

Suitability of Consumer Software-defined Radios for Precompliance Radiated Emissions Testing

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Electromagnetic compatibility (EMC) testing is an important part of the electronic product development cycle and is used to determine if a product meets the regulatory requirements for interaction with the RF environment. Radiated emissions from products that are not designed for RF transmission are often a point of failure for meeting these requirements [Patrick G. André and Kenneth Wyatt, *EMI Troubleshooting Cookbook for Product Designers*, SciTech Publishing, 2014]. Precompliance tests are often performed on a product to determine if it is likely to fail official testing requirements. These measurements still require the use of expensive equipment such as spectrum analyzers and EMC antennas. Many low-cost precompliance techniques exist, but these techniques still require the use of a spectrum analyzer [Henry W. Ott, *Electromagnetic Compatibility Engineering*, John Wiley & Sons, 2009].

Software-defined radios (SDRs) have gained considerable popularity in recent years for their ability to sample and generate RF signals from a personal computer while allowing for software control of hardware receiver components. Commercial SDRs are designed to fit a wide-range of RF applications, but their capabilities far exceed the needs for radiated emission measurements when compared to spectrum analyzers. However, there are a variety of low-cost consumer SDRs that use far fewer hardware components to sample RF signals. While these are primarily used by amateur radio enthusiasts, this paper proposes their use in precompliance radiated emissions testing.

A process to reliably measure the radiated emissions of an electronic product with the SDRplay RSP2pro consumer SDR is shown. The performance of this consumer SDR's absolute power measurement capabilities in the 30 to 1000 MHz range has been characterized by a direct comparison to measurements performed with a spectrum analyzer. The repeatability of these measurements across a small sample of RSP2pro units is shown so that variations in power level readings can be investigated. Combining the RSP2pro with the use of common VHF and UHF antennas, a complete low-cost precompliance test setup will be demonstrated.