Prediction of MPE at a given distance

1. Description of Device

Applicant	:	Shanghai Huace Navigation Technology Ltd.
Address	:	577 Songying Road, Qingpu District, 201706 Shanghai, China
EUT Description	:	Display
Model No.	:	CB-H10D
Trademark	:	CHCNAV
Radio Technology	:	Bluetooth EDR&BLE
Operation frequency	:	2402-2480MHz
Modulation type	:	GFSK, π/4 DQPSK, 8DPSK for EDR GFSK for BLE
Radio Technology	:	2.4G WIFI
Operation frequency	:	2412MHz-2462MHz for IEEE 802.11 b, g. n/HT20
Modulation type	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n :OFDM(64QAM, 16QAM, QPSK, BPSK)
Support Networks	:	GPRS, EGPRS, WCDMA
Support Bands	:	GSM850, PCS1900, WCDMA Band V, WCDMA Band IV, WCDMA Band II
TX Frequency	:	GSM850: 824.20MHz-848.80MHz PCS1900: 1850.20MHz-1909.80MHz WCDMA Band V: 826.40MHz -846.60MHz WCDMA Band II: 1852.40MHz -1907.60MHz WCDMA Band IV: 1710MHz -1755MHz
Modulation type	:	GSM/GPRS: GMSK EGPRS: GMSK/8PSK WCDMA Band II/IV/V: QPSK
Support Bands	:	LTE Band 2/4/5/7/12/13/17/41
TX Frequency	:	LTE Band 2: 1850 ~ 1910 MHz LTE Band 4: 1710 ~ 1755 MHz LTE Band 5: 824 ~ 849 MHz LTE Band 7: 2500 ~ 2570 MHz LTE Band 12: 699MHz ~ 716MHz LTE Band 13: 777MHz ~ 787MHz LTE Band 41: 2496MHz ~ 2690MHz
Modulation type	:	QPSK, 16QAM

2. Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(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
300-1,500			f/1500	30
1,500-100,000			1.0	30

3. Test Procedure

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

4. Test lab information

Shenzhen Alpha Product Testing Co., Ltd

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission

Registration Number: 293961

July 15, 2019 Certificated by IC

Registration Number: 12135A

CAB identifier: CN0085

5. Result

Worse case is as below:

Mode	Frequency (MHz)	Prediction distance (cm)	Antenna Gain(dBi)	Antenna Gain (Numeric)	RF output power dBm	RF output power mW	MPE (mW/cm^2)	Limit (mW/cm^2)
BR/EDR	2402	40	1.5	1.41	-0.916	0.8098	0.00006	1
BLE	2402	40	1.5	1.41	7.882	6.1404	0.00043	1
2.4G WIFI	2462	40	1.5	1.41	19.022	79.8362	0.00561	1
GMS 850	836.6	40	-2.8	0.52	32.63	1832.3144	0.04783	0.5577
PCS1900	1850.20	40	-1.89	0.65	32.70	1862.0871	0.05993	1
WCDMA B5	826.4	40	-2.8	0.52	23.84	242.1029	0.00632	0.5576
WCDMA B2	1907.6	40	-1.88	0.65	23.93	247.1724	0.00797	1
WCDMA B4	1740.0	40	-1	0.79	23.97	249.4595	0.00986	1
LET B2	1909.3	40	-1.53	0.70	24.20	263.0268	0.00920	1
LTE B4	1754.3	40	-1	0.79	24.23	264.8500	0.01046	1
LTE B5	836.5	40	-2.8	0.52	24.39	274.7894	0.00717	0.5493
LTE B7	2535	40	-1.12	0.77	24.49	281.1901	0.01081	1
LTE B12	715.3	40	-2.19	0.60	24.33	271.0192	0.00814	0.4660
LTE B13	784.5	40	0.05	1.01	24.27	267.3006	0.01345	0.5008
LTE B41	2687.5	40	-0.39	0.91	24.49	281.1901	0.01278	1

Maximum Simultaneous transmission MPE Ratios for BLE+2.4G WIFI +PCS1900:

Max MPE ratio $_{BLE}$Limit	Max MPE ratio $_{2.4G\ WIFI}$/Limit	Max MPE ratio $_{PCS1900}$/Limit	∑MPE ratios	Limit	Result
0.00043	0.00561	0.05993	0.11646	1	PASS

Therefore this device complies with FCC's RF radiation exposure limits for general population without SAR evaluation.