Supplyframe CAD Models

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DesignSense CAD Models Overview

At Supplyframe, quality is our top priority. Our ECAD and MCAD models are built to industry standards or component manufacturer specifications and run through a multi-stage checking process to ensure accuracy.

Our goal is to ensure that the models for components, be it for your NPIs or for requests by end users, have accurate symbols, footprints, and 3D models, ready for download using the green icons implemented throughout the DesignSense syndication network.

CAD Models are used by electrical and mechanical engineers in printed circuit board designs and mechanical assemblies, respectively. Both play important roles in the product engineering process, aimed to help facilitate new ideas to come to life or help improve existing ideas and products to make them compete with today's advanced technologies.

CAD models are broken down into two types: ECAD Models and MCAD Models. ECAD models, or electronic computer-aided design models, consist of a symbol or footprint, which are 2D representations of a component or part used in CAD drawings of schematics and printed circuit/wiring boards respectively. MCAD models, or mechanical computer-aided design models, are 3D mechanical representations used for product assemblies.

Within the guide, we will discuss our detailing model creation capabilities and quality control process.

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CAD Model Build Requirements

Supplyframe requires the following the minimum attributes of part data required to successfully import or update any of the part data and create the CAD model when requested:

- Manufacturer name
- The full manufacturer or orderable part number
- Part descriptions for each full manufacturer or orderable part number detailed
- Datasheet links with recommended land patterns/footprints for each full manufacturer or orderable part numbers listed

This information can be provided to Supplyframe through the following two options:

- Using the product data intake spreadsheet provided during the onboarding process. If you did not receive the intake spreadsheet, please send an email to NPI@Supplyframe.com and we supply a copy.
- An API connection from Supplyframe to your domain to set up a time-based query for the import of the same data as required from the first option, the Product Data Intake spreadsheet. Please provide Supplyframe with your specific instructions on how we can connect to your API. By default, we require your API key.

CAD Model Build Capabilities

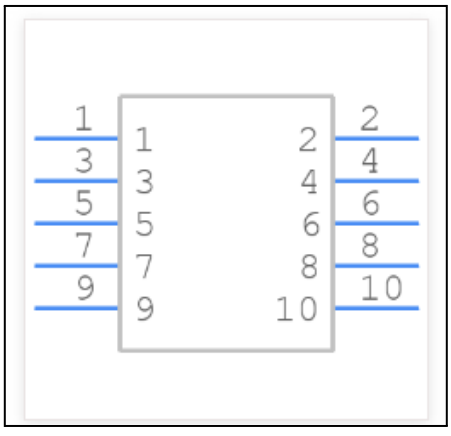
Supplyframe supports creating one symbol, footprint, and 3D model for each manufacturer part number.

1. Symbol Creation

Symbol creation follows the following industry standard guidelines:

- IEEE Std 315-1975 (Reaffirmed 1993)
- ANSI Y32.2-1975 (Reaffirmed 1989)
- CSA Z99-1975

By default, a symbol is created as a rectangular box with pins arranged around the sides of the rectangle to match the footprint pin ordering. We do not distinguish pin types (input, output, power, etc.). All pins are bidirectional. Pin names are assigned based on the information provided on the datasheet. If no pin naming is given, pins are numbered sequentially.



This is an example of a symbol with pins in sequential order without pin naming.

Figure 1. Samtec's SDL-105-G-19

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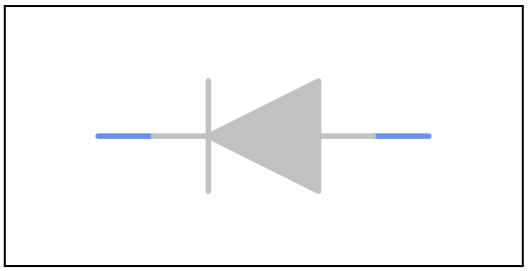
Where applicable, industry-standard symbols are automatically deployed. This is a 2-pin diode common symbol used in all applications.

Figure 2. Two-pin Diode common symbol



For a complete list of supported industry standard symbols, please refer to the following link: https://g.componentsearchengine.com/examplesPartCategorySymbols.php

Manufacturers can provide custom symbols for complex circuitry to illustrate the basic functionality of the component. This is often used for analog ICs with specific functionality. We will create custom symbols free of charge, if the custom symbol can be used for an entire category of components. Custom symbols for individual MPNs may incur an additional fee.

