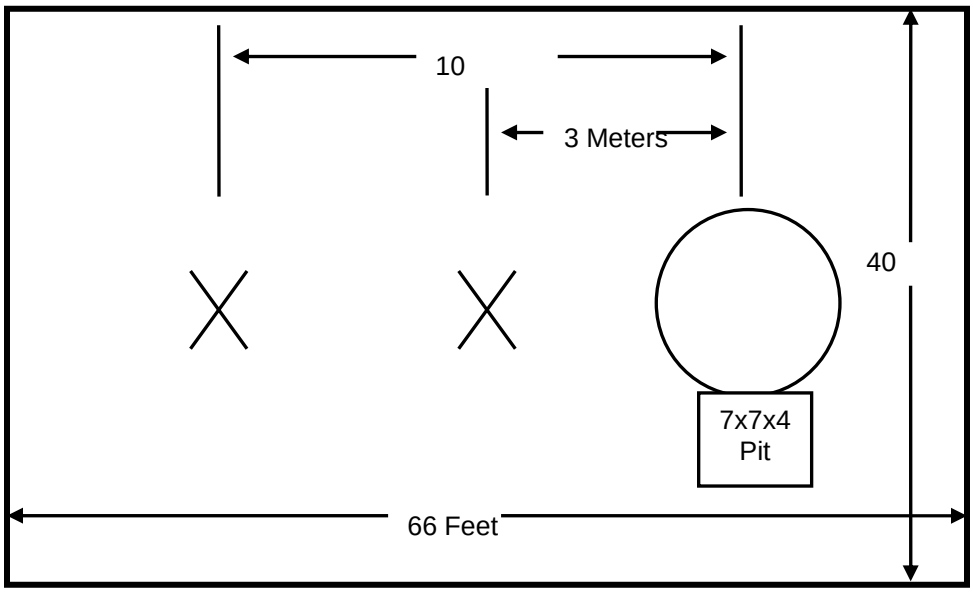

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

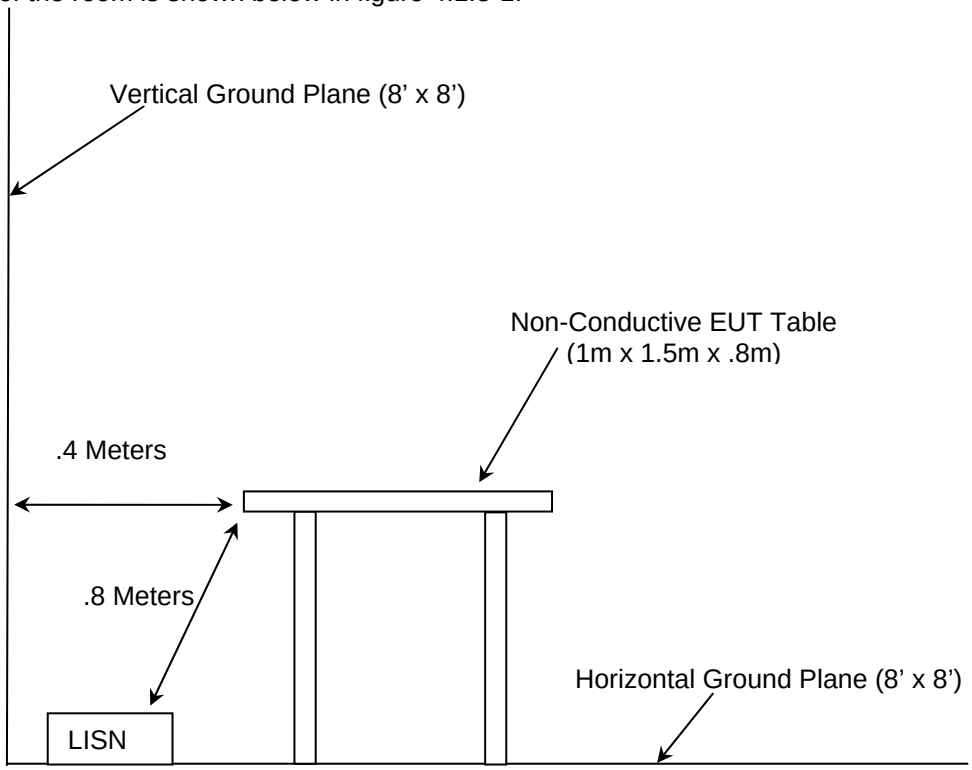

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz - 2003
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures – 2007
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2007
- US Code of Federal Regulations (CFR): Title 47, Part 24, Subpart D: Personal Communication Service - 2007
- US Code of Federal Regulations (CFR): Title 47, Part 90, Subpart I: Private Land Mobile Radio Services - 2007
- US Code of Federal Regulations (CFR): Title 47, Part 101, Subpart C: Fixed Microwave Services – 2007
- TIA-603-C: Land Mobile FM or PM - Communications Equipment - Measurement and Performance Standards – 2004
- Industry Canada Radio Standards Specification: RSS-119 - Land Mobile and Fixed Radio Transmitters and Receivers Operating in the Frequency Range 27.41-960 MHz - Issue 9, June 2007
- Industry Canada Radio Standards Specification: RSS-134 - 900 MHz Narrowband Personal Communications Services - Issue 1, Revision 1, March 25, 2000

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4-1: Test Equipment

Equipment Calibration Information					
ACS#	**Mfg.**	**Eq. type**	**Model**	**S/N**	**Cal. Due**
