Abstract

Mixed signal testing is still engineering intensive, an art form, and does not lend itself to a standard approach let alone a standard. In spite of this waveform descriptions do lend themselves to a standard, consequently mixed signal STIL should limit itself to the modest goal of a standard for arbitrary domain waveform descriptions that are consistent with the digital waveforms of the current STIL.

STIL for Mixed signal testing

The testing of a mixed signal device is one of the most difficult types of testing to define; some would say an art form. In general, standards are developed to focus on a common practice for a well understood problems set, not to define solutions to research problems.

If we look at the purpose for STIL, it is to define a standard way to describe a digital test. STIL achieved this goal because there was a common view of the basic nature of the test, that is to say the transitions between the test intent and the target tester is well understood for digital testing. As a consequence the ability to transport tests from one tester to another is relatively easy because the majority of the test intent is reflected in the tests on the tester.

In mixed signal testing the transform from test intent to target tester is much more obscure. The transform considers a minimum of the following:

- Tester instrumentation partitioning and capability
- Loadboard design - it becomes part of the tester
- DSP algorithm for response processing
- Waveforms

What lends itself to standardization? The first 2 in the list are the fundamental elements that cause the transform from the test intent to the target tester to become obscured. The loadboard circuits may be required by the device or there to deal with the particularities of an instrument in the tester and consequently may have little to do with describing the original test intent. The DSP algorithms are also difficult in that partitioning between the hardware and software may further obscure the original test intent. Whereas, waveforms are quite well understood and represent the best opportunity for standardization.

Since the transform from test intent to target tester has so many issues, lets look at standardization of the test intent as another opportunity.

Mixed signal test development is still very much a hand crafting process. Simulators are not often used except for the digital portions of the chip and the test engineer is left to uncover the transform between the digital and the analog. Analog-HDLs that permit working at higher level of abstraction than Spice and that really track implementation are still awaiting an analog synthesis technology. Mixed signal DFT is in its infancy although is starting to provide some guidance on tests, mostly as waveforms. Therefore, today’s technology does not lend itself to a standard for mixed signal test definition except for waveforms.

Conclusion

A mixed signal STIL should start with modest goals.

The first should be to define a common format for the definition of waveforms in various domains that is correlated to the digital data as defined in the current STIL. This would permit toolmakers, both from design and test, to leverage each others work without the burden of translating or transforming.

The second step would be to find the Holy Grail of test engineering managers, transportable test programs. To achieve this will require that design engineers use methods that test engineers can leverage. Until there is a common approach to verification of mixed signal designs we will not have a common way to define test intent, let alone test implementation. A mixed signal STIL standard should NOT address this until the design community has solved this problem for we have proven to ourselves that getting designer to do things for the benefit of test is a very difficult task that MUST add value to the design process to be successful.