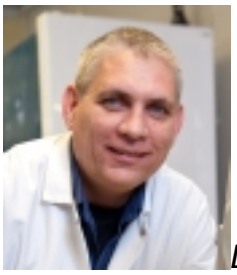
Brainstrorm: Oscillators/Timing Devices

Where in the design cycle is it best to spec in a timing device, and why?

Ramon Cerda, Vice President of Engineering, **Crystek Corporation**

The short answer is; as soon as possible. Most, if not all timing devices should be treated as long lead-times items. If the crystal oscillator manufacturer does not have your particular frequency and/or specification requirement in stock, it can take many weeks before they can deliver the timing device. There are very few manufacturing short cuts in the building of a quartz crystal. The writer has firsthand experience with important projects being delayed because of a twenty cents crystal. Throwing expediting fees at the last minute is no help. The systems/design engineers should contact the crystal oscillator manufacturer early in the design cycle. This is important not only for having a device in time but also to check what is the best timing unit for the specific application. As we all know, websites are sometimes difficult to maneuver and one can easily miss the best part for application. The “early bird” can save the company money by selecting the “right” part early. Hence, speaking with an application engineer may get you a better performing part on time, and at the lowest cost possible. Iteration of a selected timing device is sometimes necessary. This may be due to improved requirements now needed but not anticipated before or a frequency change. This is like starting over and these new requirement(s) should be communicated with the timing device manufacturer right away so they can keep up with your schedule.



David Kenny, Vice President Research & Development, **Pletronics, Inc.**

The best time to consider the timing device in the design cycle is at the very beginning. Too often the assumption is made that the timing device is an off-the-shelf component. If this is the case, it should be verified early. If this is not the case, the timing device could have significant lead time. Precision timing devices using quartz are dependent on the mechanical properties of quartz. If the particular frequency has not been previously configured, the lead-time for proper thickness blanks and associated masks can take 12-16 weeks. If the timing device is considered early enough in the design process, it may be possible to use an existing or slightly modified device and save time on time and cost by using the economy of scale by riding along with other timing products.

E.L. Fox, President, **Fox Electronics**

In short, the earlier in the design cycle, the better, especially with the advantages provided by today's configurable oscillator technologies. Timing device decisions are traditionally saved for the end stages of a design cycle, but configurable oscillator evaluation can offer unique engineering advantages when incorporated at the front end of the process.
Specifically, configurable quartz oscillators provide designers with additional options, due to their modular, flexible structure. When evaluated earlier in the design phase, configurable oscillators can be tailored to precise frequency requirements and tweaked as the design process evolves.

They can also be modified to accommodate changing stabilities, tolerances or power supply requirements depending on how the design progresses. Even the form factor might be adaptable, with appropriate allowances for heat dissipation in higher power, higher frequency designs.
Because the modular design of configurable oscillators utilizes stocked components in addition to an interchangeable building-block design, designers can receive test samples in a matter of days and full production runs in less than two weeks. And because these custom-tailored solutions can be delivered quicker, they are better equipped to accommodate last-minute adjustments if they consider their full range of options earlier in the oscillator design process.

Today's high-quality configurable oscillators, like Fox's XpressO family of crystal oscillators, deliver reliable performance across a full range of target frequencies from 0.75 MHz all the way up to 1.35 GHz. They also offer stabilities as tight as +/-20 ppm, reduce jitter to the range of 0.3 pS to 0.5 pS, satisfy voltage requirements down to 1.8 V, and offer package sizes down to 3.2 mm x 2.5 mm – at costs equal to or better than conventional quartz oscillator designs, and with very short order lead times.

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