1	Rohde & Schwarz	Spectrum Analyzers	ESMI - Display	833771/007	10-26-2008
2	Rohde & Schwarz	Spectrum Analyzers	ESMI-Receiver	839587/003	10-26-2008
25	Chase	Antennas	CBL6111	1043	06-06-2008
30	Spectrum Technologies	Antennas	DRH-0118	970102	05-10-2008
70	Rohde & Schwarz	Spectrum Analyzers	ESH-3	879676/050	10-24-2008
73	Agilent	Amplifiers	8447D	2727A05624	12-19-2008
152	EMCO	LISN	Feb-25	9111-1905	03-26-2009
153	EMCO	LISN	Feb-25	9411-2268	11-27-2008
167	ACS	Cable Set	Chamber EMI Cable Set	167	01-04-2009
168	Hewlett Packard	Attenuators	11947A	44829	02-18-2009
193	ACS	Cable Set	OATS cable Set	193	01-04-2009
211	Eagle	Filters	C7RFM3NFNM	HLC-700	01-04-2009
213	TEC	Amplifiers	PA 102	44927	12-19-2008
222	Andrew	Cables	F1-SMSM	473703-A0138A	08-27-2008
283	Rohde & Schwarz	Spectrum Analyzers	FSP40	1000033	11-09-2008
291	Florida RF Cables	Cables	SMRE-200W-12.0-SMRE	None	11-21-2008
292	Florida RF Cables	Cables	SMR-290AW-480.0-SMR	None	11-21-2008
321	Hewlett Packard	Amplifiers	HPC 8447D	1937A02809	07-17-2008
329	A.H.Systems	Antennas	SAS-571	721	08-13-2008
331	Microwave Circuits	Filters	H1G513G1	31417	08-27-2008
NA	Agilent	Signal Generator	8257D	MY45470442	10-05-2008

5.0 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Manufacturer	Equipment Type	Model Number	Serial Number(s)
Sensus	EUT	IDTB001	101, 202

