



SIEMENS DIGITAL INDUSTRIES SOFTWARE

The QA exchange deck in Solido Crosscheck enables an IP qualification handshake

Introduction

Designing an advanced system-on-chip (SoC) relies heavily on the ability to successfully integrate pre-designed IP blocks obtained from different suppliers. These IPs are often designed in parallel with the end-product, so multiple releases will be delivered to the SoC integration team during the design cycle. Each of these IP deliveries carries the risk of introducing delays to the integration due to missing models, inconsistent information between design formats, or EDA tool incompatibilities. An adequate quality assurance (QA) handshake between IP provider and integrator is needed to ensure that such disruptions are avoided.

This paper describes how the QA exchange deck in Siemens EDA's Solido™ Crosscheck software can be used to capture and exchange IP qualification requirements. We will show how the QA exchange deck can be used as part of the IP validation framework in Solido Crosscheck to provide an IP signoff handshake between IP suppliers and integrators.

The Solido Crosscheck QA exchange deck

The QA exchange deck is an input to Solido Crosscheck that describes what checks need to be executed on which IP databases as specified by the IP integrator.

The QA exchange deck describes what is required of an IP to be integrated as-is into an existing SoC design under construction. IP integrators can use this information to specify their needs on the following aspects of IP qualification:

- IP completeness: Which databases and models are required?
 - Are LEF, GDS2, OpenAccess, Verilog, and .lib models required for all IP?
 - Which IP blocks require a UPF specification?
- IP integrity: Are the various models intrinsically consistent?
 - Are all cell and terminal names properly reflected in all databases?
 - Do all cell dimensions and sizes align between .lib, LEF, and GDS2?
- IP integration: Is the IP compatible with the design tools used?
 - Are routing pins available at the right pitch and met?
 - Are clock-domains appropriately represented?

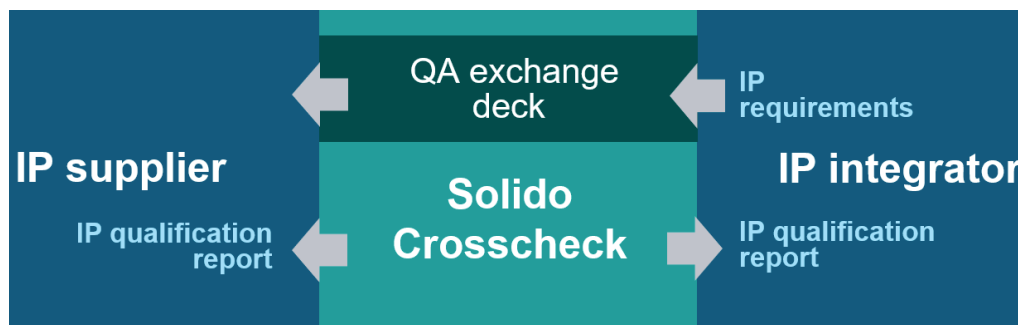


Figure 1: The Solido Crosscheck QA exchange deck.

With the QA exchange deck, Solido Crosscheck provides a standard way of describing these requirements that can be re-used for an entire category of IPs or design flows. This allows SoC designers to maintain and incrementally improve a single set of IP qualification requirements and share them with multiple IP suppliers.

Solido Crosscheck comes with an extensive database of predefined, parameterizable IP quality checks. The QA exchange deck refers to these checks by mapping between the databases and models that are supplied with an IP release, and the IP quality checks that should be applied.

Using this mapping specification, Solido Crosscheck then targets the right checks on the right IP models, and reports the results. This allows IP integrators to capture validation requirements for the various models in an IP release in a format that allows it to be re-used for different IPs.

