Test Report # 317075B2

Equipment Under Test:	Censys
Test Date(s):	8/1/17
Prepared for:	Brady Corporation Attn: Gregg Haensgen 2221 W. Camden Road Glendale, WI 53209

Report Issued by: Shane Dock, EMC Engineer

Date: 8/1/17

Report Reviewed by: Adam Alger, Quality Systems Engineer

Signature:

Date: 8/1/17

Report Constructed by: Shane Dock, EMC Engineer

Date: 8/1/17

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Laird Technologies Test Services in Review

The Laird Technologies, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:

TESTING CERT #1255.01

A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope
A2LA Certificate Number: 1255.01
Scope of accreditation includes all test methods listed herein, unless otherwise noted.

Federal Communications Commission (FCC) – USA

Accredited recognition of two 3 meter Semi-Anechoic Chambers

Accredited Test Firm Registration Number: 953492

Government of Canada

Innovation, Science and Economic Development Canada

ISED Site listing of two 3 meter Semi-Anechoic Chambers based on RSS-GEN – Issue 4
File Number: IC 3088A-2
File Number: IC 3088A-3

1 TEST REPORT SUMMARY

During **4/10/17 to 6/9/17** the Equipment Under Test (EUT), **Censys**, as provided by **Brady Corporation** was tested to the following requirements:

Requirement	Description	Specification	Method	Result
FCC Part 1.1307, 2.1091, 2.1093	RF Exposure and equipment authorization requirements	Reported	FCC KDB 447498	Reported
ISED Canada RSS-102	Radiofrequency Radiation Exposure Evaluation: Portable	Reported	RSS-102 Section 2.5.1	Reported

Notice:

The results relate only to the item tested and described in this report. Any modifications made to the equipment under test after the specified test date(s) may invalidate the data herein.

If the resulting measurement margin is seen to be within the uncertainty value, as listed in this report, the possibility exists that this unit may not meet the required limit specification if subsequently tested.

2 CLIENT INFORMATION

Company Name	Brady Corporation
Contact Person	Gregg Haensgen
Address	2221 W. Camden Road Glendale, WI 53209

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	Censys
Model Number	BCENSYS-1000
Serial Number	CENSYS1_5V & CENSYS1_12V

2.2 Product Description

The Brady Censys RFID reader is an embedded GEN2 UHF reader that periodically scans for UHF tags. The reader operates in the 905-925MHz range and employs an interrogator talks first with frequency hopping ASK pulse interval encoding. The reader is ISO-18000-6 compliant. The result of the scan is parsed by the reader to determines when tag events have occurred. Multiple tag event data are packaged into a transport layer frame with additional reader and transport layer information fields. The Censys reader has an included WiFi module to establish a connection with an existing WiFi infrastructure access point to send these tag messages. The Censys RFID reader is an easy to install device that allows for quick identification of tags for choke point and asset tracking applications.

2.3 Modifications Incorporated for Compliance

None noted at time of test

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 Additional Information

Unit programmed via Serial Connection to 905 MHz, 915 MHz, 925 MHz, or hopping. 5V and 12V units tested with internal and external antennas. Worst case emissions reported. Unit uses an Abracon Ceramic Patch antenna with a gain of 5.5 dBi (Model: ARRUN-915 MHz). All measurements were done after the unit had been in a continues transmit mode for ten minutes.

The unit has 4 antenna ports which can facilitate using the unit's own antenna or an external antenna. The unit cycles between transmitting between the four antenna ports, one at a time, with a delay between each transmission.

Antenna Information:

Model: ARRUN5-915.000MHz

Manufacturer: Abracon

Type: Ceramic Patch

Gain: 5.5dBi

3 REFERENCES

Publication	Edition	Date
CFR 47 Part 15	-	2017
ANSI C63.10	-	2013
RSS-247	2	2017
RSS GEN	4	2014
RSS-102	5	2015
CFR 47 Part 1 and 2	-	2017
FCC KDB 447498	6	2015

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of k = 2.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty ±
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

Parameter	ETSI U.C. ±	U.C. ±
Radio Frequency, from F0	$1x10^{-7}$	$0.55x10^{-7}$
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1 Fundamental Emission

Operator	Shane Dock
QA	Kim Bay
Test Date	4/20/17
Location	Conducted RF Area
Temp. / R.H.	72 degrees F, 33% RH
Requirement	FCC Part 15.247
Method	ANSI C63.10 Section 7.8.5

