

Preparation for the EMC Testing of Wireless Devices Northwest EMC, Inc.

Radiated Emissions

1. The radio's software and / or firmware should be capable of the following operational modes. It is important to note that for each mode, continuous uninterrupted operation is required:
 - Transmit or receive continuously while operating at a single channel (FCC exempts receivers that operate above 960 MHz and below 30 MHz – Canada and Europe do not). For frequency hoppers, this means without the carrier hopping. The operating channel should be selectable from the lowest, middle, and the highest channels available. The transmitted carrier must be modulated. If a variety of modulation rates are available, they should be selectable from the lowest, middle and the highest modulation rates available. The data should be pseudo-random. All "1"s, all "0"s, or alternating "1010101..." could be worse case, but is not required by the regulatory agencies. If a variety of transmitted output power levels are available, they should be selectable from the lowest, the middle, and highest output power levels available.
2. The highest gain antenna of each type, as well as the lowest gain antenna of all the antennas specified with the unit must be tested.
3. Any ancillary equipment required to operate the radio such as personal computers should be dedicated for that use until testing is completed. If the radio has a wired interface (e.g. USB) with a personal computer, the radio will also be tested for compliance as a PC peripheral to the applicable ITE specifications. This testing requires the radio to be tested as part of complete PC system, so it is important to supply a PC (or notebook) that is known to have low emissions.
4. In the case of a radio that uses OOK modulation seeking certification under FCC 15.231, the radio should be configured for un-modulated, continuous-wave (CW) operation. Peak measurements are made with the average data numerically derived based upon a duty cycle correction factor. The duty cycle correction factor is measured on a second unit that is configured for normal operation.

Antenna Port Emissions

5. The radio's software and / or firmware should be capable of the following operational modes. It is important to note that for each mode, continuous uninterrupted operation is required:
 - Same mode required for radiated emissions (see above).
- Also
- For frequency hoppers, the hopping mode typical of normal operation. All hopping channels specified for normal operation must be used. If a variety of modes are available, they should be selectable.
6. A provision should be made to allow the direct connection of the radio's antenna port (RF output port) to a spectrum analyzer. This usually entails modifying a second unit (different than the radio used for radiated emissions testing). A standard female RF connector (e.g. SMA female) is soldered to the RF output port in place of the antenna.

Immunity Testing

7. European requirements include immunity testing with the radio both transmitting and receiving. The radio and associated equipment should be configured for typical operation and a means provided for monitoring the radio link. For example, in the case of a wireless network where the client radio is the equipment under test, it should be configured to continuously "ping" a remote access point. The pinging can be monitored to see if the link is degraded or broken as a result of the immunity test.

Information to Supply NWEMC Prior to Testing

- a. Complete operating instructions to perform the testing described above.
- b. Expected maximum output power level (either peak conducted, EIRP, or ERP)
- c. The channel number and center frequency of the lowest, the middle, and the highest transmit frequencies
- d. The peak antenna gain (dBi) for all of the antennas to be used with the radio
- e. For testing to European requirements, specify the operating temperature range of your radio and its intended environment (e.g. indoor use only, or both indoor and outdoor use).
- f. For battery operated equipment, specify the type of battery (e.g. lithium ion), full charge voltage, and discharge voltage where the radio stops functioning.
- g. In the case where a previously approved radio module is used, the FCC ID numbers and any applicable test reports.

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