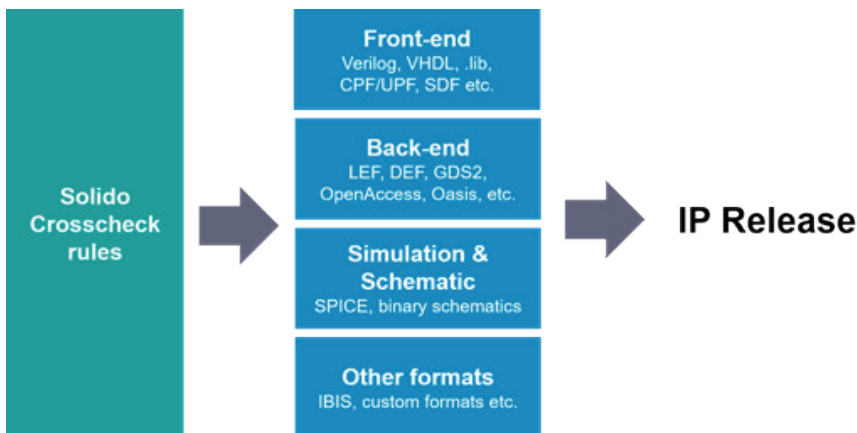


Figure 2: The QA exchange deck maps validation checks to IP formats.

QA exchange deck usage model

Here is an overview of each step in the QA exchange deck usage model:

1. Rule deck construction: IP integrators decide what IP databases are required, based on the tools used for SoC integration and design architecture, together with the expected internal consistency and EDA tool compatibility requirements. These are defined in a QA exchange deck (QA deck) that can be automatically executed by Solido Crosscheck. The QA deck is then released to the IP suppliers.
2. Design: The IP provider starts designing the IP and uses the QA deck with Solido Crosscheck to make sure that errors are detected and fixed early in the design flow.
3. Sign-off: The final release of the IP is run through Solido Crosscheck, and the IP is shipped to the IP integrators together with the Solido Crosscheck validation results report.
4. Validation results classification and error waiving: In certain instances, Solido Crosscheck may flag that some rules specified in the QA deck have been violated. In this case, the IP provider and integrator may discuss these violations and decide to waive some of the violations. These waivers are also captured within the QA deck, but they remain dedicated to a specific IP.
5. Best practices improvement: As IP suppliers and integrators increase alignment using the QA exchange deck, IP integrators may decide to enhance the QA deck to automatically capture these exceptions, either by relaxing a parameter or by pre-coding the exceptions as waivers in the format. A revised QA deck can then be distributed to IP suppliers.

These steps show how the Solido Crosscheck QA exchange deck can help IP providers capture all issues relevant for IP integrators while they are designing and characterizing the circuits, thereby preventing major design schedule delays that would occur if issues were discovered by the IP integrators after release, or even worse, right before final design tape-out.

The QA exchange deck also allows IP qualification rules to become independent from the IP database or IP provider. This makes it possible to improve IP qualification rules over time and to share the exchange deck with different IP suppliers. Having a QA exchange deck in place for a certain class of IP enables second sourcing of IP suppliers, while minimizing the risk to the tape-out schedule.

Solido Crosscheck QA exchange deck for IP providers

In the previous section, we discussed the IP QA handshake from the viewpoint of IP integrators. It is worth pointing out that this QA handshake also benefits IP providers and their customers, even if those customers do not provide QA exchange decks for IP qualification.

An IP provider may use the QA exchange deck to describe their own internal quality standards and run Solido Crosscheck's validation checks on the IPs under development as part of their internal development process. Utilizing Solido Crosscheck together with the QA exchange deck is a way to implement regression testing before a new version of a model is committed to the design repository.

In addition, the validation report produced by Solido Crosscheck (along with the description within the QA exchange deck) can be provided with every shipment of an IP version to a customer. This report helps IP integrators understand the validation steps taken for the IP they are receiving, even if they are not yet using Solido Crosscheck in their design flow.

IP providers also benefit from best-practices encapsulated in the QA exchange deck. Each time a customer reports an issue with a particular IP release, the detection of these issues can be added to a QA exchange deck being maintained as an internal standard. This standard QA exchange deck can then be shared and discussed with customers to align design best practices.

| Conclusion

The Solido Crosscheck QA exchange deck enables an IP QA handshake between provider and integrator. It allows IP integrators to capture IP quality requirements in a standard way that is independent of IP provider or instance. The QA exchange deck as part of their IP design flow for qualification reporting and as a basis for standardization discussion with IP integrators.

Utilizing Solido Crosscheck with the QA exchange deck in IP design flows means IP is designed for qualification from day one. This enables SoC designers to integrate newly-released IPs into existing SoC designs, while minimizing the risk of introducing new design schedule delays caused by unexpected quality issues.

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