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RF Shield Box

RF shielding in cell phone testing

Shielding is a must for handset repair.

Everyone is talking about UMTS: 3G (third generation mobile telephony) has finally arrived. And CDMA (code division multiple access) is starting to replace TDMA (time division multiple access) as the technology of choice. In contrast to GSM, several UMTS base stations can operate on the same frequency, allowing many more cell phones to be carried on the same channel.

There are 174 carrier frequencies for GSM 900, and more than 300 for GSM 1800/1900. This makes locating an unused channel for handset testing relatively straightforward-although the increasing saturation of the GSM market is steadily reducing the number of spare frequencies. With UMTS the problem is more acute. All mobile traffic is carried on just 12 channels, and unused frequencies are therefore few and far between not present. It is even so that the same frequency is used by multiple UMTS base stations.
But how can handsets be tested if there are no spare channels? Can reliable quality measurements be made on frequencies that are already in use?

Base station signal interferes with measurement

The number of cell phones with RF (radio-frequency) connections is in steady decline, and there is rarely adequate shielding. Where testing is carried out on frequencies also in use by local GSM or UMTS networks, this can negatively influence measurements.

For example, BER (bit-error rate) measurements can only be made on completely interference-free channels. Otherwise, any additional signals, such as those from base stations, increase background noise, which impedes the reception of test signals, distorting results. This can lead to phones being flagged as malfunctioning when actually in perfect working order – leading to lengthy, fruitless searches for the fault.

Interference can also occur between test benches, particularly where transmission quality is being tested on the same frequency by two neighbouring stations. Phase error measurements with low output levels are particularly prone to discrepancies, as signals may be received from adjacent devices, distorting the test signal and leading to a high phase error count.

Mobile phone testing interferes with network

From the network provider's point of view, however, far worse is the possibility that actual mobile traffic may be disrupted. If a handset broadcasts on a GSM control channel, for example, it can interfere with mobile traffic across the cell. Although problematic with GSM, it can be ruled out by regular checks. With UMTS, by contrast, the issue always arises, as 3G phones transmit continuous signals. Base stations control the strength of these signals to ensure that all handsets in the cell have reception but do not interfere with each other. If, during benchmark or final testing, a phone broadcasts on a frequency that is already in use, reception can be disrupted for local base stations using the same channel. This may lead to calls routed via this base station being dropped. Not only is this annoying for users and network operators, it is likely to lead to disputes between operators and repair shops.

Mobile phone tests interfere with each other

Testing and repair could be carried out within the confines of a Faraday cage. However, not only would this be prohibitively expensive, it would not eliminate disturbance from neighbouring test benches.

A more practical solution is the use of small shield boxes to isolate handsets from their immediate environment. RF shield boxes can insulate against signals of 60 dB and above, reducing both signals transmitted by the handset, and interference from the base station, to one millionth of the original. This virtually eliminates disruption, and avoids potential disputes between network operators and cell phone workshops. Moreover, testing can be carried out using all channels, allowing more rigorous and comprehensive testing.

Interference-free testing with RF Shield Box

Shielding is a must for handset repair

There is much more to RF shield boxes than metal insulation. The unique design maximises insulation and eliminates stationary standing waves and reflections within the container. RF waves can flow through cracks very easily. Non-earthed parts begin to oscillate, vibrate, allowing waves to travel through the walls of the box in both directions. Specially designed contacts and RF traps ensure no radio waves can penetrate or escape when the box is closed; quick and easy opening and closing mechanisms ensure no time is lost

during benchmark or functional testing. It is equally important to tackle internal waves. Metallic surfaces reflect radio waves, causing as much disturbance as external signals. As BER and phase error measurements can be very easily distorted for GSM phones, special absorbent shapes and materials, and precise dimensions are used to combat reflections and stationary waves. A good RF shield box provides an environment as close to real-life, open-air operation as possible. RF shield boxes allow users to make calls without interference, and phone repair companies to carry out precise tests in a controlled, insulated environment.

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