

IPC Naming Conventions and the Quest for Staying on Top of Standards

DECEMBER 8, 2020 IN PCB DESIGN & LAYOUTS 6 MIN READ



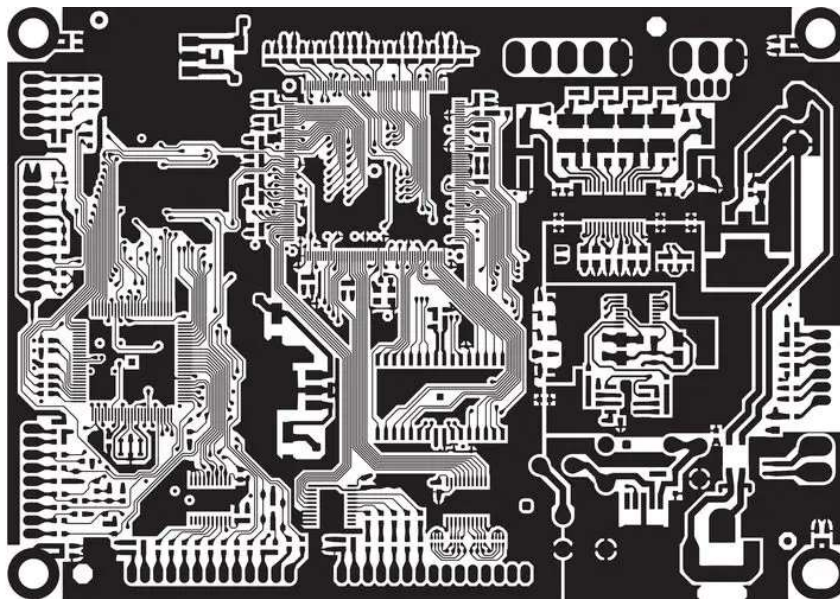
Share



Tweet



Pin



Can you name the hole and pad patterns in this Gerber under the IPC naming conventions?

IPC is a global trade organization working to create consistency in the electronics industry. IPC standards are not limited to physical objects; however, multiple separate standards exist simply for naming things. The organization has published many standards over the years governing electronics design, manufacturing, assembly, and quality testing. There are more than 10 separate IPC standards for PCB design alone, including IPC naming conventions specifically for components.

some physical dimensions, and feature sets. In contrast, IPC conventions focus on standardized packages used for SMT and through-hole components.

Two IPC Naming Conventions

IPC standards cover every facet of electronics design and fabrication, including materials, assembly, **components**, and layout. IPC naming convention standards are a specific subset of these standards, describing how certain types of electronic components should be named. There are two major naming standards that apply to PCBs:

- **IPC-7351B:** Generic Requirements for Surface Mount Design and Land Pattern Standard
- **IPC-7251:** Generic Requirements for Through-Hole Design and Land Pattern Standard

Many PCB design tools are built with component creation tools, which help you comply with the most recent revisions of the IPC standards. Some design platforms include built-in component generators that will create a compliant PCB footprint as well as a compliant name under IPC 7351B or IPC-7251. Of these two naming conventions, IPC-7251 is more complex, since it refers to other established IPC standards to determine part of its naming scheme.

Through-Hole Names Under IPC-7251

IPC-7251 names through-hole components by starting with the component type (e.g., polarized capacitor, fuse, etc.). The first 3-6 characters in a standardized IPC-7251 name describe the component type, orientation, and mounting style (vertical, horizontal, right angle, etc.). If the component is a capacitor, this character group also includes its polarity. The rest of the name includes the component dimensions and complexity.

Under IPC 7251 standards, component dimensions are defined in millimeters, with two places to the right of the decimal point and no leading zeros. Part of an IPC 7251-compliant name is the component's fabrication complexity level. This is defined using either "A", "B", or "C", which matches the Design Producibility levels listed in the IPC-2221 and IPC-2222 standards. In addition, IPC-7251 further references IPC 7252-7259 for different types of components, connectors, and mounting hardware.

