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Certification Test Report

FCC ID: SDBTGB20

FCC Rule Part: CFR 47 Part 24 Subpart D, Part 101 Subpart C

ACS Report Number: 12-2161.W04.1A

Applicant: Sensus Metering Systems, Inc.
Model: TGB20

Test Begin Date: December 5, 2012
Test End Date: December 5, 2012

Report Issue Date: January 7, 2013



For The Scope of Accreditation Under Certificate Number AT-1533

This report must not be used by the client to claim product certification, approval, or endorsement by ACLASS, ANSI, or any agency of the Federal Government.

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This report contains 14 pages

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1.0 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with the specific test requirements of Part 2 Subpart J, Part 24 Subpart D and Part 101 Subpart C of the FCC's Code of Federal Regulations for a Class II permissive change.

The purpose of this Class II Permissive Change is to include additional emission designators to the existing filing.

1.2 Product Description

The TGB20 is a base station for the Sensus Metering Systems meters. The device receives telemetry transmission from multiple system end point units used mostly for utility metering. The TGB20 sends also command information to the end point units. The TGB20 transceiver is powered by 24 VDC and is usually housed in a rack mountable enclosure.

Manufacturer Information:
Sensus Metering Systems, Inc.
639 Davis Drive
Morrisville, NC 27560

Test Sample Serial Numbers: 2078

Test Sample Condition: The equipment was in good operating conditions with no physical damage.

1.3 Test Methodology

1.3.1 Configurations and Justification

The TGB20 has been configured to support the mPass 10k mode of operation. The equipment has not been subject to any hardware or power changes and the mode of operation covered in the original certification report corresponds to the worst case. Therefore, the RF output power, spurious emissions and frequency stability requirements addressed in the original certification test report are still relevant. The TGB20 was only tested for occupied bandwidth to include the new mode of operation, mPass 10k.

1.3.2 In-Band Testing Methodology

The EUT is designed to operate in multiple bands under the requirements of CFR 47 Parts 24 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	930.0 - 931.0
24D	940.0 - 941.0
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	Approx. Test Freq.
24D	930.0 - 931.0	Middle	930.5000
24D	940.0 - 941.0	1 near top and 1 near bottom	940.0125
101	941.0 - 941.5		941.4875
101	959.85 - 960.0	Middle	959.9250

1.4 Emission Designators

The TGB20 transmitter produces 2 distinct modulation formats. The emissions designators for the modulation types used by the TGB20 transmitter are as follows:

EMISSIONS DESIGNATORS:

mPass Mode (5 kbps): 5K90F1D

mPass Mode (10 kbps): 11K8F1D

Note that the compliance of the mPass 5k mode of operation is covered in the original certification report.

2.0 TEST FACILITIES

2.1 Location

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

Advanced Compliance Solutions, Inc.
3998 FAU Blvd, Suite 310
Boca Raton, Florida 33431
Phone: (561) 961-5585
Fax: (561) 961-5587
www.acstestlab.com

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS, Boca Raton, Florida, is accredited to ISO/IEC 17025 by ANSI-ASQ National Accreditation Board under their ACCLASS program and has been issued certificate number AT-1533 in recognition of this accreditation.

2.3 Radiated & Conducted Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with metallic loaded springs. An EMCO Model 1051 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:

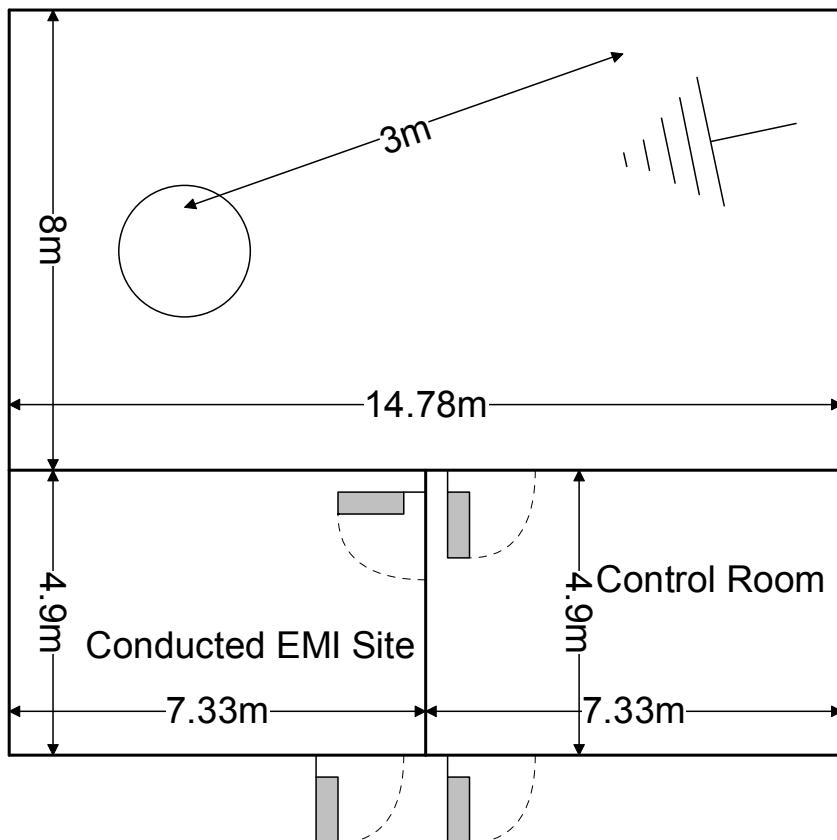


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are $7.3 \times 4.9 \times 3 \text{ m}^3$. As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50 Ω /50 μH and an EMCO Model 3825, which are installed as shown in Photograph 3. For 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

