SunTech Medical: Improvements in Electromagnetic Compatibility for the Advantage OEM Module Series

For over 20 years, SunTech Medical, Inc. has been a leading provider of Blood Pressure technology to monitoring and defibulator companies. Our sole focus on blood pressure allows us to study various patient populations and to develop algorithms specific to the needs and environments of those patient groups. We are the only company with proprietary algorithms for auscultatory, oscillometric, stress, transport motion, patient motion, veterinary, dialysis, pediatric, neo-natal, ambulatory, geriatric, and bariatric applications. Our Advantage OEM Module Series provides for many of these applications in a single, robust platform.

Our monitors and modules are used in almost every environment where accurate BP is required. Each of these environments have different susceptibility and radiated emissions requirements. For instance, a pre-hospital transport device has need of a module with fewer emissions and reduced susceptibility than a home healthcare device. This is due to higher levels of Electromagnetic Interference (EMI) within the transport environment.

Our original Advantage Model 2 module is a 2-layer PCB which is used in most environments with no EMC problems. Certain environments such as pre-hospital transport may require a more robust design. In order to meet these needs, we developed a 4-layer Model 2 module with additional hardware to reduce emissions and susceptibility. Ground and power planes were added in addition to numerous filter and bypass capacitors as well as inductors. To further improve the susceptibility, protective circuitry was added to several I/O lines to specifically reduce the risk of failure due to electrostatic discharge (ESD).

The graphs in figure 1 show how these changes improved the radiated emissions. The first graph shows noise conducted into the chamber from other sources. The second and third graphs show noise emitted from the 2-layer and 4-layer Model 2 modules in “idle” mode where the processors are operating but the pump and valves are not energized. The limit line printed on the figure 1 graphs is the “B” limit (as defined by EN55011:1998) rather than the “A” limit (the “B” limit is the more stringent limit).

Thousands of these 4-layer Model 2 modules have been placed into the pre-hospital market and provide NIBP in ambulances and helicopters throughout the world.

Figure 1a: Noise conducted into the anechoic chamber from sources other than the unit under test(UUT), highest peak ~ 22dBµV

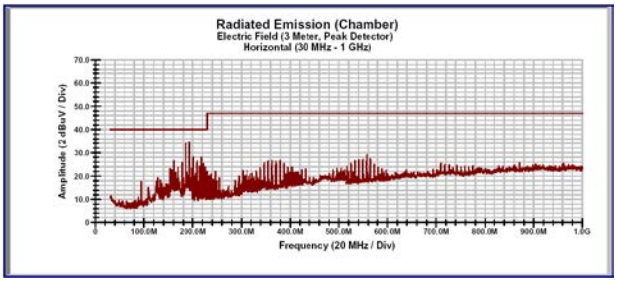


Figure 1b: Horizontal Scan of 2-layer Model 2 in “Idle” Mode, Highest Peak ~ 34dBµV

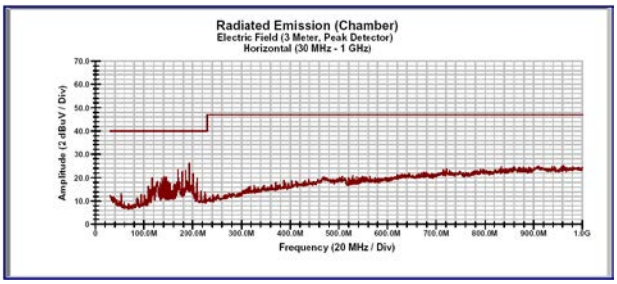
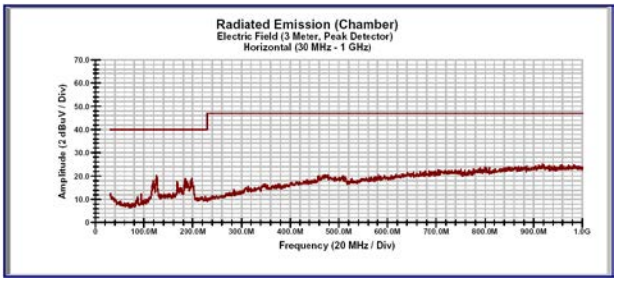


Figure 1c: Horizontal Scan of 4-layer Model 2 in “Idle” Mode, Highest Peak ~ 26dBµV



Future Improvements

As the latest regulatory standards require reductions in emissions and susceptibility, manufacturers must respond by implementing improvements that can respond to these requirements. SunTech is currently working on further EMC improvements by replacing the original analog amplification circuitry with a single higher resolution analog-to-digital(ADC) chip, re-designing the analog and digital ground planes, developing new ways of protecting I/O paths and investigating better designed components.