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

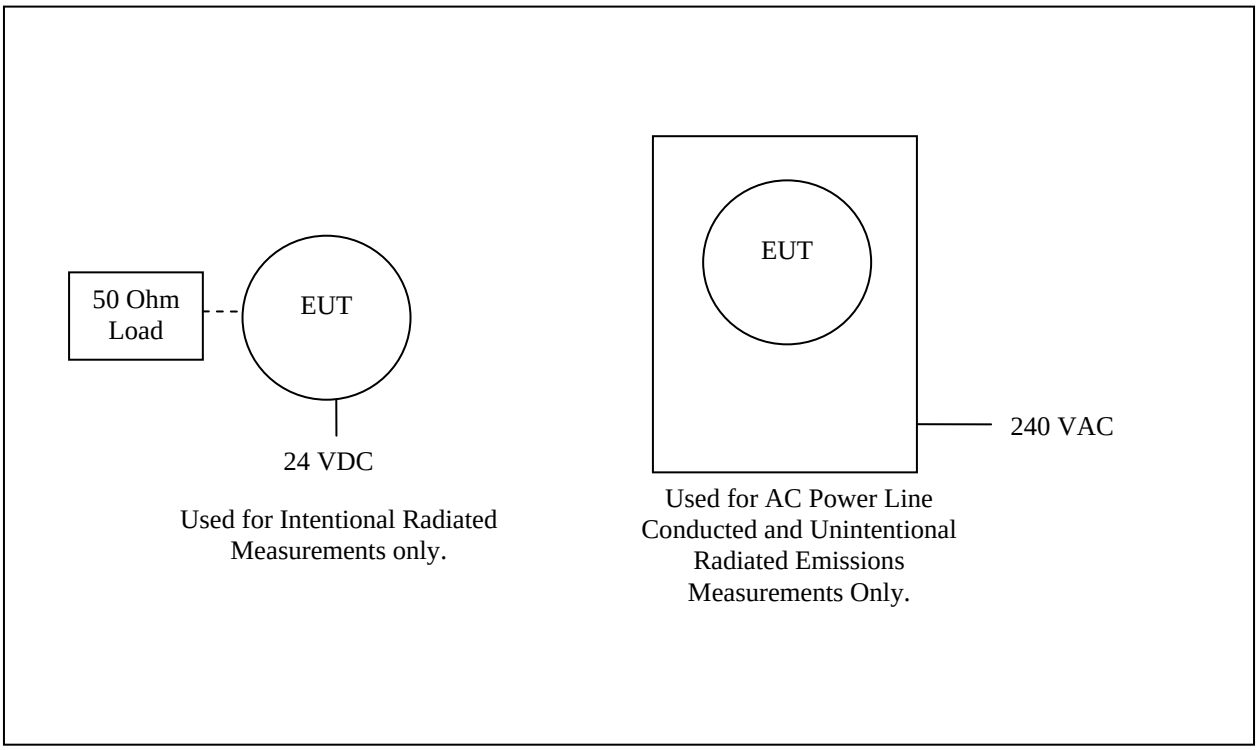

Figure 6-1: EUT Test Setup

For radiated emissions measurements, the IDTB001 was modified with an external RF connector for connection to a non-radiating 50 ohm load.

*See Test Setup photographs for additional detail.

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Field Strength of Spurious Emissions

7.1.1 Measurement Procedure

The equipment under test is placed on the open area test site (described in section 2.3.2) on a wooden table at the turntable center. For each spurious emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360º and the maximum reading on the spectrum analyzer is recorded. This was repeated for both horizontal and vertical polarizations of the receive antenna.

The equipment under test is then replaced with a substitution antenna fed by a signal generator. The signal generator's frequency is set to that of the spurious emission recorded from the equipment under test. The antenna mast is raised and lowered from one (1) to four (4) meters to obtain a maximum reading on the spectrum analyzer. The output of the signal generator is then adjusted until the reading on the spectrum analyzer matches that obtained from the equipment under test. The signal generator level is recorded. The spurious emission level is calculated by correcting the signal generator level for the cable loss and gain of the substitution antenna referenced to a dipole. The spectrum was investigated up to 10 times the fundamental emission.

Data was collected at frequencies according to Section 1.4. The equipment under test was evaluated to multiple FCC rule parts with the most stringent limit (-20dBm) applied to all measurements.

7.1.2 Measurement Results

Results of the test are shown below in and Tables 7.1.2-1 through 7.1.2-8.