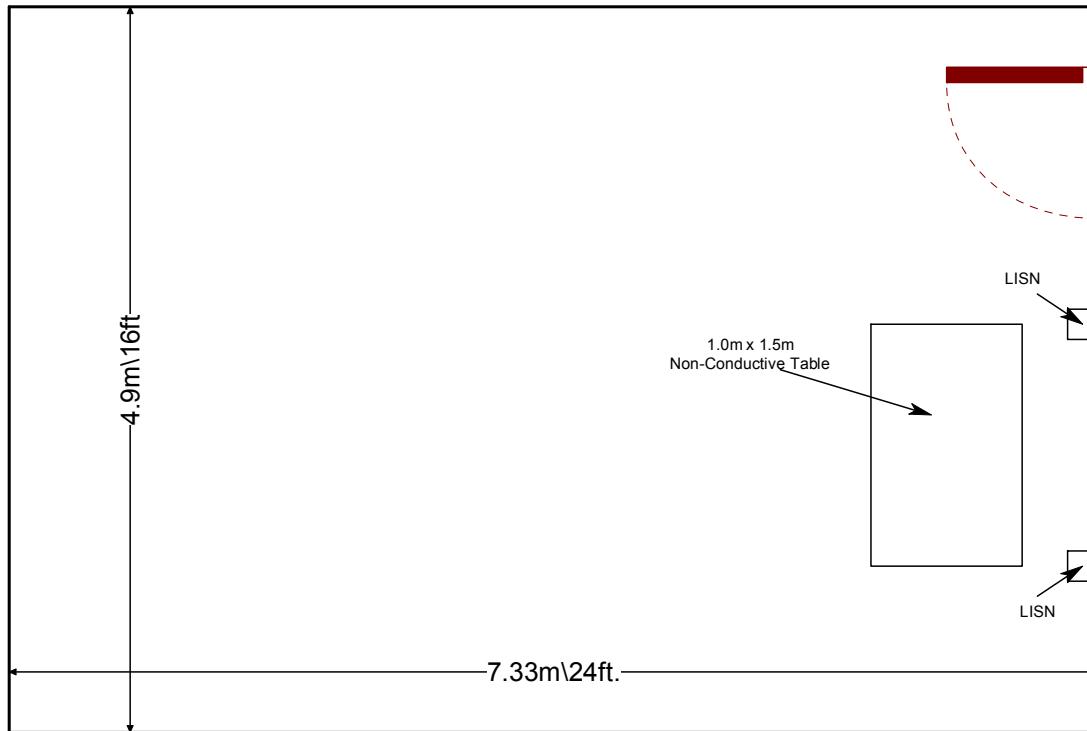


Figure 2.3.2-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- 1 - ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 kHz to 40GHz - 2003
- 2 - US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures - 2012
- 3 - US Code of Federal Regulations (CFR): Title 47, Part 24, Subpart D: Personal Communications Services – 2012
- 4 - US Code of Federal Regulations (CFR): Title 47, Part 101, Subpart C: Fixed Microwave Services - 2012
- 5 – TIA-603-C: Land Mobile FM or PM - Communications Equipment - Measurement and Performance Standards – 2004
- 6 – Industry Canada Radio Standards Specification: RSS-119 - Radio Transmitters and Receivers Operating in the Land Mobile and Fixed Services in the Frequency Range 27.41-960 MHz, Issue 11, June 2011
- 7 – Industry Canada Radio Standards Specification: RSS-134 - 900 MHz Narrow Band Personal Communication Service, Issue 1, March 2000

4.0 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
523	Agilent	E7405	Spectrum Analyzers	MY45103293	1/5/2011	1/5/2013
1265	Weinschel	48-10-33	Attenuators	BX7204	12/3/2012	12/3/2013
2075	Hewlett Packard	8495B	Attenuators	2626A11012	1/2/2012	1/2/2013
2076	Hewlett Packard	HP5061-5458	Cables	2076	1/2/2012	1/2/2013
2082	Teledyne Storm Products	90-010-048	Cables	2082	5/31/2012	5/31/2013
RE587	FairviewMicrowave Inc.	SA3N511-15	Attenuators	RE587	4/18/2012	4/18/2013

NCR=No Calibration Required

5.0 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Sensus Metering Systems, Inc.	TGB20	2078
2	24 VDC Power Supply	Lineage Power	J2007003 L102	10KZ47016361

Table 5-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	Power Cable	1.2 m	No	Power Supply to EUT
B	Power Cord	2.2m	No	Power Supply to AC Mains

