



RF EXPOSURE EVALUATION REPORT

APPLICANT : dormakaba EAD GmbH
PRODUCT NAME : data collection terminal
MODEL NAME : 9600-K6 BLE
BRAND NAME : dormakaba
FCC ID : NVI-KT9600K6B
STANDARD(S) : 47CFR 2.1091
: KDB 447498
RECEIPT DATE : 2019-05-20
TEST DATE : 2019-06-21 to 2019-07-02
ISSUE DATE : 2019-07-08

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Change history		
Version	Date	Reason of changed
1.0	2019-07-08	Original



1. Technical Information

Note: Provide by applicant.

1.1 Applicant and Manufacturer Information

Applicant:	dormakaba EAD GmbH
Applicant Address:	Albertistr. 3, 78056 Villingen-Schwenningen, Germany
Manufacturer:	In-Tech Electronics Ltd
Manufacturer Address:	Unit A, 13/F, Wing Tai Centre, 12 Hing Yip Street, Kwun Tong Kowloon, Hong Kong

1.2 Equipment under Test (EUT) Description

EUT Name:	data collection terminal
Hardware Version:	02
Software Version:	V5
Frequency Bands:	Bluetooth: 2402 MHz ~ 2480 MHz RFID: 13.56MHz
Modulation Mode:	Bluetooth LE: GFSK ASK
Antenna Type:	PCB Antenna
Antenna Gain:	Bluetooth: 0.35 dBi

Note: This test report is updated from report SZ19050100S01, based on the similarity between before, only the WLAN 2.4GHz module was pulled out on the motherboard.



1.3 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#	02	V5

1.4 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	47 CFR§2.1091	Radio Frequency Radiation Exposure Evaluation: mobile devices
2	KDB 447498 D01v06	General RF Exposure Guidance



2. Device Category and RF Exposure Limit

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 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.

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



3. RF Output Power

<Bluetooth>

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	2.51
	CH 19	2440	2.39
	CH 39	2480	2.42
Tune-up Limit			3.0

<RFID 13.56MHz>

E(dB μ V/m)	E(V/m)	d(m)	EIRP
33.07	0.000045	3	0.000001

Note:

1. The maximum radiated emission at 13.56MHz refers from RF report NO. SZ19050100W03.
2. The modular for RFID approach to certain low power transmitters that has low radiation, therefore the power density of RFID mode closes to zero.

4. RF Exposure Evaluation

➤ Standalone transmission evaluation:

Bands	Frequency (MHz)	Maximum Tune-up Power (dBm)	Antenna Gain (dBi)	EIRP (mW)	Power density (mW/cm ²)	Limit for MPE (mW/cm ²)
Bluetooth	2402	3.0	0.35	1.08	0.002	1.0

Note:

1. According to KDB 447498, SAR test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.
2. For 5GHz WLAN, only the worst case will be used for calculating the power density.
3. MPE calculate method

$$\text{Power Density} = \text{EIRP}/4\pi R^2$$

Where: EIRP = P+G

P = Output Power (dBm)

G = Antenna Gain (dBi)

R = Separation Distance (20cm)

➤ Simultaneous transmission evaluation:

Multi-Band simultaneous Transmission Consideration

Simultaneous Transmission Consideration	Position	Applicable Combination
	Hand/Body	Bluetooth + RFID

1. This device contains transmitters that may operate simultaneously, therefore simultaneous transmission analysis is required.
2. The worst condition for Bluetooth & RFID will be calculated for transmitting simultaneously.

Formula: $\text{Result} = \text{Power density}_1 / \text{limit}_1 + \text{Power density}_2 / \text{limit}_2 \leq 1 \text{ mW/cm}^2$.

Transmission Bands	Power Density	Limit	Simultaneous Transmission Result
Bluetooth	0.002	1	0.002
RFID 13.56MHz	0	0.979	



Annex A General Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
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2. 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

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