PART 24 / RSS-134

Table 7.1.2-1: Field Strength of Spurious Emissions – 901.9875 MHz – Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1803.975	-55.89	-59.00	H	5.10	-53.90	-20.00	33.90
1803.975	-58.45	-61	V	5.20	-55.80	-20.00	35.80
2705.9625	-52.15	-51	H	5.52	-45.48	-20.00	25.48
2705.9625	-54.89	-53	V	5.42	-47.58	-20.00	27.58
3607.95	-55.59	-56	H	6.81	-49.19	-20.00	29.19
3607.95	-53.16	-50	V	6.79	-43.21	-20.00	23.21
4509.9375	-45.67	-39	H	7.19	-31.81	-20.00	11.81
4509.9375	-52.34	-47	V	6.99	-40.01	-20.00	20.01
5411.925	-51.67	-42	H	6.75	-35.25	-20.00	15.25
5411.925	-52.53	-44	V	6.61	-37.39	-20.00	17.39
8117.8875	-55.5	-43	H	6.25	-36.75	-20.00	16.75
8117.8875	-56.18	-45	V	6.25	-38.75	-20.00	18.75
9019.875	-58.91	-49	H	6.43	-42.57	-20.00	22.57
9019.875	-58.72	-49	V	6.53	-42.47	-20.00	22.47

Table 7.1.2-2: Field Strength of Spurious Emissions – 930.5 MHz – MPass Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1861	-58.11	-61.00	H	4.99	-56.01	-20.00	36.01
1861	-56.39	-55	V	5.09	-49.91	-20.00	29.91
2791.5	-51.82	-51	H	5.63	-45.37	-20.00	25.37
2791.5	-55.92	-54	V	5.53	-48.47	-20.00	28.47
3722	-53.7	-51	H	6.66	-44.34	-20.00	24.34
3722	-52.9	-51	V	6.61	-44.39	-20.00	24.39
4652.5	-40.82	-32.4	H	6.91	-25.49	-20.00	5.49
4652.5	-45.72	-38	V	6.68	-31.32	-20.00	11.32
5583	-55.86	-48	H	6.84	-41.16	-20.00	21.16
5583	-55.83	-46	V	6.76	-39.24	-20.00	19.24
6513.5	-59.34	-52	V	6.38	-45.62	-20.00	25.62
7444	-47.92	-36	H	5.94	-30.06	-20.00	10.06
7444	-52.16	-42	V	6.04	-35.96	-20.00	15.96
8374.5	-50.16	-35.5	H	6.28	-29.22	-20.00	9.22
8374.5	-54.88	-39	V	6.28	-32.72	-20.00	12.72
9305	-52.87	-38	H	6.23	-31.77	-20.00	11.77
9305	-50.93	-36.14	V	6.33	-29.81	-20.00	9.81

PART 90 / RSS-119

Table 7.1.2-3: Field Strength of Spurious Emissions – 896.0125MHz – Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1792.025	-57.54	-58.00	H	5.12	-52.88	-20.00	32.88
1792.025	-59.8	-63	V	5.22	-57.78	-20.00	37.78
2688.0375	-54.24	-52	H	5.49	-46.51	-20.00	26.51
2688.0375	-55.94	-54	V	5.39	-48.61	-20.00	28.61
3584.05	-54.57	-51	H	6.84	-44.16	-20.00	24.16
3584.05	-52.81	-50	V	6.82	-43.18	-20.00	23.18
4480.0625	-49.2	-41	H	7.17	-33.83	-20.00	13.83
4480.0625	-52.18	-47	V	6.98	-40.02	-20.00	20.02
5376.075	-52.47	-42	H	6.70	-35.30	-20.00	15.30
5376.075	-50.73	-42	V	6.55	-35.45	-20.00	15.45
8064.1125	-55.78	-43	H	6.25	-36.75	-20.00	16.75
8064.1125	-56.63	-47	V	6.25	-40.75	-20.00	20.75
8960.125	-59.02	-48	H	6.43	-41.57	-20.00	21.57
8960.125	-57.61	-47	V	6.52	-40.48	-20.00	20.48

