

An Innovative Way to Reduce Electromagnetic Interference

By Peter Alfke

Unwanted EMI (electromagnetic interference) can be difficult and expensive to control. Usually, designers simply shield their systems in order to comply with regulations. However there is another, less expensive alternative.

Most digital systems are clocked by a stable, 50% duty cycle, crystal-controlled frequency. This simplifies design, debugging, and timing margin analysis, but also generates a high level of EMI — at the clock frequency, its third harmonic, and its fifth harmonic.

By frequency-modulating the clock, you can spread the radiated energy over a wider

band and thus reduce the energy at any specific frequency. Spreading a 40 MHz clock frequency just $\pm 2.5\%$ (between 39 and 41 MHz) reduces the amplitude of the fundamental frequency by 9.5 dB, the third harmonic by 11.2 dB, and the fifth harmonic by 13.0 dB. It would take expensive shielding to achieve a similar reduction.

Many display systems and telecom devices cannot tolerate a frequency-modulated clock, but where applicable, a spread-spectrum clock can offer an inexpensive solution to a difficult problem.

International Microcircuits offers a number of low-cost crystal-controlled EMI-reducing oscillators. Visit their web site (www.imicorp.com) for more information. ♦