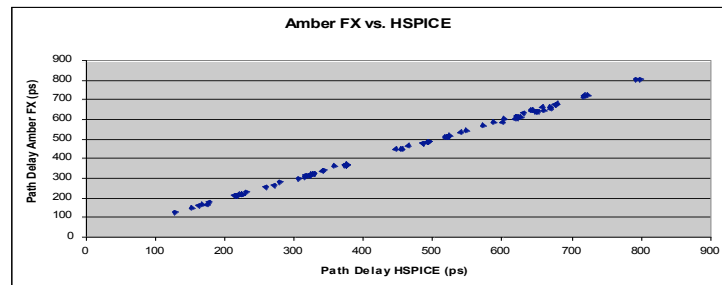


## Amber FX STA and FXM - Fast Transistor Model

Amber™ FX STA is a cell based static timing analyzer that delivers near SPICE accuracy combined with the threaded performance and capacity of the Amber™ Static Analysis tool suite.

The Amber FX STA is integrated into the Amber Analyzer tool suite and leverages its fully threaded, incremental and scalable architecture. The Amber Analyzer combines 10x to 100x throughput improvement over current tools, dynamic memory scaling for capacity, with the ability to consider multiple factors or corners simultaneously (timing, leakage, statistical variance, signal integrity), and advanced analysis and debug capabilities.

Amber FX STA uses a fast transistor model, FXM, which is accurate to within 2% of SPICE. This model addresses many of the known accuracy and characterization problems found in other models such as the non-linear delay (NLDM), current composite source (CCS) and effective current source (ECS) models.



Amber FX Analyzer addresses known limitations in the current static analysis flow:

1. **Speed vs. other Transistor STA tools:** Amber FX leverages the Amber Analyzer threaded architecture to deliver 10x or more faster, performance than existing transistor level timing solutions.
2. **Accuracy:** The Amber FXM transistor model is within 2% of SPICE or better. When compared with NLDM, Amber FX provides substantially better accuracy all process, temperature, parasitic conditions.
3. **Speed and Accuracy vs. other STA tools.** The Amber FX model can be used selectively - only when a timing condition is outside of accuracy range of NLDM or CCS. Then Amber FX is nearly as fast as Amber STA - 10x speed-ups over other timing tools with substantial improvements in accuracy.
4. **Capacity:** Amber uses dynamic memory scaling to facilitate full chip timing of the largest circuits in design today. Amber FX has been run on designs as large as 10m instances.
5. **Accurate Incremental:** 100x more throughput with “accurate” incremental capability. Allows users to make complex circuit changes from block level

hierarchy, to cell swap-outs to logic changes, and then incrementally calculate timing and signal integrity results. Most importantly, ***it gives exactly the same answer as if the entire design had been re-run***. Conventional tools claim incremental capability but provide incorrect results and radically limit the type of circuit changes that can be made.

6. **Scripting Compatibility:** Amber FX shares the same user interface, readers, reporting and constraint processing with the Amber Analyzer and is compatible with respect to existing scripts and flows. Unlike other transistor STA tools which require separate scripts and constraints, Amber FX fits in seamlessly in the timing flow.

The Amber fast transistor model, FXM, addresses known limitations in the existing libraries and models:

1. **Accuracy:** FXM is within 2% of SPICE for both delay and variance. It handles non-linear driver receiver effects, resistive interconnect, miller cap effects at receivers, propagation of complex waveforms and glitches, IR drop/simultaneous register switching, and multiple input switching.
2. **Characterization:** FXM is easy and fast to characterize. An entire library (10k unique transistors) can be characterized in a few hours. CCS or ECS characterization literally requires 100x more CPU hours.
3. **One view supports all applications:** Unlike CCS or ECS which require special views and characterization for each application (delay, noise, variance...), one FXM view supports all applications: delay, noise, variance, leakage, etc.
4. **Variance:** FXM supports local and global variance parameters for calculation of statistical timing. In addition, FXM is device area (length and width) accurate.
5. **Local Temperature and Voltage:** In addition to global temperature and voltage corners, users can set specific paths or regions to alternate temperature (i.e., a hotspot) and voltage values (IR drop) with FXM.

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