The IPC naming convention for through-hole land patterns uses component dimensions to derive the land pattern name. The first 3–6 characters in the land pattern name describe the component family, which is then followed by the following data:



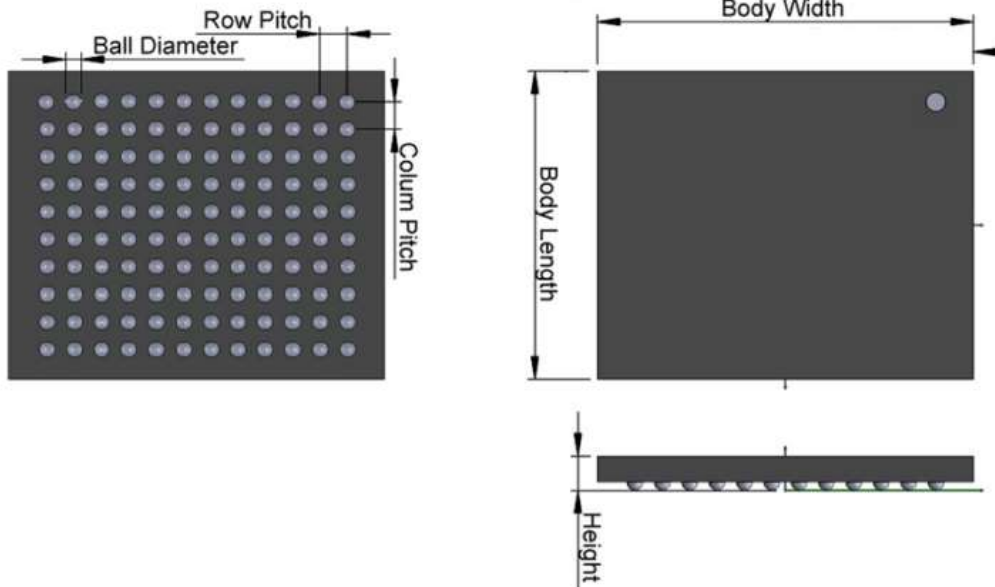
- D = Body diameter for round components
- T = Body thickness for rectangular components
- H = Height for vertically-mounted components
- Q = Number of pins for components with more than two leads
- R = Number of rows (for connectors)
- A, B, or C = Fabrication complexity level

A similar format is used in the IPC naming convention for SMD components.

SMD Names Under IPC-7351B

IPC-7351B names surface-mounted components by starting with the component dimensions and land pattern; there are specific codes included in the standard for different component packages. The first 3-7 characters in a standardized name are either an acronym of the component type or an abbreviation that distinguishes between component subtypes. The rest of the name varies by component, but the overall component name is related to the part's land pattern.

Some components include their dimensions in metric units within their name. When the name includes dimensions, those dimensions have one significant digit on each side of the decimal point. Other IPC-7351B names contain pin numbers or denote the presence of specific features. For example, ball grid arrays include a "C" within their name for collapsing balls, or "N" for non-collapsing balls. An example of a BGA120C80P10X12_900X1100X100 ball grid array package is shown below.



IPC 7351B-compliant name and dimensions for a BGA120C80P10X12_900X1100X100 package.

The example above is one example of the structure used to create naming conventions for SMD components. Although the naming format shown above does not apply to every package and land pattern, there is a general pattern that one can extract for a range of components. The naming convention follows the general pattern:

(Package type) + (Lead type) + (Lead pitch) + (Body length) + (Body width) + (Height)

Some components may also have a suffix at the very end of the component name to indicate things like heat sink attachment, reversed pin orders, or non-standard pins for transistor footprints.

Here, we've only looked at the land pattern for different components, which will need to be reflected in the **PCB footprint**. We still haven't looked at the padstack, which has its own IPC naming conventions.