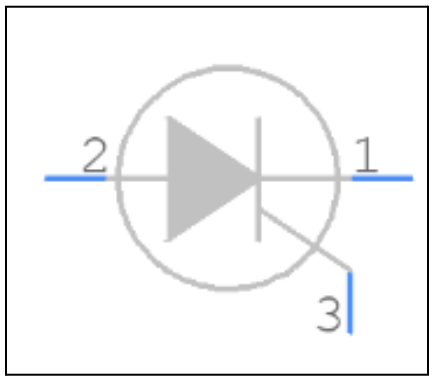
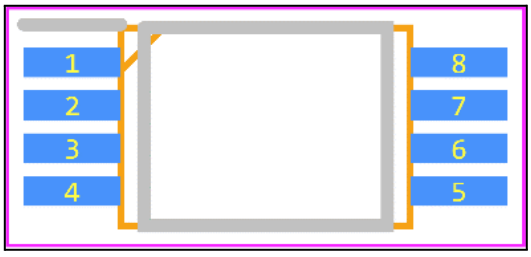


Figure 3. STMicroelectronic's TM8050H-8W

Custom symbols must be provided as a picture (JPG, PNG, SVG) and must include the pin names for each pin. If you would like to deploy custom symbols, please email NPI@supplyframe.com and include the request for custom symbols in your email.

2. Footprint Creation



PCB Footprints are created using the IPC-7351B standard. If a manufacturer provides the recommended land patterns or footprints from their product datasheets, we can create symbols and footprints for the parts.

Supplyframe utilizes the following options available for creating footprints:

- PCB Library Wizard, or the Wizard
- Freeform Builder

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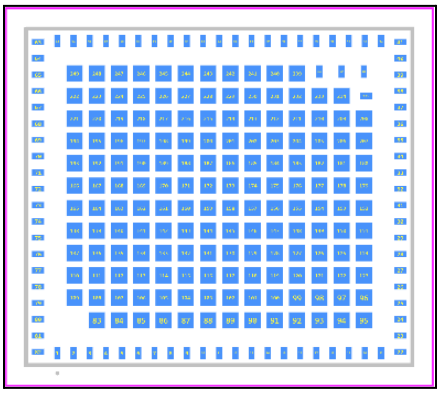
The PCB Library Wizard uses mechanical dimensions from the land patterns to create footprints that are common IPC standard packages. For a complete list on the common IPC standard packages we support, please visit the following link: https://g.componentsearchengine.com/packageCategories.php

For components where the Wizard cannot be used, a tool called the Freeform Builder will be used to create the footprints. The Freeform Builder uses rules developed in collaboration with leading circuit board manufacturers alongside manufacturer-supplied land patterns to create more complex footprints.



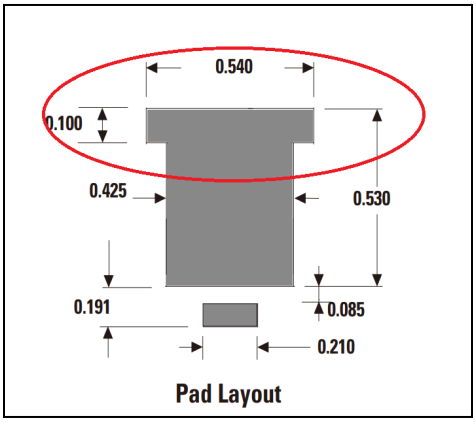
Please note, the **recommended land patterns** and **dimensions** associated with the part number's package are required variables for the Freeform Builder to build the footprints successfully.

3. Limitations on Footprint Creation

Supplyframe supports more than 25 PCB design tools and more than 30 3D CAD tool formats. The desired output format is createdfrom a universal dataset stored for each MPN in our database. Different PCB design tools support different features, which in turn sometimes limits our ability to create ECAD models for components with certain features to createECAD models that are compatible across all PCB design tools.

3.1 Irregularly Shaped Pads (applies to ECAD model only)

We only support the use of rectangular pads for footprints. Sometimes components use triangular, round or oval pads or rectangles with chamfered edges as pads. **Edge mount** components that have a **footprint on both sides of a PCB cannot be generated**. All examples above **will be abandoned** and shown in the DesignSense insights portal.