6.0 EQUIPMENT UNDER TEST SETUP AND BLOCK DIAGRAM

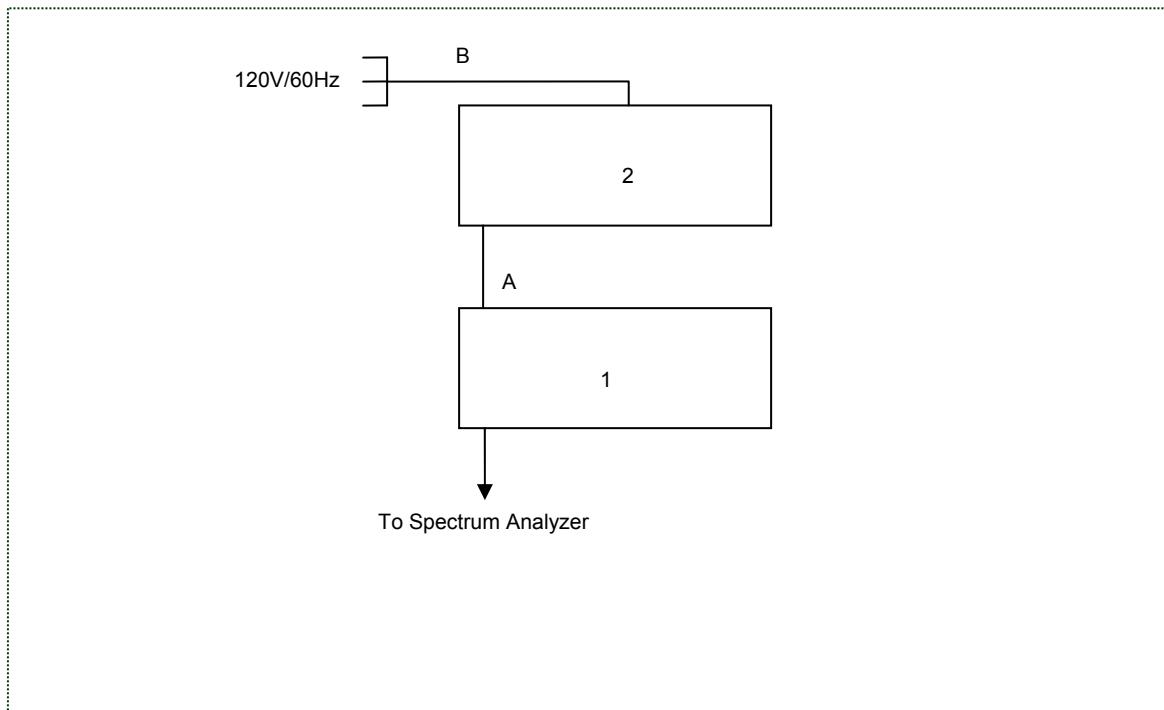


Figure 6-1: EUT Test Setup

7.0 SUMMARY OF TESTS

7.1 Occupied Bandwidth (Emission Limits)

7.1.1 Measurement Procedure

The RF output of the equipment under test was directly connected to the input of the Spectrum Analyzer through 45 dB of passive attenuation. The spectrum analyzer resolution and video bandwidths were set to 300 Hz and 3000 Hz respectively. The internal correction factors of the spectrum analyzer were employed to correct for any cable or attenuator losses. Results of the test are shown below for all modes of operation.

7.1.2 Measurement Results

Part 24.133 a(1)