Table 7.1.2-4: Field Strength of Spurious Emissions – 935.0125MHz – MPass Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1870.025	-55.71	-57	H	4.97	-52.03	-20.00	32.03
1870.025	-56.71	-58	V	5.07	-52.93	-20.00	32.93
2805.0375	-51.71	-50	H	5.65	-44.35	-20.00	24.35
2805.0375	-55.42	-53	V	5.55	-47.45	-20.00	27.45
3740.05	-52.02	-49	H	6.63	-42.37	-20.00	22.37
3740.05	-52.54	-50	V	6.59	-43.41	-20.00	23.41
4675.0625	-43.76	-36	H	6.86	-28.88	-20.00	8.88
4675.0625	-46.61	-40	V	6.63	-33.37	-20.00	13.37
5610.075	-57.8	-50	H	6.84	-43.16	-20.00	23.16
5610.075	-58.56	-52	V	6.76	-45.24	-20.00	25.24
7480.1	-49.5	-37	H	5.95	-31.05	-20.00	11.05
7480.1	-51.03	-39	V	6.05	-32.95	-20.00	12.95
8415.1125	-52.17	-38	H	6.29	-31.71	-20.00	11.71
8415.1125	-55.93	-45	V	6.29	-38.71	-20.00	18.71
9350.125	-54.4	-41	H	6.20	-34.80	-20.00	14.80
9350.125	-52.67	-38	V	6.30	-31.70	-20.00	11.70

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Table 7.1.2-5: Field Strength of Spurious Emissions – 928.925MHz – Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1857.85	-55.75	-57.00	H	4.99	-52.01	-20.00	32.01
1857.85	-54.98	-55	V	5.09	-49.91	-20.00	29.91
2786.775	-51.55	-50	H	5.62	-44.38	-20.00	24.38
2786.775	-55.82	-54	V	5.52	-48.48	-20.00	28.48
3715.7	-50.94	-48	H	6.67	-41.33	-20.00	21.33
3715.7	-51.9	-48	V	6.62	-41.38	-20.00	21.38
4644.625	-40.37	-32.12	H	6.92	-25.20	-20.00	5.20
4644.625	-47.32	-40	V	6.70	-33.30	-20.00	13.30
5573.55	-54.87	-46	H	6.85	-39.15	-20.00	19.15
5573.55	-55.66	-47	V	6.76	-40.24	-20.00	20.24
6502.475	-57.58	-49	H	6.19	-42.81	-20.00	22.81
6502.475	-57.38	-48	V	6.39	-41.61	-20.00	21.61
7431.4	-49.04	-36	H	5.93	-30.07	-20.00	10.07
7431.4	-53.55	-45	V	6.03	-38.97	-20.00	18.97
8360.325	-49.29	-34.49	H	6.28	-28.21	-20.00	8.21
8360.325	-53.34	-41	V	6.28	-34.72	-20.00	14.72
9289.25	-52.73	-37	H	6.24	-30.76	-20.00	10.76
9289.25	-51.28	-37	V	6.34	-30.66	-20.00	10.66

Table 7.1.2-6: Field Strength of Spurious Emissions – 932.25MHz – Normal Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1864.5	-56.69	-54	H	4.98	-49.02	-20.00	29.02
1864.5	-58.11	-60	V	5.08	-54.92	-20.00	34.92
2796.75	-50.9	-48	H	5.64	-42.36	-20.00	22.36
2796.75	-55.25	-52	V	5.54	-46.46	-20.00	26.46
3729	-52.98	-51	H	6.65	-44.35	-20.00	24.35
3729	-52.31	-49	V	6.60	-42.40	-20.00	22.40
4661.25	-41.43	-33	H	6.89	-26.21	-20.00	6.21
4661.25	-45.62	-38	V	6.66	-31.34	-20.00	11.34
5593.5	-56.67	-49	H	6.84	-42.16	-20.00	22.16
5593.5	-57.79	-50	V	6.76	-43.24	-20.00	23.24
7458	-48.7	-36	H	5.94	-30.26	-20.00	10.26
7458	-52.38	-43	V	6.04	-36.96	-20.00	16.96
8390.25	-50.83	-39	H	6.29	-32.71	-20.00	12.71
8390.25	-55.84	-42	V	6.29	-35.71	-20.00	15.71
9322.5	-53.34	-40	H	6.22	-33.78	-20.00	13.78
9322.5	-52.28	-38	V	6.32	-31.68	-20.00	11.68

