中认信通
CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)

ACCREDITED
TESTING LABORATORY
CERTIFICATE # 6356.01

RF EXPOSURE EVALUATION

Applicant: **Transmitter Solutions**

Address: 2480 South 3850 West, Suite B, Salt Lake City, Utah, United States

FCC ID: **2ASPO-REAKBLENFCV2**

Product Name: **Multi-technologies Reader**

Standard(s): **47 CFR §1.1310, 47 CFR §2.1091**
447498 D01 General RF Exposure Guidance v06

The above device has been tested and found compliant with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

Report Number: **CR230418721-00D**

Date Of Issue: **2024/2/28**

Reviewed By: **Calvin Chen**

Title: RF Engineer

Approved By: **Sun Zhong**

Title: Manager

Test Laboratory: **China Certification ICT Co., Ltd (Dongguan)**
No. 113, Pingkang Road, Dalang Town, Dongguan,
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Test Facility

The Test site used by China Certification ICT Co., Ltd (Dongguan) to collect test data is located on the No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 442868, the FCC Designation No. : CN1314.

Declarations

China Certification ICT Co., Ltd (Dongguan) is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol "▲". Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	CR230418721-00D	Original Report	2024/2/28

1.1 Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

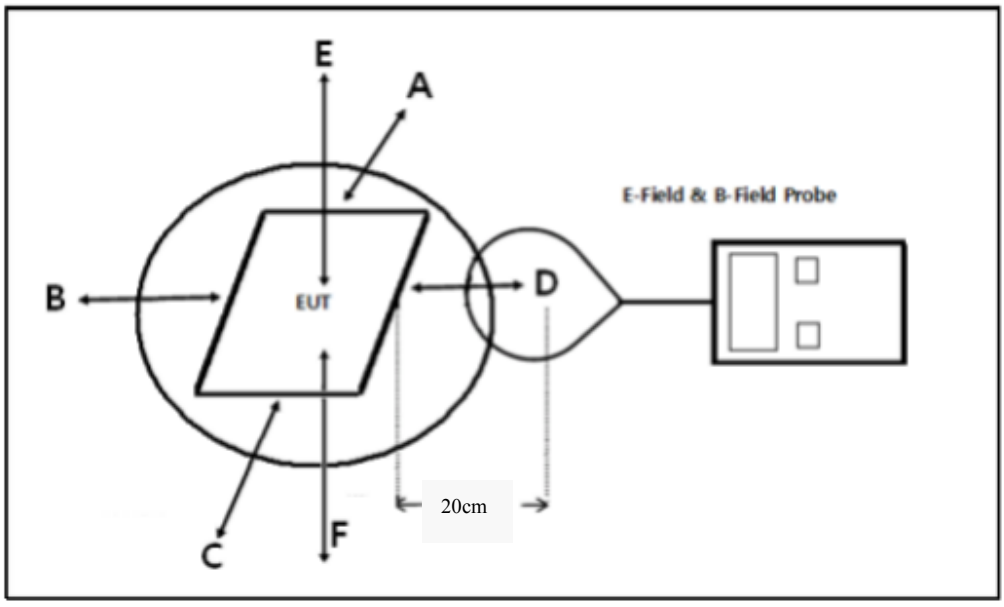
Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

1.2 Block Diagram of Test Setup For RFID



1.3 Calculation formula:

Prediction of power density at the distance of the applicable MPE limit
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);
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, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

1.4 Test Data For 125kHz RFID:

Serial Number:	24JL_1	Test Date:	2024/2/27
Test Site:	RF	Test Mode:	Transmitting
Tester:	David Huang	Test Result:	Pass

Environmental Conditions:					
Temperature: (℃)	25.4	Relative Humidity: (%)	67	ATM Pressure: (kPa)	100.8

Test Equipment List and Details:

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Narda	Electric and Magnetic Field Probe-Analyzer	EHP-200AC	180ZX10204	2021/6/7	2024/6/6

** Statement of Traceability: China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).*

Test Data:

H-Field Strength

Frequency Range (kHz)	Position A (A/m)	Position B (A/m)	Position C (A/m)	Position D (A/m)	Position E (A/m)	Limit (A/m)
125	0.0321	0.0331	0.0247	0.0136	0.0613	1.63

Note: Test with 20cm distance from the center of the probe(s) to the edge of the device.

E-Field Strength

Frequency Range (kHz)	Position A (V/m)	Position B (V/m)	Position C (V/m)	Position D (V/m)	Position E (V/m)	Limit (V/m)
125	0.4632	0.2678	0.3199	0.5643	0.6053	614

Note: Test with 20cm distance from the center of the probe(s) to the edge of the device.

1.5 Power Density Calculation:

Operation Modes	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	1.5	1.413	-3.5	0.45	20.00	0.0001	1.0
NFC	13.56	0	1.00	-30.03	0.001	20	<<0.0001	0.98

Note:
1. The Above Parameters were provided by the manufacturer.
2. *NFC field strength is 65.17BμV/m @ 3m = -30.03 dBm(0.001mW) EIRP. That equal to antenna gain is 0dBi and used the EIRP value as conducted power.

Simultaneous transmission:

125 kHz RFID and NFC, BLE can transmission simultaneously:

$S_{BLE}/S_{limit\text{-}BLE} + S_{NFC}/S_{limit\text{-}NFC} + H_{\text{-}RFID}/H_{\text{-}limit}$

=0.001/1+0.0001/0.98+0.0613/1.63

=0.039

< 1.0

Result: The device meet FCC MPE at 20 cm distance

TEST SETUP PHOTOGRAPHS

Please refer to the attachment CR230418721-00D-TSP TEST SETUP PHOTOGRAPHS.

===== END OF REPORT =====