



RF EXPOSURE EVALUATION REPORT

APPLICANT : dormakaba EAD GmbH
PRODUCT NAME : data collection terminal
MODEL NAME : 9600-K6 BLE 3G
BRAND NAME : dormakaba
FCC ID : NVI-KT9600K6B3G
STANDARD(S) : 47CFR 2.1091
: KDB 447498
RECEIPT DATE : 2019-05-20
TEST DATE : 2019-06-21 to 2019-07-02
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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:	Albertstr. 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:	GSM 850: 824.2 MHz ~ 848.8 MHz GSM 1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz Bluetooth: 2402MHz-2480MHz RFID: 13.56MHz
Modulation Mode:	GPRS: GMSK , EDGE: 8PSK WCDMA: QPSK/16QAM Bluetooth LE: GFSK RFID: ASK
Antenna Type:	PCB Antenna
Antenna Gain:	BT: 0.35dBi, RFID: 0dBi, GSM850: 5.1dBi, GSM1900; 3.9dBi, WCDMA Band II: 3.9dBi, WCDMA Band V: 5.1dBi

Note: This test report is updated from report SZ19050100S01, based on the similarity between before, only the WLAN 2.4GHz module was removed, and increase GSM850/GSM1900/WCDMA Band II/WCDMA Band V.



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

< GSM Output Power >

GSM850 TX Channel	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS 1 Tx slot	32.51	32.75	32.89	33.00	23.51	23.75	23.89	24.00
GPRS 2 Tx slots	29.99	30.00	30.10	30.50	23.99	24.00	24.10	24.50
GPRS 3 Tx slots	28.02	28.05	28.16	28.50	23.76	23.79	23.90	24.24
GPRS 4 Tx slots	25.96	26.02	26.18	26.50	22.96	23.02	23.18	23.50
EDGE 1 Tx slot	25.50	25.54	25.49	26.00	16.50	16.54	16.49	17.00
EDGE 2 Tx slots	25.08	25.13	25.31	25.50	19.08	19.13	19.31	19.50
EDGE 3 Tx slots	24.02	23.98	23.92	24.50	19.76	19.72	19.66	20.24
EDGE 4 Tx slots	21.15	21.28	21.30	21.50	18.15	18.28	18.30	18.50

GSM1900 TX Channel	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS 1 Tx slot	29.33	29.26	28.97	29.50	20.33	20.26	19.97	20.50
GPRS 2 Tx slots	26.41	25.74	25.74	26.50	20.41	19.74	19.74	20.50
GPRS 3 Tx slots	24.89	24.66	24.23	25.00	20.63	20.40	19.97	20.74
GPRS 4 Tx slots	22.83	22.62	22.19	23.00	19.83	19.62	19.19	20.00
EDGE 1 Tx slot	24.79	24.63	24.28	25.00	15.79	15.63	15.28	16.00
EDGE 2 Tx slots	24.93	24.77	24.39	25.00	18.93	18.77	18.39	19.00
EDGE 3 Tx slots	23.88	23.58	23.81	24.00	19.62	19.32	19.55	19.74
EDGE 4 Tx slots	22.96	23.28	22.86	23.50	19.96	20.28	19.86	20.50



< WCDMA Output Power >

Band	WCDMA Band II			Tune-up Limit (dBm)	WCDMA Band V			Tune-up Limit (dBm)
	TX Channel	9262	9400		9538	4132	4183	
Rx Channel	9662	9800	9938		4357	4408	4458	
Frequency (MHz)	1852.4	1880	1907.6		826.4	836.6	846.6	
RMC 12.2Kbps	22.98	22.87	23.02	23.50	23.59	23.64	23.35	24.00
HSDPA Subtest-1	22.74	22.70	22.76	23.50	23.37	23.50	23.12	24.00
HSDPA Subtest-2	22.71	22.74	22.71	23.50	23.36	23.58	23.16	24.00
HSDPA Subtest-3	22.79	22.76	22.73	23.00	23.37	23.53	23.18	24.00
HSDPA Subtest-4	22.24	22.20	22.26	23.00	22.87	23.00	22.62	23.50
HSUPA Subtest-1	23.27	22.93	23.25	23.50	23.45	24.07	23.89	24.50
HSUPA Subtest-2	21.27	20.93	21.25	21.50	21.45	22.07	21.89	22.50
HSUPA Subtest-3	22.27	21.93	22.25	22.50	22.45	23.07	22.89	23.50
HSUPA Subtest-4	21.07	20.73	21.05	21.50	21.25	21.87	21.69	22.00
HSUPA Subtest-5	23.26	23.01	23.21	23.50	23.41	23.91	23.86	24.00
HSPA+ (16QAM) Subtest-1	22.98	22.72	22.72	23.00	23.08	23.63	24.05	24.50

<Bluetooth>

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

<RFID 13.56MHz>

E(dBμV/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)
GSM850	848.8	24.50	5.1	912.011	0.182	0.566
GSM1900	1850.2	20.74	3.9	291.072	0.058	1.0
WCDMA Band II	1852.4	23.5	3.9	549.541	0.109	1.0
WCDMA Band V	836.6	24.50	5.1	912.011	0.182	0.558
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. 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	WWAN+ Bluetooth + RFID

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

Formula: Result=Power density ₁/ limit ₁ + Power density ₂/ limit ₂ + Power density ₃/ limit ₃ ≤ 1 mW/cm².

Transmission Bands	Power Density/ SAR	Limit	Simultaneous Transmission Result
WWAN	0.182	0.566	0.324
Bluetooth	0.002	1	
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
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