

SAR Calculations for Bluelight

Bluelight Maximum Transmit Power(P_t) = +8 dBm

Bluelight Max Antenna Gain (G_t) = +5.5 dBi

Bluelight EIRP_{max} = $P_t + G_t = 13.5 \text{ dBm} = 22.4 \text{ mW}$

The worst case transmit duty cycle for a data only Bluetooth device would be transmission of DH5 packets in a piconet with one other user. In that case, the transmit duty cycle would be 76.1%. The average power for DH5 packets would be:

$\text{EIRP}_{\text{max}} \times .761 = 17.05 \text{ mW} = +12.32 \text{ dBm}$

The specification for SAR is 1mW/cm². If there is 12.32 dB of space loss, the signal from Bluelight would be 0 dBm or 1 mW. The range 12.32 dB of space loss at 2402 MHz (lowest Bluetooth frequency) can be calculated by the equation:

$$L_s = [(4\pi d)/\lambda]^2$$

Where λ = wavelength = c/f and d =range in meters

For $L_s = 12.81$ and $f=2402 \text{ MHz}$, $d= 1.58 \text{ inches}$

So, the incident signal will never be greater than 1 mW unless the body is within 1.58 inches of the Bluelight antenna. When the Compaq notebook is in use, the Bluelight antenna is at the top of the display within the multiport module, and the typical distance to the human body (hands on the keyboard) is 8 inches. It would be unnatural and uncomfortable to hold one's hand within 1.58 inches of the Bluelight antenna continuously. Therefore, it is unlikely that the allowed SAR levels will be exceeded.