

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: KEEPWAY INDUSTRIAL(ASIA)CO.,LTD
Address of applicant: Flat D,8/F,SuccessInd.Bld G.,No.17SheungHeiSt.,
SanPoKong,Kowloon,HongKong

Manufacturer: HuaRui Technology(ShenZhen)CO.,LTD
Address of manufacturer: 401,building 3,No.32,Dafu Road, Zhang ge community,
Fucheng street, Longhua, District Shenzhen

General Description of EUT:

Product Name: Covert Wireless Trail Camera
Trade Name: /
Model No.: WC20
Adding Model(s): WC20-A, WC20-V, CT660-A, CT660-V
Rated Voltage: Adapter DC12V; 12x AA batteries
Power Adapter: /
FCC ID: 2APJQ-WC20
Equipment Type: Mobile Device

Technical Characteristics of EUT:

4G
Support Networks: FDD-LTE
Support Band: FDD-LTE Band 2, 4, 12, 13, 25, 26, 66
FDD-LTE Band 2: Tx: 1850-1910MHz,
FDD-LTE Band 4: Tx: 1710-1755MHz,
FDD-LTE Band 12: Tx: 699-716MHz,
FDD-LTE Band 13: Tx: 777-787MHz,
FDD-LTE Band 25: Tx: 1850-1915MHz,
FDD-LTE Band 26: Tx: 814-849MHz,
FDD-LTE Band 66: Tx: 1710-1780MHz
FDD-LTE Band 2: Rx: 1930-1990MHz,
FDD-LTE Band 4: Rx: 2110-2155MHz,
FDD-LTE Band 12: Rx: 729-746MHz,
FDD-LTE Band 13: Rx: 746-756MHz,
FDD-LTE Band 25: Rx: 1930-1995MHz,
FDD-LTE Band 26: Rx: 859-894MHz,
FDD-LTE Band 66: Rx: 2110-2200MHz
FDD-LTE Band 2: 21.87dBm,
FDD-LTE Band 4: 23.39dBm,
FDD-LTE Band 12: 22.32dBm,

Type of Emission: FDD-LTE Band 13: 22.73dBm,
 FDD-LTE Band 25: 23.14dBm,
 FDD-LTE Band 26: 22.77dBm,
 FDD-LTE Band 66: 24.14dBm
 FDD-LTE Band 2: 1M80G7D, 1M80W7D
 FDD-LTE Band 4: 1M80G7D, 1M80W7D
 FDD-LTE Band 12: 1M30G7D, 1M30W7D
 FDD-LTE Band 13: 1M30G7D, 1M30W7D
 FDD-LTE Band 25: 1M80G7D, 1M80W7D
 FDD-LTE Band 26: 1M30G7D, 1M30W7D
 FDD-LTE Band 66: 1M80G7D, 1M80W7D
 Type of Modulation: QPSK, 16QAM
 Antenna Type: External Antenna
 FDD-LTE Band 2: 3dBi,
 FDD-LTE Band 4: 3dBi,
 FDD-LTE Band 12: 3dBi,
 Antenna Gain: FDD-LTE Band 13: 3dBi,
 FDD-LTE Band 25: 3dBi,
 FDD-LTE Band 26: 3dBi,
 FDD-LTE Band 66: 3dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, 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.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

1.3 MPE Calculation Method

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

S = power density (in appropriate units, e.g., mw/cm²)

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

For FDD-LTE Band 2:

Maximum Tune-Up output power: 23.5 (dBm)

Maximum peak output power at antenna input terminal: 223.87(mW)

Prediction distance: >20(cm)

Prediction frequency: 1880.0 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0889 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For FDD-LTE Band 4:

Maximum Tune-Up output power: 24.0 (dBm)

Maximum peak output power at antenna input terminal: 251.19(mW)

Prediction distance: >20(cm)

Prediction frequency: 1752.5 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0997 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For FDD-LTE Band 12:

Maximum Tune-Up output power: 23.5 (dBm)

Maximum peak output power at antenna input terminal: 223.87(mW)

Prediction distance: >20(cm)

Prediction frequency: 711.0 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0889 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.474 (mw/cm²)

For FDD-LTE Band 13:

Maximum Tune-Up output power: 24.0 (dBm)

Maximum peak output power at antenna input terminal: 251.19(mW)

Prediction distance: >20(cm)

Prediction frequency: 782.0 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0997 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.5213 (mw/cm²)

For FDD-LTE Band 25:

Maximum Tune-Up output power: 24.0 (dBm)

Maximum peak output power at antenna input terminal: 251.19(mW)

Prediction distance: >20(cm)

Prediction frequency: 1905.0 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0997 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For FDD-LTE Band 26:

Maximum Tune-Up output power: 23.5 (dBm)

Maximum peak output power at antenna input terminal: 223.87(mW)

Prediction distance: >20(cm)

Prediction frequency: 831.5 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0889 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.5543 (mw/cm²)

For FDD-LTE Band 66:

Maximum Tune-Up output power: 24.5 (dBm)

Maximum peak output power at antenna input terminal: 281.84(mW)

Prediction distance: >20(cm)

Prediction frequency: 1745.0 (MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.1119 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Result: Pass