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- An excellent and timely document is available on the Internet by an anonymous FTP from: **rtfm.mit.edu**, **/pub/usenet-by-group/news.answers/powerlines-cancer-faq/part1** and **part2**.
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- **Amateur Radio RF Safety Calculator**
- **v1.2 (2015-08-18) by Paul Evans, VP9KF , Hintlink Technology**
- **Calculate Radio Frequency Power Density The average power at the antenna:**
  In watts
  **The antenna gain in dBi:**
  Enter 2.2 for dipoles; add 2.2 for antennas rated in dBd
  **The distance to the area of interest:**
  From the centre of the antenna, in feet
  **The frequency of operation:**
  In MHz

- **Ground Reflection Effects**
  In most cases, the ground reflection factor is needed to provide a truly worst-case estimate of the compliance distance in the main beam of the antenna. Including the ground reflection effects may yield more accurate results especially with very low antennas, non-directional antennas, and calculations below the main lobe of directional antennas.Do you wish to include effects of ground reflections? Yes No
- This is a main beam power density estimation program intended for use as part of a routine evaluation of RF safety compliance with FCC regulations. Amateur Radio operators licensed by the Federal Communications Commission of the United States of America are required to do a "routine evaluation" of the strength of the RF fields around their stations, subject to certain exemptions. These rules can be found in the FCC's ET Docket No. 93-62. More information can be found at the ARRL Website RF Safety page. This program uses the formulas given in FCC OET Bulletin No. 65 to estimate power density in the main lobe of an antenna, with use of the EPA-recommended ground reflection factor as an option. This program is intended for approximate far-field calculations. It may overestimate the actual field strength of high-gain antennas in the near field (within several wavelengths of the antenna.) However, it may also underestimate the strength of fields that may be encountered in *hot spots* in the near field. No computer program can predict where wiring or reflective objects may create hot spots in your particular installation. This is a World Wide Web front end for a public domain program written by **W4/VP9KF** using PHP. This program was derived from a public domain BASIC program written by Wayne Overbeck N6NB and published in the January, 1997 issue of *CQ VHF*, p. 33. Terms: GNU Licence.
- **No Warranties:** This information is provided "as is" without any warranty, condition, or representation of any kind, either express or implied, including but not limited to, any warranty respecting non-infringement, and the implied warranties of conditions of merchantability and fitness for a particular purpose. In no event shall we be liable for any direct, indirect, special, incidental, consequential or other damages howsoever caused whether arising in contract, tort, or otherwise, arising out of or in connection with the use or performance of the information contained on this web site.
- **Frequencies**
  **in MHzPeak Envelope**
  **Power in**
  **Watts**1.800 - 2.000
- 500
- 3.500 - 4.000
- 500
- 7.000 - 7.300
- 500
- 10.100 - 10.150
- 425
- 14.000 - 14.350
- 225
- 18.068 - 18.168
- 125
- 21.000 - 21.450
- 100
- 24.890 - 24.990
- 75
- 28.000 - 29.700
- 50
- 50.000 - 54.000
- 50
- 144.000 - 148.000
- 50
- 222.000 - 225.000
- 50
- 420.000 - 450.000
- 70
- 902.000 - 928.000
- 150
- 1240.000 - 1300.000
- 200
- 2300.000 and higher
- 250
- **Exemptions**
  **to Routine RF Radiation Evaluations**
- On 1997-08-27, in the Second Memorandum and Order, the FCC adopted a sliding scale for categorical exemption to routine RF radiation compliance testing based on peak envelope power (PEP) at various Amateur Radio operating frequencies. While the RF radiation exposure compliance levels are based on average power, the categorical exemptions from the requirement for periodic station compliance testing are based upon peak envelope power (PEP). Stations operating at or below these respective PEP levels are categorically excluded from having to perform a routine RF radiation evaluation. However, **all stations**, regardless of power level, still must comply with the RF exposure limits.
- **Average Power Estimate**
- Amateurs are required to perform a routine evaluation of the strength of the RF fields around their stations, subject to certain exemptions based on peak envelope power (PEP) levels at the various amateur bands. However, the FCC regulations on permissible RF exposure are not based on peak envelope power (PEP), but on average power over a 30 minute time period for uncontrolled environments, or a 6 minute time period for controlled environments. The part of the regulations that determine whether a station operator must perform a periodic evaluation, however, is based on PEP. **Operating ModeDuty Factor**Morse code (CW)
- 40%
- SSB phone
- 20%
- FM
- 100%
- RTTY/Digital
- 100%
- AM
- 100%
- To estimate your average power, first start with your Peak Envelope Power (PEP). Multiply that by the **duty factor** for the mode you are using, then by the maximum percentage of time you expect to operate within the averaging period. For example, if you operate a 1500 watt PEP SSB phone station that is on for 10 minutes, off for 10 minutes and on for 10 minutes, you are operating with 200 watts average power (1500 watts PEP * 20% * 67% = 200 watts average power) over a 30 minute period. If you operate a 1500 watt Morse Code (CW) station over the same time period, you have 1500 watts PEP * 40% * 67%, or 400 watts average power. In most cases for the 6 minute controlled environment exposure estimate, you should probably assume that it is possible to operate over the entire 6 minute period, so the 1500 watt PEP SSB phone station would be 300 watts average power for controlled-exposure calculations. An RTTY or digital bulletin station, or FM repeater transmitter, would probably be on for the full 30 minute time period, so the RTTY bulletin station or FM repeater would be 1500 watts average power. If it operated 10 minutes on, 10 minutes off and 10 minutes on, it would have 1000 watts average power over 30 minutes.

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