Padstack Naming Conventions

Padstack information is also important to consider when working with component models and **creating your PCB footprints**. Although padstacks are part of the IPC-7351 and IPC-7251 naming conventions for use in PCB footprints, they are also specified in the PCB layout when vias are used to route through multiple layers. Your design tools will normally create padstacks automatically during layout as you place and size vias.

The padstack naming convention consists of combinations of letters and numbers that represent the shape and dimensions of landing pads on different layers. The first letter defines the shape of the pad,

For a complete list of component prefixes and abbreviations under both standards, take a look [at this document](#). To see a full list of guidelines for naming padstacks, [see this document](#). As of now, everything is still named under the IPC-7251 or IPC-7351B standards. There is still no release date for IPC-7351C, which would be the newest revision on naming conventions for SMD land patterns. No matter which standard you are using, the right set of component search tools can help you quickly find new components and import them into your design.

Ultra Librarian provides components that adhere to IPC naming conventions whenever possible. Additionally, our data is stored in a vendor-neutral format, ensuring there are no inconsistencies across CAD types. Working with Ultra Librarian takes the guesswork out of preparing for your next great device and puts your ideas on the road to success. [Register today](#) for free.

[REGISTER TODAY](#)

The Ultra Librarian Team

Ultra Librarian offers the world's largest PCB CAD library, putting cutting-edge materials at your fingertips so you can build better products faster—all for free.

Join Our Newsletter

Subscribe to our newsletter to receive the latest news, and important updates

Search by Part 

Last Name

Enter your email

SUBSCRIBE

Related **Posts**

ECAD/MCAD WORKFLOW & TEAM MANAGEMENT

PCB DESIGN & LAYOUTS

Most Important High Speed Comparator Design Techniques

 JULY 7, 2022

5 Most Impactful PCBA Manufacturing Industry Trends To Know

 JUNE 30, 2022

If you're looking for any of our component footprints or models, we have readily available and free options for you and your design team. Search our library for the solution you've been looking for.

SEARCH OUR LIBRARY

Free Design Resources

Ultra Librarian is the worlds largest online – and always free – PCB CAD

[REGISTER TODAY](#)

Recommended



SiliconExpert Now Offers ECAD Model Footprints and Symbols through Teaming with Ultra Librarian

🕒 SEPTEMBER 13, 2019



The 74HC14 Datasheet: High-Speed, Hex Inverting Schmitt Trigger

🕒 APRIL 1, 2021



List of IC Manufacturer Codes

🕒 SEPTEMBER 15, 2020



IQS624 Datasheet: Multifunctional Sensor Aimed for Rotation Sensing

🕒 APRIL 14, 2022

Search Our Blog

Categories

[ANNOUNCEMENT](#)
[COMPONENT PARAMETERS & APPLICATIONS](#)
[DATASHEETS](#)
[ECAD/MCAD WORKFLOW & TEAM MANAGEMENT](#)



[PARTNER CONTENT](#)

[PCB DESIGN & LAYOUTS](#)

[PCB FOOTPRINTS](#)

[STEP MODELS & 3D INTEGRATIONS](#)

[UNCATEGORIZED](#)

[VIDEO](#)[Ultra Librarian](#)[Solutions](#)[CAD Tools](#)[IC Partners](#)

Blog	Video	Virtual Librarian	Desktop Free	3D Step	KiCAD	Browse by	TDK
FAQ	Library	Service	Reader	Altium	OrCAD	Manufacturer	Texas Instruments
Legal	Frank's	PCB	Online	Autodesk	PADS	Analog Devices	Toshiba
Standards	Garage	Designers	Reader	Cadence	Pulsonix	Digi-Key	Trinamic
Terminology	Contact Us	IC	Reference	eCADSTAR	Quadcept	Maxim Integrated	Vishay
Guide		Vendors	Design	Eagle	Full List	STMicroelectronics	Work With Us
		CAD					
		Vendors					