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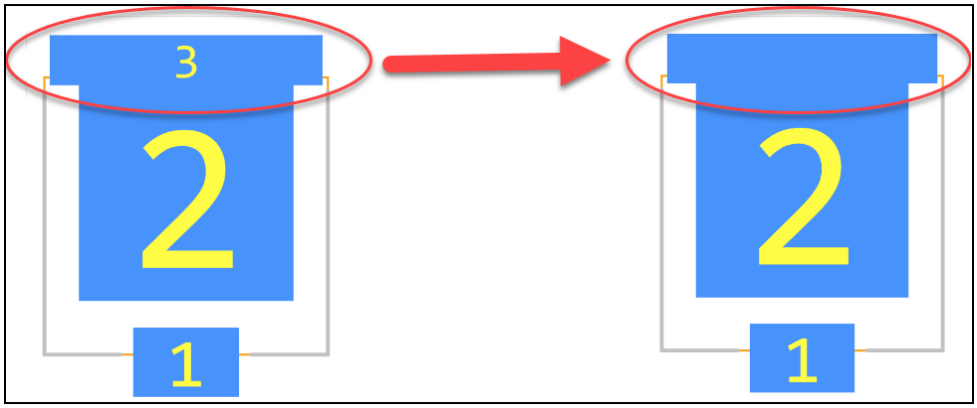
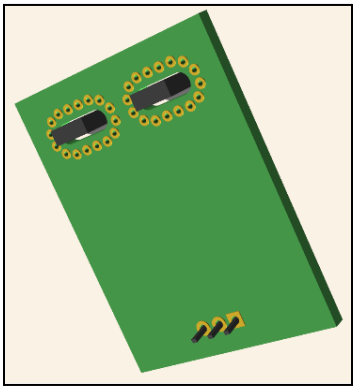
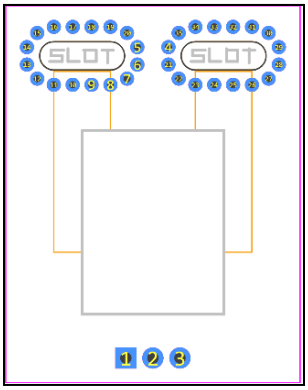


3.2 Slotted Holes (applies to ECAD model only)

This limitation is similar to the irregularly shaped pads, due to the way in which CAD tools support slotted holes. If the slotted hole is non-plated, through hole, then the slot shape can be created on layer 25 so that:

A. It shows a slot on the footprint
B. The slot is created in the PCB's 3D Viewer

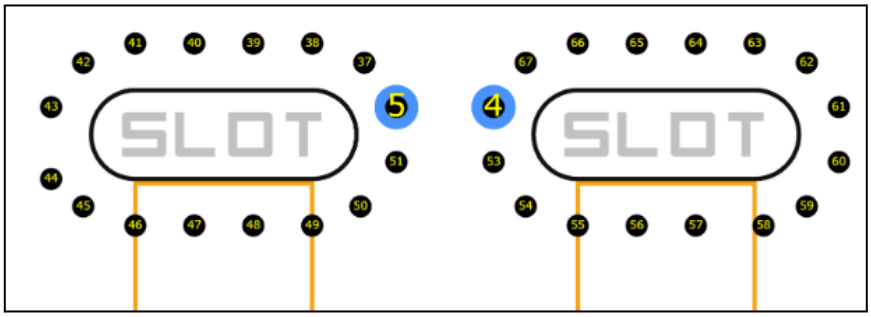




For plated slotted holes, the same slot shapes are used on layer 25 which overlay a rectangular shaped land pad on all layers. This means that when the PCB goes to fabrication, the slotted hole is correctly represented and there is a solder pad.

