1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant:	Qihan Technology Co.,LTD
Address of applicant:	China National Offshore Oil Building, No.3168
	Houhaibin Road, Nanshan District, Shenzhen, China
Manufacturer:	Qihan Technology Co.,LTD
Address of manufacturer:	China National Offshore Oil Building, No.3168
	Houhaibin Road, Nanshan District, Shenzhen, China

General Description of EUT:

Product Name:	Intelligent Robot
Trade Name:	Sanbot
Model No.:	T1-A1-L
Adding Model(s):	/
FCC ID:	2ANXY-T1-A1-L
Rated Voltage:	DC 14.8V by Battery

Technical Characteristics of EUT:

	WIFI: 802.11b, 802.11g, 802.11n
Support Standards:	BT: V4.0
	ZigBee: IEEE802.15.4
	WIFI: 2412-2462MHz
Frequency Range:	BT: 2402-2480MHz
	ZigBee: 2405-2480MHz
	WIFI: 9.51dBm (Conducted)
Max RF Output Power:	BT: 2.50dBm (Conducted)
	ZigBee: 16.27dBm (Conducted)
	WIFI: CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Type of Modulation:	BT: GFSK, Pi/4 QDPSK, 8DPSK
	ZigBee: DSSS
Type of Antenna:	Integral Antenna
Antenna Gain:	1.65dBi
Device Category:	Mobile Device

1.2 Standard Applicable

According to §1.1310 (e). system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

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)
(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

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

1.3 MPE Calculation Method

$S = (30*P*G) / (377*R^2)$

S = 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 (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

WIFI:

Maximum Tune-Up output power: 9.51 (dBm)

Maximum peak output power at antenna input terminal: 8.93 (mW)

Prediction distance: 20(cm)

Prediction frequency: 2462(MHz)

Antenna gain: 1.65 (dBi)

Directional gain (numeric gain): 1.46

The worst case is power density at prediction frequency at 20cm: 0.003(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

BT(EDR):

Maximum Tune-Up output power: 2.503 (dBm)

Maximum peak output power at antenna input terminal: 1.78 (mW)

Prediction distance: 20(cm)

Prediction frequency: 2480(MHz)

Antenna gain: 1.65 (dBi)

Directional gain (numeric gain): 1.46

The worst case is power density at prediction frequency at 20cm: 0.001(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

BT(BLE):

Maximum Tune-Up output power: 0.842 (dBm)

Maximum peak output power at antenna input terminal: 1.21 (mW)

Prediction distance: 20(cm)

Prediction frequency: 2480(MHz)

Antenna gain: 1.65 (dBi)

Directional gain (numeric gain): 1.46

The worst case is power density at prediction frequency at 20cm: 0.001(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

ZigBee:

Maximum Tune-Up output power: 16.27 (dBm)

Maximum peak output power at antenna input terminal: 42.36 (mW)

Prediction distance: 20(cm)

Prediction frequency: 2440(MHz)

Antenna gain: 1.65 (dBi)

Directional gain (numeric gain): 1.46

The worst case is power density at prediction frequency at 20cm: 0.013(mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

Result: Pass

1.5 Test Setup Photos