Maximum Conducted Output Power (watts)	Maximum Conducted Output Power (dBm)
1	30

Test Parameters

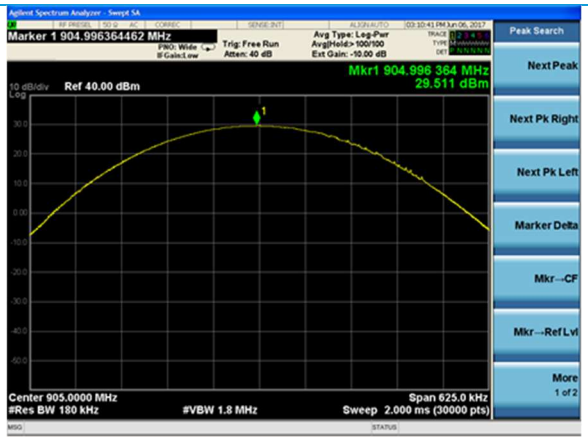
Frequency	905, 915, and 925 MHz
Settings	Units Set for maximum output power
Settings	All 4 antenna ports checked. Worst case measured.
EUT	EUT measured in thermal equilibrium

Table

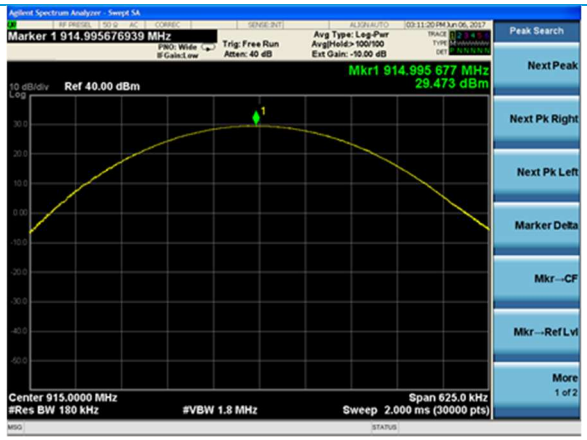
Antenna Port	Low Channel Power (dBm)	Mid Channel Power (dBm)	High Channel Power (dBm)
1	29.59	29.37	29.39
2	29.41	29.48	29.58
3	29.27	29.35	29.65
4	29.51	29.47	29.52

Plots

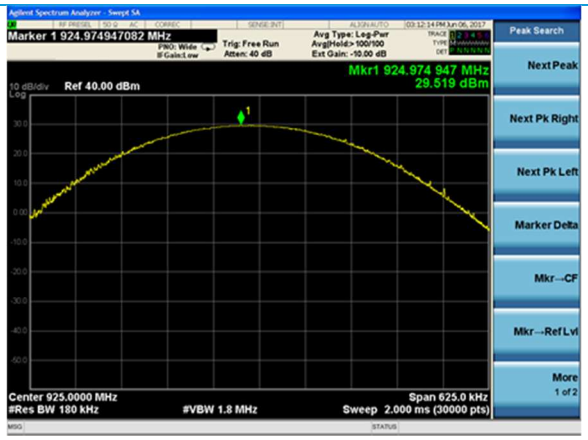
Antenna Port 4 (Worst Case)



Low



Mid



High

6 EXCLUSION CALCULATION

6.1 FCC

Frequency = 925 MHz
Output Power = 29.65 dBm + .25 dB (Tune-up Tolerance) = 29.90 dBm
= 977.24 mW

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: S = power density
P = power input to the antenna
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

Maximum peak output power at antenna input terminal:	29.90	(dBm)
Maximum peak output power at antenna input terminal:	977.237	(mW)
Antenna gain(typical):	5.5	(dBi)
Maximum antenna gain:	3.548	(numeric)
Prediction distance:	22	(cm)
Prediction frequency:	925	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	0.62	(*f* / 1500) (mW/cm²)

Power density at prediction frequency: 0.57 (mW/cm²)

6.2 ISED Canada

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

where: S = power density
P = power input to the antenna
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

Maximum peak output power at antenna input terminal:	29.90	(dBm)
Maximum peak output power at antenna input terminal:	0.977237	(W)
Antenna gain(typical):	5.5	(dBi)
Maximum antenna gain:	3.548	(numeric)
Prediction distance:	0.32	(m)
Prediction frequency:	925	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	2.79	(0.02619 ƒ ^(0.6834)) (W/m²)
Power density at prediction frequency:	2.69	(W/m²)

Threshold – (0.02619) * (f(MHz) ^ .6834) = 2.79 W/m^2, which is more than 2.69 W/m^2.

The EUT is therefore exempt from routine evaluation at 32 cm.

7 REVISION HISTORY

Version	Date	Notes	Person
V1	6/19/17	First Draft	Shane Dock
V2	6/30/17	Updated	Shane Dock
V3	7/11/17	Final Draft	Shane Dock
V4	7/21/17	Updated Draft	Shane Dock
V5	7/24/17	Revised Final Draft	Shane Dock
V6	8/1/17	2nd Correction	Shane Dock

END OF REPORT