Supplyframe has two options available to display slotted holes correctly:

1. Keeping SLOT and vias, where unused pins are non-plated through hole type, to remove electrical connections from them completely:



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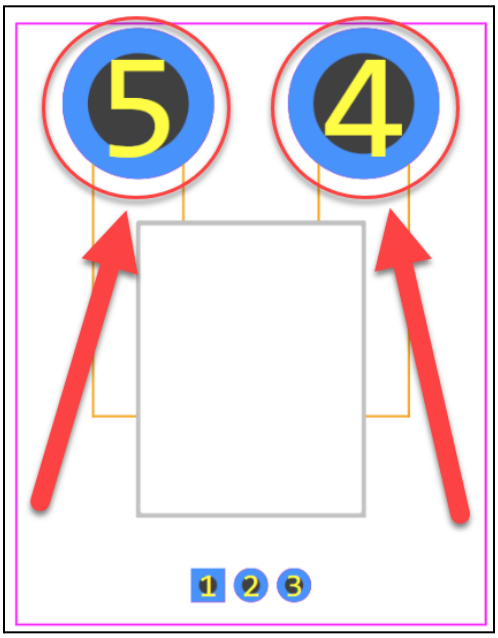
2. Using round holes instead of slotted holes, calculated using an IPC pad stack calculator for slotted pins:



3.3 Edge Mount Connectors

Edge mount connectors usually require two footprints per part, but Supplyframe currently supports one footprint per part.

4. 3D Models

3D Models can be supplied in a variety of ways:

- Templates
- Skyscrapers
- Custom 3D models created by the manufacturer
- Custom 3D Models created by Supplyframe (additional costs may apply). Contact your Supplyframe Sales Manager or email NPI@supplyframe.com to request more information

We always accept the manufacturer-provided 3D models in STEP file format as the first option. If the step files are not available, we always supplement the Orderable Part Numbers with Templates and skyscrapers as part of the automatic ECAD model creation process. They are included in any ECAD model subscription.

4.1 Templates

Template-based 3D models are created using a unique mechanism and comply with ISO 10303-21, the STEP file format, or VRML as an alternate format. When they are imported into any compatible PCB design tool, they are positioned, scaled and orientated correctly onto the corresponding footprint. As a result, 3D Models can be created for the common IPC standard packages, similar to the footprint model creation process, where the complete dimensions of the package are required.

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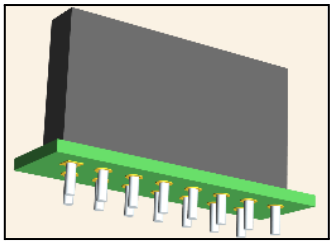
4.2 Skyscrapers



Skyscraper 3D models are created using the assembly outline of the footprint of the component for the x- and y- axes dimensions along with the maximum height as specified in the datasheet or technical drawing for the z-axis dimension.

There are some considerations that can impact the creation of a skyscraper 3D model:

- All four corners of a land pad can't be outside the external body dimensions
- Drill holes outside of the 3d body outline
- Open Assembly Outline(s) found
- 2-pin part with non-zero pin spacing
- More than 100 pins
- Open Assembly Outline(s) or Arc found

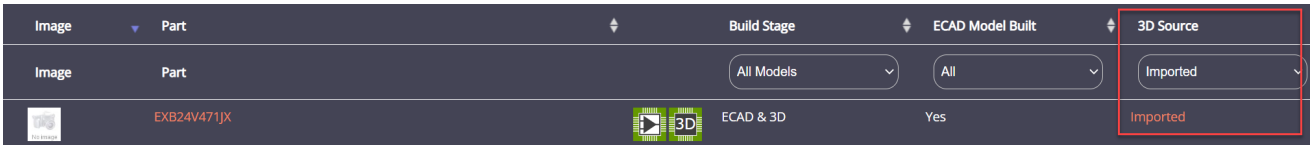
NOTE: For parts where 3D Models cannot be created using templates or skyscrapers, the following options below are available.

4.3 Custom 3D Models Created by Manufacturers

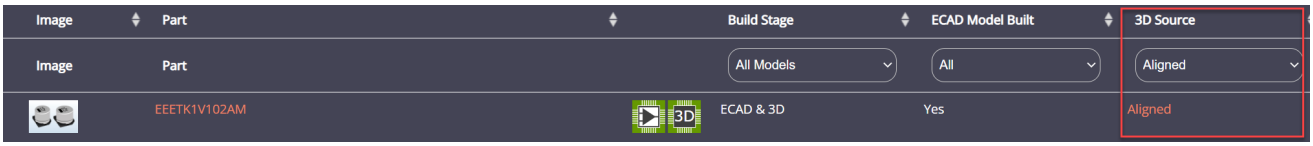
Manufacturer supplied 3D Models delivered in STEP format can be directly uploaded to each manufacturer part number. If the component is PCB mountable (has a footprint) the uploaded model will be aligned with its footprint making sure the 3D model is positioned exactly on top of the footprint when displayed together with the PCB.

