Valor Parts Library

Virtual components for optimizing the PCB manufacturing process

Overview

The Valor Parts Library (VPL) provides physically accurate models of electronic components used as a digital twin for PCB design for manufacturing (DFM) as well as assembly, inspection, and test applications.

The VPL contains more than 35 million manufacturer-specific part numbers, including the dimensioned package model for each part. All information about the physical package is derived from the part manufacturer’s datasheet. Package names are based on the recognized JEDEC JES-D 30B standard.

What is VPL?

The Valor Parts Library is a database that provides access to a library of parts, content-creation services for custom or proprietary parts, and automation tools to facilitate the new product introduction (NPI) design and manufacturing process of PCBs.

How is VPL Used?

The Valor Parts Library is used primarily for two applications: Valor PCB DFM and Valor Process Preparation—the front-end engineering steps taken by PCB assembly operations.

Valor PCB DFM

With the Valor Parts Library, PCB design engineers can perform comprehensive assembly DFM analysis for their products. The VPL enables identification of potential solderability issues with component footprints that otherwise could not be determined without having to build physical

BENEFITS

- Physical models of electronic components are accurate.
- "As-built" representation enables realistic documentation and accurate design for assembly (DFA) analysis.
- Comprehensive approved vendor list (AVL) validation ensures all qualified parts are acceptable for manufacturing use.
- SMT part libraries can be generated automatically.
- Cost and process bottleneck of researching component data are removed.
- Custom attributes can be created for individual part numbers.
- Component test outline is created automatically based on VPL body outline and pin contact areas.
- Stencil design time is reduced by being able to see where the copper, mask, stencil aperture and pin align graphically.
- AOI and AXI inspection programming times are reduced by using VPL data to create regions of interest.

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prototypes. The VPL, when used with Valor NPI, detects footprints that have insufficient heel, toe, and side spacing for proper solder filleting.

Another DFM application benefit of using the VPL is to validate the approved vendor list (AVL) for qualified parts. A common practice is to create a PCB CAD library using the initial manufacturing part numbers. However, designers may want to expand their sourcing options by searching for alternative parts. Although the electrical properties of similar components can be identical, the sizes of the physical packages can vary. The only way to systematically identify if any of the alternate parts will present a problem in manufacturing is to run the Alternate Parts Analysis function in Valor NPI that is tied to VPL content.

**Valor Process Preparation**

As the PCB design is prepared for the manufacturing process, several steps can benefit from the Valor Parts Library content.

Virtual Sticky Tape (VST) is a proven way to correct SMT component rotations and positions before running a first article. It simulates the process of the component being picked up by the feeder and placing it on the board. When VPL data is used as the source for the SMT part information, the review process using VST is much quicker than if machine libraries were used for the validation.

The Stencil Design module reduces time to market by allowing in-house creation of the stencil data instead of going back and forth with the stencil vendor to validate the process. Because the Valor Parts Library contains the actual pin contact area, the stencil design module can display this data so that the copper, solder mask, paste, stencil opening, and pin contact data can be used to determine the exact stencil aperture for optimum results.

Most PCB factories support more than one SMT vendor, and each has their own part library format and requirements. This creates significant inefficiencies and room for error because the same part must be created for each of the various SMT platforms being used. Using a single source for that part data would be much more efficient. The Valor Parts Library can be used to create machine-specific part data through Valor Process Preparation. Algorithms automatically transform the VPL data into machine-specific part data that can be included with the placement data, which allows the SMT vendor software to create the final program. This provides a repeatable process for part data creation that does not rely on individual methods for each component.

The time to bring an inspection program online is usually dictated by the number of new parts. When the source data is simple centroid information, there is no alternative other than to slowly create enough information to make an inspection profile for the new part. Valor Process Preparation can use the Valor Parts Library to create the regions of interest for new parts, which significantly reduces the time needed to create inspection profiles for new parts. VPL also can be used to provide both footprint and package data to allow faster program generation for AXI inspection.
Test probe placement can be optimized with the accurate pin contact information provided by VPL.

Test programming also requires libraries to be created for new parts, which involves laboriously creating package outlines. When the Valor Parts Library is available, those parts are automatically enveloped to create an optimum package outline. No part creation work is needed because the outline is immediately ready for use.

Benefits of VPL

The Valor Parts Library, when used with Valor NPI or Process Preparation offers:

- a streamlined design-through-manufacturing process
- more accurate DFM analysis than using CAD data
- a simplified manufacturing part library management process
- more complete manufacturing product model
- and consistency of part data across all applications.

System Requirements

- RedHat 6 and 7 x86/x64
- Windows x86/x64
- Oracle, PostgreSQL and SQL Server