Table 7.1.2-7: Field Strength of Spurious Emissions – 941.4875MHz – MPass Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1882.975	-55.82	-57	H	4.94	-52.06	-20.00	32.06
1882.975	-55.65	-57	V	5.04	-51.96	-20.00	31.96
2824.4625	-50.78	-49	H	5.67	-43.33	-20.00	23.33
2824.4625	-55.34	-54	V	5.57	-48.43	-20.00	28.43
3765.95	-50.95	-48	H	6.60	-41.40	-20.00	21.40
3765.95	-51.9	-48	V	6.55	-41.45	-20.00	21.45
4707.4375	-41.91	-33	H	6.80	-26.65	-20.00	6.65
4707.4375	-42.21	-35	V	6.56	-28.50	-20.00	8.50
5648.925	-57.19	-50	H	6.83	-43.17	-20.00	23.17
5648.925	-56.08	-48	V	6.76	-41.24	-20.00	21.24
6590.4125	-58.64	-50	H	6.11	-43.89	-20.00	23.89
7531.9	-50.83	-36	H	5.98	-29.62	-20.00	9.62
7531.9	-52.97	-40	V	6.07	-33.93	-20.00	13.93
8473.3875	-53.03	-39	H	6.30	-32.70	-20.00	12.70
8473.3875	-56.75	-44	V	6.30	-37.70	-20.00	17.70
9414.875	-54.91	-41	H	6.15	-34.85	-20.00	14.85
9414.875	-53.51	-40	V	6.25	-33.75	-20.00	13.75

Table 7.1.2-8: Field Strength of Spurious Emissions – 959.925MHz – MPass Mode

Frequency (MHz)	Spectrum Analyzer Level (dBm)	Generator Level (dBm)	Antenna Polarity (H/V)	Correction Factors (dB)	Corrected Level (dBm)	Limit (dBm)	Margin (dB)
1919.85	-56.16	-57.00	H	4.87	-52.13	-20.00	32.13
1919.85	-55.83	-55	V	4.97	-50.03	-20.00	30.03
2879.775	-51.2	-48	H	5.75	-42.25	-20.00	22.25
2879.775	-55.12	-52	V	5.65	-46.35	-20.00	26.35
3839.7	-50.52	-47	H	6.51	-40.49	-20.00	20.49
3839.7	-51.86	-48	V	6.44	-41.56	-20.00	21.56
4799.625	-39.42	-30.3	H	6.62	-23.68	-20.00	3.68
4799.625	-40.32	-31.81	V	6.36	-25.45	-20.00	5.45
5759.55	-58.6	-55	H	6.81	-48.19	-20.00	28.19
5759.55	-58.12	-52	V	6.76	-45.24	-20.00	25.24
7679.4	-45.63	-30.17	H	6.06	-24.11	-20.00	4.11
7679.4	-50.4	-36.63	V	6.12	-30.51	-20.00	10.51
8639.325	-50.81	-36.56	H	6.34	-30.22	-20.00	10.22
8639.325	-55.97	-44	V	6.37	-37.63	-20.00	17.63
9599.25	-56.41	-44	H	6.32	-37.68	-20.00	17.68
9599.25	-56.3	-44	V	6.38	-37.62	-20.00	17.62

7.2 Radiated Emissions (Unintentional Radiators)

7.2.1 Measurement Procedure

The equipment under test is placed in the Semi-Anechoic Chamber (described in section 2.3.1) on a wooden table at the turntable center. For each radiated emission, the antenna mast is raised and lowered from one (1) to four (4) meters and the turntable is rotated 360º to obtain a maximum peak reading on the spectrum analyzer. The radiated emissions are then measured using an EMI receiver employing a CISPR quasi-peak detector for frequencies below 1000 MHz and an Average detector function for frequencies above 1000 MHz. This repeated for both horizontal and vertical polarizations of the receive antenna.