The alignment of 3D models is a separate process from the ECAD model creation process. All custom 3D models that require alignment are placed into a separate queue and will be processed based on alignment resource availability. Although our content engineers thrive to process alignments as soon as possible, there is no processing time commitment for alignments.

Alignments can be verified in the Insight Portal in the Models Overview or Purchase Order sections. Under the 3D Source column you can filter by 3D Source. The "Imported" status means that the 3D Step file has been uploaded for the part but hasn't been aligned with its corresponding footprint yet:



When the part is "Aligned", the provided 3D Step model, the device, is connected to the footprint created for the respective part numbers.



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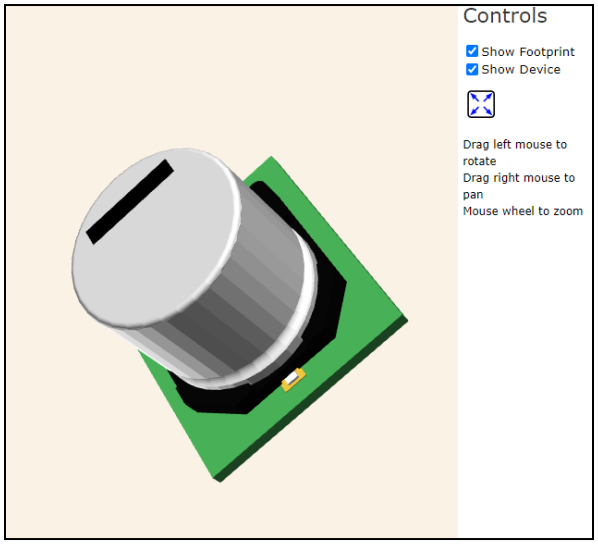
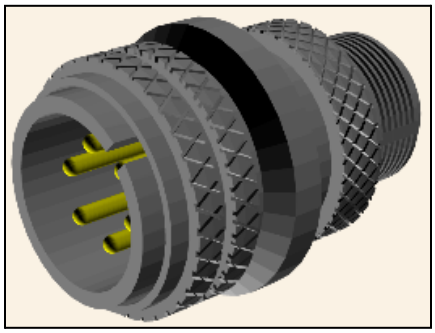


4.3 Custom 3D Models Created by Supplyframe

Supplyframe generates high-fidelity 3D models in STEP format for manufacturers. Supplyframe 3D model creation is available per geometry or as an annual subscription with a predefined allowance for requests from the manufacturer's website.



Model Build Quality Control

The model development team conducts the following steps for the quality and accuracy of created components from the PCB Library Wizard, the Freeform Builder, or a Template-Based 3D model:

1. Two development engineers create an ECAD model for the component independently.
2. Once the ECAD model creation for the component has been completed by each engineer, they are compared. If they do not match, they are submitted to a senior member of the QA team for verification and corrections.
3. Internal monitoring checks part parameters that fall outside the typical package type to spot-check and locate errors prior to release.
4. If an issue is detected a senior member of the team will resolve the issue or resubmit with comments to the build queue for review and updating prior to release.
5. The ECAD model for the component is always checked by a senior member of the team to ensure quality and accuracy.

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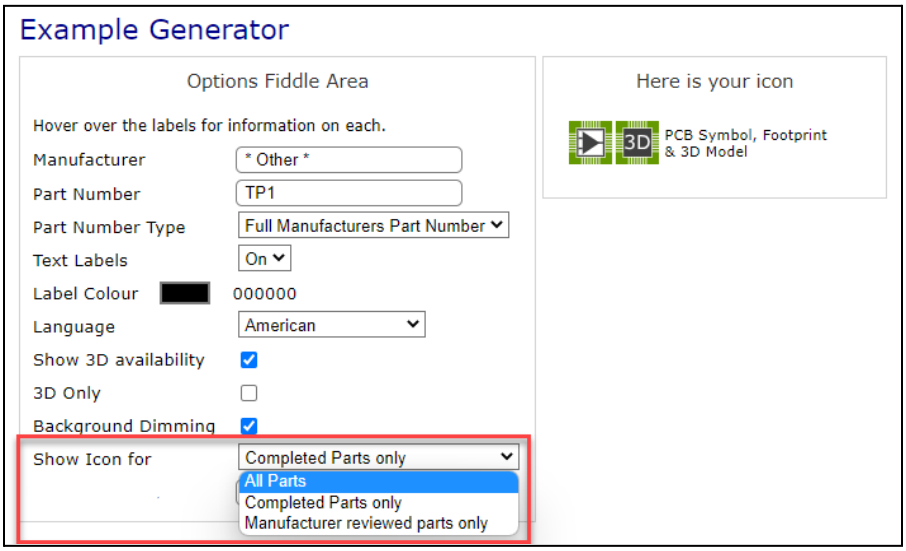
5.1 Post-Release Support

