

**EIRP Calculation of RF Exposure**

**CRF 47 Part 15.247 (b)(5)**

(b)(5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See Sec. 1.1307(b)(1) of this chapter.

**CRF 47 Part 15.407(f)**

(f) U-NII devices are subject to the radio frequency radiation exposure requirements specified in Sec. 1.1307(b), Sec. 2.1091 and Sec. 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

The CV60 is a vehicle mount computer. The user and installation manuals instruct to provide for a separation distance of 20-cm or greater distance between the CV60 antennas and the body of the user or near by persons. The CV60 802.11abg and Bluetooth(TM) radios transmit on separate antennas.

Radio Disc / Rule	MHz - MHz	Watts (Conducted)
<b>802.11abg radio FCC ID QDS-BRCM1017</b>		
15C	2412.0 - 2472.0	0.082
15C	5745.0 - 5825.0	0.026
15E	5180.0 - 5240.0	0.019
15E	5260.0 - 5320.0	0.027

<b>Bluetooth Radio FCC ID: EHABTM-210</b>		
15C	2402.0 - 2480.0	0.0005

**Calculations**

The exposure level at a 20 cm distance from the EUT's transmitting antenna is calculated using the general equation (See OET 65, Page 19, Eq. 4):

$$S = (PG)/4\pi R^2$$

Where: S = power density (mW/cm<sup>2</sup>)

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 (20 cm = limit for MPE estimates)

PG = EIRP

Solving for S, the maximum power densities 20 cm from the transmitting antennas are summarized in the following tables:

802.11abg Radio                      CV60 antenna with highest power co-located transmitter operational  
FCC ID: QDS-BRCM1017  
IC: 4324A-BRCM1017                      Calculation for exposure at 20cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 20cm mW/cm <sup>2</sup>	Pwr Density Limit mW/cm <sup>2</sup>	Power Density Ratio
Intermec CV60	linear	805-615-304	2450	82.00000	1	0.02054	1.0	0.02054

Bluetooth                                      Integral antenna of the radio worst case EIRP.  
FCC ID: EHABTM210  
IC: 1223A-BTM210                      Calculation for exposure at 20cm distance

Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 20cm mW/cm <sup>2</sup>	Pwr Density Limit mW/cm <sup>2</sup>	Power Density Ratio
Internal	chip	NA	2450	0.558000	2.17	0.000183	1.0	0.000183

**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 CV60 when using internal co-located transmitters.

Calculation for exposure at 20cm distance

Transmitter FCC ID: Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	Peak Conducted Power (mW)	Gain (dBi)	Pwr Density @ 20cm mW/cm <sup>2</sup>	Pwr Density Limit mW/cm <sup>2</sup>	Power Density Ratio
FCC ID: QDS-BRCM1017 CV60 linear	panel	NA	2450	82.000000	1	0.020537	1.0	0.020537
FCC ID: EHABTM210 Internal chip	chip	NA	2450	0.558000	2.17	0.000183	1.0	0.000183
							ratio limit	
Total							1.0	0.020720

**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.**

**ERP Calculation of RF Exposure**

ERP is sometimes preferred. The calculation as the Sum of the ERP of the co-located transmitters is in the table below. ERP TX1 + ERP TX2

Worst Case Exposure for IV6 when using internal co-located transmitters.

Calculation for exposure at 20cm distance

Transmitter FCC ID: Antenna Description	Antenna Type	Antenna Part No.	Transmit Freq. (MHz)	ERP Power (mW)		Pwr Density @ 20cm mW/cm <sup>2</sup>	Pwr Density Limit mW/cm <sup>2</sup>	Power Density Ratio
FCC ID: QDS-BRCM1017 CV60 linear	panel	NA	2450	62.940000	0	0.012522	1.0	0.012522
FCC ID: EHABTM210 Internal chip	chip	NA	2450	0.560000	0	0.000111	1.0	0.000111
Total				63.500000		0.012633		
							ratio limit	
Total							1.0	0.012633

**The worst case configuration for ERP combinations of co-located transmitters and antennas is shown. The ratio of exposure compared the limit when totaled does not exceed 1.0.**

**Please note that EIRP = ERP x 1.64, so EIRP data presented is worst case.**