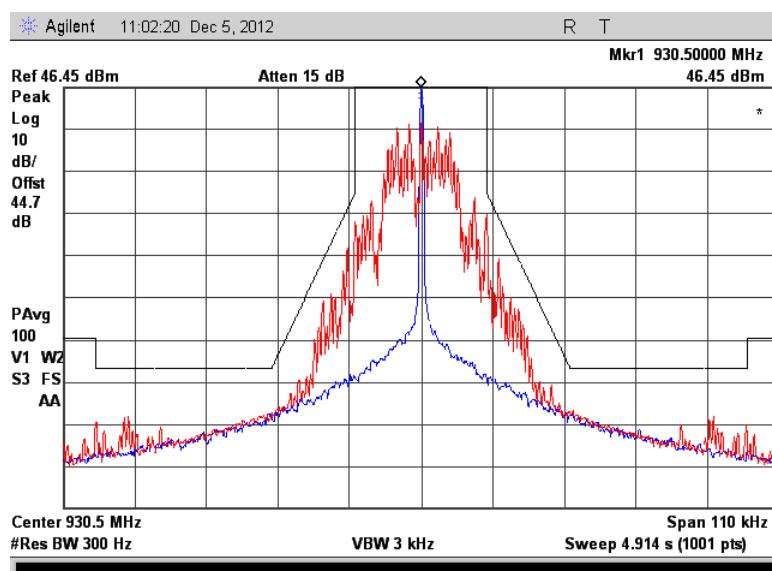


Figure 7.1.2-1: 930.5 MHz – 25 kHz Channel Spacing – mPass 10k Mode

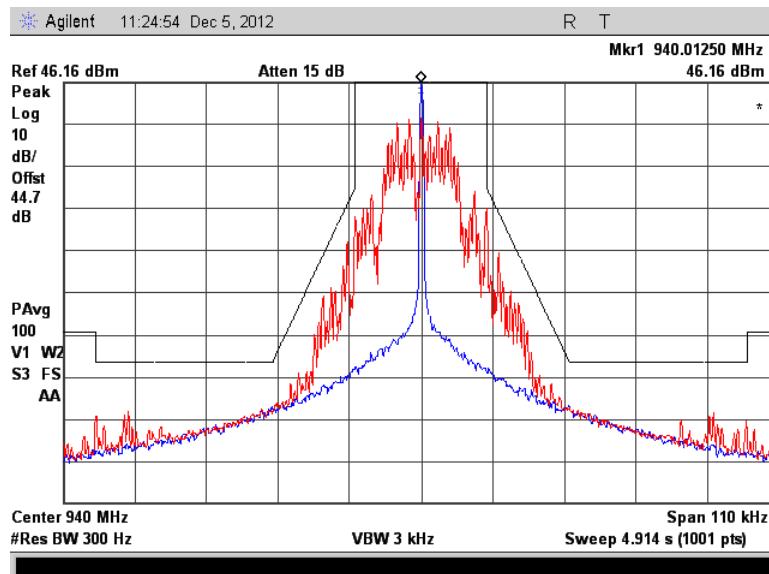


Figure 7.1.2-2: 940.0125 MHz – 25 kHz Channel Spacing – mPass 10k Mode

Part 101.111 a(6)

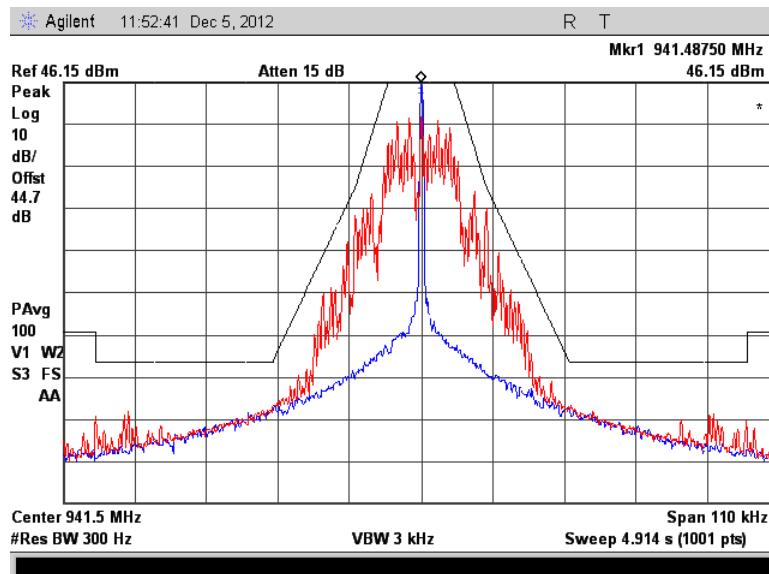


Figure 7.1.2-3: 941.4875 MHz – mPass 10k Mode

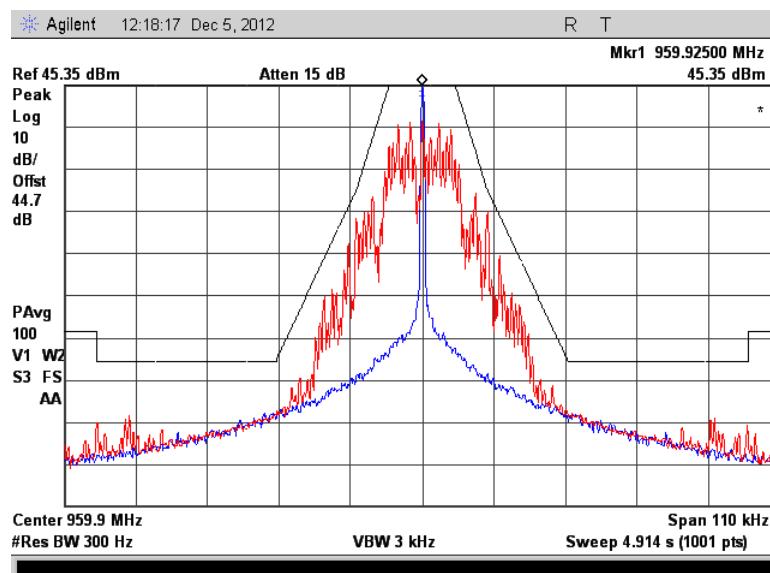


Figure 7.1.2-4: 959.925 MHz – mPass 10k Mode

8.0 CONCLUSION

In the opinion of ACS, Inc. the model TGB20, manufactured by Sensus Metering Systems, Inc., meets all the requirements of FCC Part 24D and Part 101 where applicable.

End Report