

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: Bushnell Holdings Inc
Address of applicant: Bushnell Holdings Inc.9200 Cody, Overland Park, KS 66214
USA N/A

Manufacturer: KEEPWAY INDUSTRIAL(ASIA)CO.,LTD
Address of manufacturer: Flat D,8/F.,SuccessInd.Bld G.,No.17 SheungHeiSt., San Po Kong, Kowloon, Hong Kong

General Description of EUT:

Product Name: CelluCORE 24
Trade Name: /
Model No.: 119906
Adding Model(s): 119906A,119906V
Software Version: BS881NC2Dx19202.014
Hardware Version: KT8810MV03
Rated Voltage: Adapter DC12V; 12x AA batteries
FCC ID: 2ASQI-KW881
Equipment Type: Mobile

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,
Uplink Frequency: 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,
Downlink Frequency: FDD-LTE Band 25: Rx: 1930-1995MHz,
FDD-LTE Band 26: Rx: 824-849MHz,
FDD-LTE Band 26: Rx: 859-869MHz,
FDD-LTE Band 66: Rx: 2110-2200MHz
RF Output Power: FDD-LTE Band 2: 21.74dBm,

FDD-LTE Band 4: 23.56dBm,
FDD-LTE Band 12: 23.02dBm,
FDD-LTE Band 13: 22.71dBm,
FDD-LTE Band 25: 22.58dBm,
FDD-LTE Band 26: 22.96dBm,,
FDD-LTE Band 66: 22.98dBm
FDD-LTE Band 2: 1M81G7D, 1M81W7D
FDD-LTE Band 4: 1M9G7D, 1M9W7D
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 Emission: QPSK, 16QAM

Type of Modulation: External Antenna

Antenna Type: 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 equivalent 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: 22.0(dBm)

Maximum peak output power at antenna input terminal: 158.49 (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: 0.0629 (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: 1732.5(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: 24.0(dBm)

Maximum peak output power at antenna input terminal: 251.19 (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: 0.0997 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.4740 (mw/cm²)

For FDD-LTE Band 13

Maximum Tune-Up output power: 23.0(dBm)

Maximum peak output power at antenna input terminal: 199.53 (mW)

Prediction distance: >20(cm)

Prediction frequency: 784.5(MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0792 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.5230 (mw/cm²)

For FDD-LTE Band 25

Maximum Tune-Up output power: 23.0(dBm)

Maximum peak output power at antenna input terminal: 199.53 (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: 0.0792 (mw/cm²)

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

For FDD-LTE Band 26

Maximum Tune-Up output power: 23.0(dBm)

Maximum peak output power at antenna input terminal: 199.53 (mW)

Prediction distance: >20(cm)

Prediction frequency: 819.0(MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0792 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 0.5460 (mw/cm²)

For FDD-LTE Band 66

Maximum Tune-Up output power: 23.0(dBm)

Maximum peak output power at antenna input terminal: 199.53 (mW)

Prediction distance: >20(cm)

Prediction frequency: 1712.5(MHz)

Antenna gain: 3 (dBi)

Directional gain (numeric gain): 2.00

The worst case is power density at prediction frequency at 20cm: 0.0792 (mw/cm²)

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

Result: Pass