RF EXPOSURE

EVALUATION REPORT

Issued to

RM Acquisition LLC

For

Truck Information Terminal

Model Name	:	HD100
Trade Name	:	RAND MCNALLY
Brand Name	:	RAND MCNALLY
FCC ID	:	A4C-01002A
Standard	:	47CFR §2.1091 47CFR §1.1310 KDB 447498 D01 General RF Exposure Guidance v05
Test date	:	2013-7-16
Issue date	:	2013-7-19

by

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by Zhu Zhan	*Approved by* Zeng Dexin	*Review by* Peng Huarui
Zhu Zhan	Zeng Dexin	Peng Huarui
(Test Engineer)	*(Department Manager)*	(SAR *Manager*)
Date 2013.7.19	*Date* 2013.7.19	*Date* 2013.7.19

CTIA Authorized Test Lab LAB CODE 20081223-00 IEEE 1725 OTA OFTA 電訊管理局 ilac-MRA TAF Testing Laboratory GCF Official Observer of Global Certification Forum Bluetooth BQTF FCC Reg. No. 695796

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	Jul. 19, 2013	First edition

1.Testing Laboratory

1.1. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101
FCC Registration Number:	695796

1.2. Accreditation Certificate

Accredited Testing Laboratory:	No. CNAS L3572

2.Technical Information

Note: the following data is based on the information by the applicant.

2.1. Identification of Applicant

Company Name:	RM Acquisition LLC
Address:	9855 Woods Drive, Skokie, Illinos 60077

2.2. Identification of Manufacturer

Company Name:	SHENZHEN LONGHORN AUTOMATIC ELECTRONICS EQUIPMENT CO., LTD.
Address:	LONGHORN HI-TECH ESTATE, GONGYEYUAN RD., DALANG STREET, BAOAN, SHENZHEN, CHINA

2.3. Equipment Under Test (EUT)

Model Name:	HD100
Trade Name:	RAND MCNALLY
Brand Name:	RAND MCNALLY
Hardware Version:	V4.0
Software Version:	V4.0
Frequency Bands:	CDMA 800MHz / CDMA 1900MHz; 802.11 b/g/n;
Modulation Mode:	CDMA:CDMA; 802.11 b: DSSS; 802.11g: OFDM; 802.11n: OFDM;
Antenna type:	External Monopole Antenna
Development Stage:	Identical prototype
Battery Model:	N/A
Battery specification:	N/A

2.3.1. Photographs of the EUT

Please see for photographs of the EUT.

2.3.2. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	V4.0	V4.0

2.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**47 CFR§2.1091**	Radiofrequency Radiation Exposure Evaluation: mobile devices
2	**47CFR§ 1.1310**	Radiofrequency radiation exposure limits
2	**KDB 447498 D01**	General RF Exposure Guidance v05

3. Device Category and RF Exposure Limit

Per user manual, this device is a Truck Information Terminal within car use. Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47 CFR § 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location.

Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

47CFR § 1.1310

GENERAL POPULATION / UNCONTROLLED EXPOSURE

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
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

4. Measurement Of Conducted Peak Output Power.

1. CDMA Conducted average output power

Band	Channel	Frequency (MHz)	Output Power (dBm)
CDMA 800MHz	1013	824.7	24.35
	384	836.52	23.66
	777	848.31	23.90
CDMA 1900	25	1850.2	23.46
	600	1880.0	23.52
	1175	1909.8	23.65

2. WiFi Mode Conducted average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			802.11B (DSSS)	802.11G (OFDM)	802.11N20 (OFDM)
WiFi	1	2412	17.68	9.87	9.65
	6	2437	17.57	9.33	8.76
	11	2462	17.34	9.28	8.71

5. RF Exposure Evaluation

Standalone transmission MPE evaluation

Bands	Antenna Gain (dBi)	Conducted Average Power per tune up (dBm)	Calculated to ERP (mW)
CDMA 800	1.80	25.00	291.743
CDMA 1900	3.80	24.00	367.282
WiFi 2450	2.00	18.00	60.954

Note:

1.Per KDB447498D01v05, When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR or MPE must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter.

2. EIRP=P*G, ERP=EIRP-2.15dB

3. Per 47CFR 2.1091(c)
Mobile device are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more, or if they operate at frequencies above 1.5 GHz and their ERP is 3 watts or more.
So standalone MPE evaluation is not required for CDMA antenna and WiFi antenna.

Simultaneous transmission MPE evaluation

Bands	Antenna Gain (dBi)	Conducted Average Power (dBm)	Calculated Power Density (mW/cm^2)	Limit (mW/cm^2)	MPE ratio
CDMA 800	1.80	25.00	0.095	0.566	0.168
CDMA 1900	3.80	24.00	0.120	1.000	0.120
WiFi 2450	2.00	18.00	0.020	1.000	0.008

Note:

1. Calculated Power Density = (PG)/(4 π R^2)

Where, S= Power Density (1 mW/cm^2)

P = Power Input to antenna
G= Antenna Gain
R= Sparation distance between radiator and human body

2. MPE ratio= Calculated Power Density/Power Density Limit
Power Density Limit= f/1500 (300-1,500 MHz) or 1 (1,500-100,000), f is taken as center frequency of the test band

3.Per Section7.2 of KDB447498D01v05
Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0.

4. Highest MPE ratio for CDMA antenna is 0.168, and MPE ratio for WiFi antenna is 0.008, so the sum of MPE ratio is 0.176≤ 1.0, so simultaneous transmission MPE test is not required.