

<https://www.fcc.gov/consumers/guides/specific-absorption-rate-sar-cell-phones-what-it-means-you>

## Specific Absorption Rate (SAR) For Cell Phones: What It Means For You

Español

There is considerable confusion and misunderstanding about the meaning of the maximum reported Specific Absorption Rate (SAR) values for cell phones (and other wireless devices). SAR is a measure of the rate of RF (radiofrequency) energy absorption by the body from the source being measured – in this case, a cell phone. SAR provides a straightforward means for measuring the RF exposure characteristics of cell phones to ensure that they are within the safety guidelines set by the FCC.

Many people mistakenly assume that using a cell phone with a lower reported SAR value necessarily decreases a user's exposure to RF emissions, or is somehow "safer" than using a cell phone with a high SAR value. While SAR values are an important tool in judging the maximum possible exposure to RF energy from a particular model of cell phone, a single SAR value does not provide sufficient information about the amount of RF exposure under typical usage conditions to reliably compare individual cell phone models. Rather, the SAR values collected by the FCC are intended only to ensure that the cell phone does not exceed the FCC's maximum permissible exposure levels even when operating in conditions which result in the device's highest possible – but not its typical - RF energy absorption for a user.

### SAR Testing

SAR testing uses standardized models of the human head and body that are filled with liquids that simulate the RF absorption characteristics of different human tissues. In order to determine compliance, each cell phone is tested while operating at its highest power level in all the frequency bands in which it operates, and in various specific positions against the dummy head and body, to simulate the way different users' typically hold a cell phone, including to each side of the head. To test cell phones for SAR compliance, the phone is precisely placed in various common positions next to the head and body, and a robotic probe takes a series of measurements of the electric field at specific pinpoint locations in a very precise, grid-like pattern within the dummy head and torso. All data for each phone placement are submitted as a part of the equipment approval test report for final authorization. However, only the highest SAR values for each frequency band are included in the final authorization to demonstrate compliance with the FCC's RF guidelines.

### What SAR Shows

The FCC requires that cell phone manufacturers conduct their SAR testing to include the most severe, worst-case (and highest power) operating conditions for all the frequency bands used in the USA for that cell phone. The SAR values recorded on the FCC's authorization and in the cell phone manual to demonstrate compliance with Commission rules indicate only the highest single measurement taken for each frequency range that the particular model uses. FCC approval means that the device will never exceed the maximum levels of consumer RF exposure permitted by federal guidelines, but it does not indicate the amount of RF exposure consumers experience during normal use of the device. While only the maximum SAR values are used for FCC approval, all test reports submitted by the manufacturer are available in full for public inspection on the Commission's website.

### What SAR Does Not Show

The SAR value used for FCC approval does not account for the multitude of measurements taken during the testing. Moreover, cell phones constantly vary their power to operate at the minimum power necessary for communications; operation at maximum power occurs infrequently. Consequently, cell phones cannot be reliably compared for their overall exposure characteristics on the basis of a single SAR value for several reasons (each of these examples is based on a reported SAR value for cell phone A that is higher than that for cell phone B):

Cell phone A might have one measurement that was higher than any single measurement for cell phone B. Cell phone

A would, therefore, have a higher reported SAR value than cell phone B, even if cell phone B has higher measurements than A in most other locations and/or usage configurations. In such a case, a user generally would receive more RF energy overall from cell phone B.

Cell phone A might communicate more efficiently than cell phone B, so that it operates at lower power than cell phone B would under comparable conditions. Consequently, a user would receive more RF energy overall from cell phone B.

The highest value from cell phone A might come from a position which the user seldom or never employs to hold a phone, whereas that user might usually hold a phone in the position that resulted in the highest value for cell phone B. Therefore, the user would receive the highest RF exposure that cell phone B delivers but would not receive the highest RF exposure that cell phone A delivers.

#### The Bottom Line

ALL cell phones must meet the FCC's RF exposure standard, which is set at a level well below that at which laboratory testing indicates, and medical and biological experts generally agree, adverse health effects could occur. For users who are concerned with the adequacy of this standard or who otherwise wish to further reduce their exposure, the most effective means to reduce exposure are to hold the cell phone away from the head or body and to use a speakerphone or hands-free accessory. These measures will generally have much more impact on RF energy absorption than the small difference in SAR between individual cell phones, which, in any event, is an unreliable comparison of RF exposure to consumers, given the variables of individual use.