ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : **E14NR-004**

AGR No. : **A149A-004**

Applicant : **Smart Power Solutions Inc.**

Address : **1FL, Venture Town Janyoungsilkwan 1688-5, Sinil-do, Daeduck-gu, Daejeon, 306-203, South Korea**

Manufacturer : **Smart Power Solutions Inc.**

Address : **1FL, Venture Town Janyoungsilkwan 1688-5, Sinil-do, Daeduck-gu, Daejeon, 306-203, South Korea**

Type of Equipment : **RFID Reader**

FCC ID. : **UQBASX-30XX**

Model Name : **ASX-301R**

Multiple Model Name : **ASX-31RT**

Serial number : **N/A**

Total page of Report : **6 pages (including this page)**

Date of Incoming : **October 30, 2014**

Date of issue : **November 10, 2014**

SUMMARY

The equipment complies with the regulation; ***FCC PART 15 SUBPART C Section 15.247***

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Prepared by: Ki-Hong, Nam / Senior Engineer, ONETECH Corp.

Approved by: Gea-Won, Lee / Managing Director, ONETECH Corp.

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CONTENTS

PAGE

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Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
E14NR-004	November 03, 2014	Initial Issue	All
	November 10, 2014	Retesting due to output value changes.	All

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: Smart Power Solutions Inc.
ADDRESS	: 1FL, Venture Town Janyoungsilkwan 1688-5, Sinil-do, Daeduck-gu, Daejeon, 306-203, South Korea
CONTACT PERSON	: Sang-Min, Kim / Manager
TELEPHONE NO	: +82-42-936-4905
FCC ID	: UQBASX-30XX
MODEL NAME	: ASX-301R
BRAND NAME	: AsReader / AsReader / Asterisk
SERIAL NUMBER	: N/A
DATE	: November 10, 2014

EQUIPMENT CLASS	**DSS – PART 15 SPREAD SPECTRUM TRANSMITTER**
KIND OF EQUIPMENT	RFID Reader
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2009
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2 GENERAL INFORMATION

2.1 Product Description

The Smart Power Solutions Inc., Model ASX-301R (referred to as the EUT in this report) is a RFID Reader. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	RFID Reader
OPERATING FREQUENCY	917.1 MHz ~ 926.9 MHz
RF OUTPUT POWER	20.14 dBm (0.103 W)
NUMBER OF CHANNEL	50 Channels
MODULATION TYPE	ASK
ANTENNA TYPE	Patch Antenna
ANTENNA GAIN	0.45 dBi
LIST OF EACH OSC. OR CRYSTAL. FREQ.(FREQ.>=1 MHz)	19.20 MHz
RATED SUPPLY VOLTAGE	DC 5.0 V

2.2 Alternative type(s)/model(s); also covered by this test report.

-. The following lists consist of the added model and their differences.

Model Name	Differences	Tested
ASX-301R	Basic Model	☑
ASX-31RT	The models are identical to basic model but the exterior case design is different.	☐

Note: 1. Applicant consigns only basic model to test. Therefore this test report just guarantees the units, which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

3. EUT MODIFICATIONS

-. None

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4. RADIO FREQUENCY EXPOSURE

4.1 RF Exposure Calculation

According to the FCC rule 1.1310 table 1B, the limit for the maximum permissible RF exposure for an uncontrolled environment is f/1500 mW/cm² for the frequency range between 300 MHz and 1500 MHz.

The electric field generated for a 1 mW/cm² exposure is calculated as follows:

$E = \sqrt{(30 * P * G)} / d$, and $S = E^2 / Z = E^2 / 377$, because 1 mW/cm² = 10 W/m²

Where

S = Power density in mW/cm², Z = Impedance of free space, 377 Ω

E = Electric filed strength in V/m, G = Numeric antenna gain, and d = distance in meter

Combing equations and rearranging the terms to express the distance as a function of the remaining variable

$d = \sqrt{(30 * P * G) / (377 * S)}$

Changing to units of mW and cm, using P (mW) = P (W) / 1 000, d (cm) = 100 * d (m)

$d = 0.282 * \sqrt{(P * G) / S}$

Where

d = distance in cm, P = Power in mW, G = Numeric antenna gain, and S = Power density in mW/cm²

4.2 Calculated MPE Safe Distance

According to above equation, the following result was obtained.

Peak Output Power		Antenna Gain		Safe Distance	Power Density (mW/cm²)	FCC Limit
(dBm)	(mW)	Log	Linear	(cm)	@ 20 cm Separation	(mW/cm²)
20.14	103.28	0.45	1.11	3.9	0.023	0.60

According to above table, safe distance, $D = 0.282 * \sqrt{103.28 * 1.11/0.60} = 3.90$ cm.

For getting power density at 25 cm separation in above table, following formula was used.

$S = P * G / (4\pi * R^2) = 103.28 * 1.11 / (4 * 3.14 * 20\text{^}2) = 0.023$

Where:

S = Power Density,

P = Power input to the external antenna (Output power from the EUT antenna port (dBm) – cable loss (dB)),

G = Gain of Transmit Antenna (linear gain), R = Distance from Transmitting Antenna

Note: End users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance, because the applicant does not provide an antenna for sale with the EUT.

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