All Term Stability Frequency and Time Sources

An Interview with David Chandler, senior manager for product marketing and applications and Microchip Technology's Frequency and Time Systems business unit.

Microchip is presenting a session on "All-Term Stability." What does "All-Term Stability Frequency and Time Sources" Mean?

All-Term Stability Frequency and Time Sources refer to oscillators and other frequency and time standards that have a unique combination of excellent spectral purity or short-term stability, characterized by phase noise, and long-term stability, which is characterized by Allan Deviation and drift. Within specific size, weight, and power (SWAP) restrictions, you can find products that specialize in one of these requirements, but rarely would a solution provide best-in-class performance for both long and short-term stability within its SWAP domain. However, with the advent of significant GNSS denial, and other new demanding applications, customers need solutions that can provide best-in-class performance for both stability types.

Can you give examples of references that fit into this "All-Term Stability" group?

Microchip has several products geared towards "All-Term Stability." My colleague, Chris Higgins is giving a talk on these at ITSF this year. Without stealing too much of his thunder, I will give one example, the Low-Noise Chip-Scale Atomic Clock. This product is specifically designed to address customer demand for low power references that have monthly aging rates of less than 1 ppb per month and phase noise of less than -120 dBc/Hz at a 10 Hz offset. While we make units with better aging or better phase noise, the combination of both while only drawing 300 mW of power is very unique. On top of that it all fits into a 50 x 50 x 13 mm package.

How did Microchip manage to achieve that kind of performance in such a small footprint with such low power?

It is the combination of two of our products, the chip scale atomic clock (CSAC), and the evacuated miniature ovenized crystal oscillator (EMXO). We have several patents on both devices, and we are the only manufacturer in the world who makes both these types of products. We were able to reduce the overall size by combing the layouts of both products on to one board. Of course, there was a lot more than just a board layout. Significant modeling and circuit design were also needed to optimize the performance of the unit. Our customers have been really impressed with the results.

Can you give an example of an application that would need an “All-Term” stability oscillator?

Software defined radio (SDR) is a good example. The radios need the long-term stability of the CSAC so that they can work in a GNSS denied environment and still ensure they are transmitting on the correct frequency channels. They need good short-term stability to ensure a low bit error rate for the transmission. If the radio uses orthogonal frequency-division multiplexing to combat multipath issues, the demands on the close-to -carrier phase noise become significant. It would be difficult to achieve the performance requirements without using something like LNCSAC. Many of our customers previously would have to design in two separate frequency references to address both the long-term and short-term stability requirements for SDR, driving up the power and size of their solutions.

Are there any new products that Microchip will be unveiling at ITSF this year, possibly unrelated to the All-term stability products?

Yes, there are two particularly interesting new products that I think will gain a lot of attention this year. We are going to be debuting our entrance into the High Accuracy PTP time over ethernet solution. We will also be debuting a product that will provide a unique way of providing traceability directly to UTC. Please stop by our booth to learn more about these products and the all-term stability oscillators.