

MPE Estimates

System Description

CK61 hand held computer with the addition of IP30, RFID hand grip scanner

The CK61 is a hand held computer. The unit contains WLAN and Bluetooth radios.

FCC ID: EHA802UIAG 802.11 abg

FCC ID: HN2-BTM311 Bluetooth

The IP30 is a RFID hand grip option. It contains the IM4 RFID PC Card and Bluetooth Radios

FCC ID: EHAIM4 915 MHz

FCC ID: EHA-BTM4 Bluetooth

The radios all transmit on separate antennas.

The WLAN or Bluetooth radios operates at anytime when the CK61 is connected to the IP30, operation against the head or body is not considered normal when the IP30 is used to read RFID tags as the IP30 should be aimed toward those tags.

The IP30 RFID scanner is operated by the user only when in the hand.

The user manual instruct to provide for a separation distance of 23-cm or greater distance between the CK61/IP30 system antennas and the head or torso of the user or near by persons.

Radio Disc / Rule	MHz -	MHz	Watts (Conducted)
CK61			
802.11abg radio FCC ID: EHA802UIAG		IC: 1223A-802UIAG	
15C	2412	2462	0.045
15E	5180	5240	0.043
15E	5260	5320	0.053
15E	5745	5805	0.029
Bluetooth Radio FCC ID: HN2-BTM311		IC: 1223A-BTM311	
15C	2402	2480	0.00869
IP30			
RFID radio FCC ID: EHAIM4		IC: 1223A-IM4	
15C	902.75	927.25	0.861
Bluetooth Radio FCC ID: EHA-BTM4		IC: 1223A-BTM4	
15C	2402	2480	0.00964

Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population. The exposure level at the distance listed from the EUT's transmitting antenna is calculated using the general equation:

Calculations	cm	inches
	23.0	9.06

The exposure level at a 23 cm distance from the EUT's transmitting antenna is calculated using the general equation (See OET 65, Page 19, Eq. 4):

$$S = (PG)/4PIR^2$$

Where: S = power density (mW/cm²)

P = power input to the antenna (mW)

G = numeric power gain relative to an isotropic radiator

R = distance to the center of the radiation of the antenna (23 cm = limit for this MPE estimate)

PG = EIRP

Solving for S, the maximum power densities 23 cm from the transmitting antennas are summarized in the following tables:

802.11abg Radio CK61 antenna with highest power frequency band worst case EIRP

FCC ID: EHA802UIAG

IC: 1223A-802UIAG

Calculation for exposure at 23cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 23cm mW/cm ²	Pwr Density Limit mW/cm ²	Power Density Ratio
Intermec CK61	linear	CAF28977	2450	45.000	2	0.0107	1.0	0.010729
Intermec CK61	linear	CAF28977	5300	53.000	4	0.0200	1.0	0.020027

Bluetooth
 FCC ID: HN2-BTM311
 IC: 1223A-BTM311

CK61 Bluetooth chip antenna worst case EIRP

Calculation for exposure at 23cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 23cm mW/cm ²	Pwr Density Limit mW/cm ²	Power Density Ratio
on board chip	linear	NA	2450	8.690	2	0.0021	1.0	0.002072

RFID Radio
 FCC ID: EHAIM4
 IC: 1223A-IM4

IP30 yagi antenna worst case EIRP

Calculation for exposure at 23cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 23cm mW/cm ²	Pwr Density Limit mW/cm ²	Power Density Ratio
Intermec IP30	yagi	NA	902	861.000	5.2	0.4289	0.601	0.713614

Bluetooth
 FCC ID: EHA-BTM4
 IC: 1223A-BTM4

IP30 Bluetooth PC trace antenna worst case EIRP.

Calculation for exposure at 23cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 23cm mW/cm ²	Pwr Density Limit mW/cm ²	Power Density Ratio
PC trace	microstrip	NA	2450	9.640	0	0.001450	1.0	0.001450

Co-Located Transmitter Calculation of RF Exposure

Per FCC TCB Training April 3, 2002

“Devices operating in multiple frequency bands

When RF exposure evaluation is required for TCB approval

Separate antennas – estimated minimum separation distances may be considered for the frequency bands that do not require evaluation or TCB approval, however, the estimated distance should take into account the effect of co-located transmitters. (Note 24)

Note 24 According to multiple frequency exposure criteria, the ratio of field strength or power density to the applicable exposure limit at the exposure location should be determined for each transmitter and the sum of these ratios must not exceed 1.0 for the location to be compliant.”

Worst Case Exposure for CK61 / IP30 when using co-located transmitters.

Calculation for exposure at 23cm distance

Transmitter FCC ID: Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 23cm mW/cm ²	Pwr Density Limit mW/cm ²	Power Density Ratio
FCC ID: EHA802UIAG CK61 linear	linear	CAF28977	5300	53.0	4	0.0200	1.0	0.0200
FCC ID: HN2-BTM311 Internal chip	chip	NA	2450	8.7	2	0.0021	1.0	0.0021
FCC ID: EHAIM4 IP30 yagi	yagi	NA	902	861.0	5.2	0.4289	0.601	0.7136
FCC ID: EHA-BTM4 PC trace	microstrip	NA	2450	9.6	0	0.0015	1.0	0.0015
							ratio limit	
Total							1.0	0.7372

The worst case configuration for all combinations of co-located transmitters and antennas are shown. In all cases the ratio of exposure compared the limit when totaled does not exceed 1.0.