

RF Safety Standards and Guidelines

A Motorola Report on RF Safety and Compliance

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Research on the possible health effects of exposure to radiofrequency (RF) energy dates back more than 50 years and will continue for the foreseeable future. As research adds to the extensive scientific knowledge in this important area, we believe it will further strengthen the basis for public confidence in the safety of current and future wireless communications technologies.

Confidence in safety results from decades of experience and scientific research. It is strengthened by the existence of rigorous, science-based standards and guidelines. Developed by independent panels of experts, these guidelines recommend limits for safe human exposure to radio waves. Motorola product lines are designed, built and tested to operate within these limits.

Who Sets Exposure Standards and Guidelines?

Globally, the two leading organizations are the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and the Institute of Electrical and Electronics Engineers (IEEE). The European Union (EU), numerous countries outside the EU and the World Health Organization (WHO) have endorsed or adopted ICNIRP-based RF exposure limits. The United States, Canada, Korea and Taiwan have exposure limits based in whole or in part on the IEEE standard. An extensive IEEE standard review recently resulted in the adoption of RF exposure limits more closely aligned with those recommended by ICNIRP. This decision reflected the reliance of both organizations on a common scientific knowledge base.

How Are These Standards and Guidelines Determined?

Standard setting begins with an evaluation of all available published research on the possible biological effects of exposure to radio waves. From that research, scientists have identified an exposure threshold for known adverse health effects. Exposures above this threshold have been shown to cause heat- and stress-related effects, as the body absorbs more energy than it can naturally dissipate through blood flow and other thermoregulatory processes. Expert reviews have found no evidence of heat- or stress-related effects or of any adverse effects unrelated to heat or stress at exposures below the threshold.

Standard-setting organizations apply substantial "safety factors" in establishing limits for workers and the general public. The ICNIRP and IEEE whole-body exposure limits for workers are 10 times below the accepted threshold for adverse effects. Limits for the general public are placed at 50 times below the threshold level to account for age, health and other physical differences from those working around RF equipment, such as transmission sites. Both groups – workers and the public – are protected by limits set well below the point where any adverse health effects have been found to exist.

The ICNIRP guidelines and the IEEE standard use a measurement known as Specific Absorption Rate (SAR) in setting exposure limits for wireless phones and other portable radio products. SAR is the ratio of energy per mass of the body or tissue exposed to RF energy and is expressed as watts per kilogram (W/kg) or milliwatts per gram (mW/g). ICNIRP and IEEE prescribe other Maximum Permissible Exposure (MPE) limits for whole-body exposure, most

relevant to base station sites and other fixed radio transmission facilities, and for localized exposures more relevant to portable radio products.

How Are These Standards and Guidelines Applied?

Numerous scientific expert reviews in recent years have affirmed the adequacy of the ICNIRP and IEEE limits. They continue to echo the conclusion by ICNIRP that "there is no substantive evidence that adverse health effects, including cancer, can occur in people exposed to levels at or below the limits" prescribed by ICNIRP or, by extension, by IEEE. In the United Kingdom, the National Radiological Protection Board (NRPB) stated: "On the basis of current safety standards for radiofrequency radiation, the use of such hand-held radio telephones does not present a health hazard." The U.S. Federal Communications Commission (FCC) stated that its IEEE-based exposure guidelines "represent the best scientific thought and are sufficient to protect the public health." Advice from the U.S. Food and Drug Administration (FDA) states that "the scientific evidence does not show a danger to users of wireless phones, including children and teenagers."

Laboratory testing confirms that Motorola portable communications products operate within applicable standards and guidelines. Handheld wireless phones meet these standards, in part, because they operate at minimal power levels. Vehicle-installed telephones and other installed radio devices also operate at relatively low power and are operated in such a fashion that physical separation between the user and the antenna keep RF exposures within recognized limits. In the case of radio transmitters and base station sites that may be placed on towers, rooftops or elsewhere, restrictions on physical access and other measures help assure that RF exposures remain within accepted limits. At ground level, measurements confirm that public exposures are far below established safety limits.

As underscored by ICNIRP, WHO and national government assessments from Australia, Canada, France, Germany, Japan, New Zealand, Sweden, the Netherlands, the United States and the United Kingdom, existing standards are reliable safeguards of public health. They are based on a large and ever-expanding base of scientific evidence covering a broad range of possible biological effects. Standard setting is a dynamic process. Existing guidelines regularly are reviewed against the latest accumulated research to assure that they reflect the best and latest scientific knowledge. That is a sound basis for confidence in the protection afforded by these standards – and in the safety of Motorola products.

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About Motorola

Motorola is known around the world for innovation and leadership in wireless and broadband communications. Inspired by our vision of Seamless Mobility, the people of Motorola are committed to helping you get and stay connected simply and seamlessly to the people, information, and entertainment that you want and need. We do this by designing and delivering "must have" products, "must do" experiences and powerful networks -- along with a full complement of support services. A Fortune 100 company with global presence and impact, Motorola had sales of US \$36.8 billion in 2005. For more information about our company, our people and our innovations, please visit www.motorola.com