The field strength of each radiated emission is calculated by correcting the EMI receiver level for cable loss, amplifier gain, and antenna correction factors.

Field Strength (dBuV/m) = EMI Receiver Level (dBuV) + Cable Loss (dB) – Amplifier Gain (dB) + Antenna Correction Factor (1/m)

7.2.2 Measurement Results

Results of the test are shown below in Table 7.2.2-1.

Table 7.2.2-1: Radiated Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk	(H/V)	(dB)	pk	Qpk	pk	Qpk	pk	Qpk
31.4	---------	28.78	V	-9.93	---------	18.85	--------	40.0	---------	21.15
50.234	---------	30.76	V	-18.87	---------	11.89	--------	40.0	---------	28.11
104.643	---------	28.17	V	-14.44	---------	13.73	--------	43.5	---------	29.77
168.794	---------	30.15	V	-15.55	---------	14.60	--------	43.5	---------	28.90
240.612	---------	34.31	H	-13.74	---------	20.57	--------	46.0	---------	25.43
249.689	---------	34.62	H	-12.83	---------	21.79	--------	46.0	---------	24.21
299.206	---------	32.89	H	-11.82	---------	21.07	--------	46.0	---------	24.93
434.621	---------	25.75	V	-8.35	---------	17.40	--------	46.0	---------	28.60
544.788	---------	23.64	V	-5.60	---------	18.04	--------	46.0	---------	27.96
951.5	---------	9.01	V	2.28	---------	11.29	--------	46.0	---------	34.72

Measurements taken above 951.5 MHz were below the noise floor of the measurement equipment.

7.3 Power Line Conducted Emissions

7.3.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.3.2 Measurement Results

Results of the test are shown below in and Tables 7.3.2-1.

Table 7.3.2-1: Conducted EMI Results

Frequency (MHz)	Uncorrected Reading (dBuV)		Total Correction Factor (dB)	Corrected Level (dBuV)		Limit (dBuV)		Margin (dB)		Line
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	
Line 1										
0.18	22.5	4.3	9.80	32.30	14.10	64.49	54.49	32.2	40.4	GND
0.3	16.8	2.5	9.80	26.60	12.30	60.24	50.24	33.6	37.9	GND
1.33	20.3	10.2	9.80	30.10	20.00	56.00	46.00	25.9	26.0	GND
2.15	14.2	5.8	9.80	24.00	15.60	56.00	46.00	32.0	30.4	GND
4.19	13.3	8.1	9.80	23.10	17.90	56.00	46.00	32.9	28.1	GND
19.51	9.2	4.3	10.11	19.31	14.41	60.00	50.00	40.7	35.6	GND
Line 2										
0.17	23.2	4.8	9.80	33.00	14.60	64.96	54.96	32.0	40.4	GND
0.25	18.2	3.5	9.80	28.00	13.30	61.76	51.76	33.8	38.5	GND
0.46	13.8	2.4	9.80	23.60	12.20	56.69	46.69	33.1	34.5	GND
1.36	23.1	13.2	9.80	32.90	23.00	56.00	46.00	23.1	23.0	GND
6.27	16.8	11.8	9.81	26.61	21.61	60.00	50.00	33.4	28.4	GND
18.83	13.1	8.4	10.11	23.21	18.51	60.00	50.00	36.8	31.5	GND

8.0 CONCLUSION

In the opinion of ACS, Inc. the model IDTB001, manufactured by Sensus Metering Systems, meets all the requirements of FCC Part 15, 24, 90, and 101 as well as RSS-119 and RSS-134 as applicable.

End of Report