Please submit questions or report any issues to npi@supplyframe.com. Upon receipt, the ECAD model for the component in question is removed from the database. Our support team will work with you to resolve the issue and alert you when the updated model is ready for review.

5.2 Manufacturer Review of Generated Models

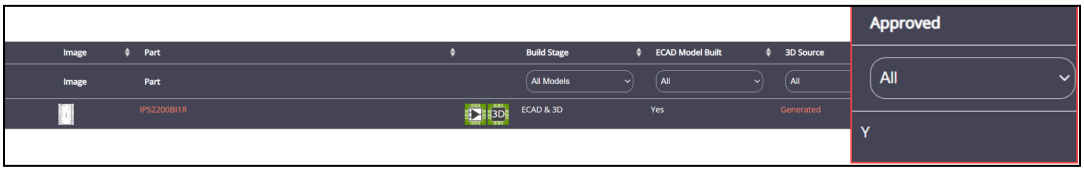
Manufacturers can review the models for each part number in the system for accuracy and approve them for confirmation through the Insight Portal. This feature does NOT control what is seen to be released and available for download. It is controlled separately in the green icon javascript implementation process, using the Show Icon For options below:



- All Parts: shows icons regardless of status (default option)
- Completed Parts only: shows icons for parts with both ECAD and MCAD models
- Manufacturer-reviewed parts only: shows icons for parts that have been reviewed approved by the manufacturer in the Insight Portal

To show icons for Manufacturer Reviewed Parts only, users affiliated with manufacturers with access will need to approve the parts in the Insight Portal through the following procedure:

1. Inspect the models for all parts available under My Models >> Overview section in the Insight Portal.
2. If the models are correctly created, select the checkbox.
3. Click on the Approve option.
4. The Approved column for the associated part number will be updated to “Y”, indicating that the part has been “Manufacturer Approved”.



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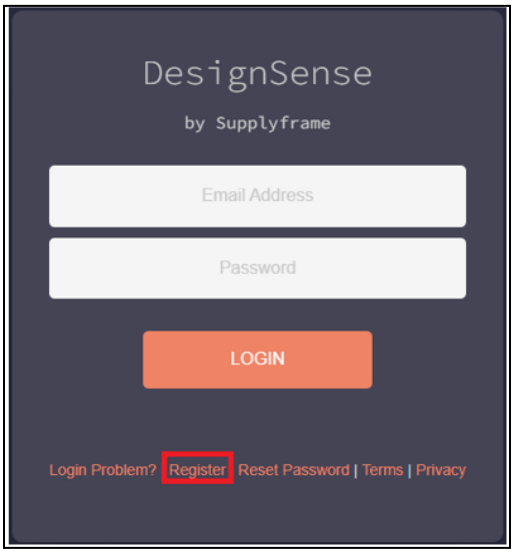
For all other questions or issues related to ECAD/MCAD models or the DesignSense Insights Portal, please submit an email to npi@supplyframe.com, and we will respond within 24 hours Monday - Friday.

References

- Green icon implementation reference (for reference only.) https://g.componentsearchengine.com/multiviewDocs.php
- Common industry standard part categories: https://g.componentsearchengine.com/partCategories.php
- Common industry standard package categories: https://g.componentsearchengine.com/packageCategories.php
- Registration and access to the DesignSense Insight Portal:

1. Go to https://designsense.info and click **Register**.



2. Please complete the form with the required information, then click **Register**.

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3. When prompted, view your inbox from the email address used in the registration, and confirm the account.

4. Please send an email to NPI@supplyframe.com, and include the email addresses of the desired users that would like to review the model analytics. Our team will grant access and will notify the requester when this is completed.

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