Labeling For Electronics
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Bar Coding for Electronics Manufacturing

Manufacturers know that time to market, customer satisfaction, and cost control is critical to competing in a global economy. Maximizing productivity, efficiency, tracking and process improvements are key to success.

Labeling and bar code systems are widely employed to automate accurate and versatile identification systems.

Bar coding provides accurate and productive ways to:

- Track inventory, production, work-in-process and customer orders in real-time.
- Track warehouse and stock-room operations and speed up cycle counting and inventory validation.
- Prevent employee mistakes, such as picking the wrong materials.
- Automate data capture in shipping and receiving.
- Collect tracking and traceability records to meet customer, industry standard and US government mandates.
- Increase responsiveness, improve customer service, and enhance productivity.

Bar coding was adopted throughout the electronic manufacturing and assembly industry as part of an effort to capture data before, during and after production.

This data stays with the components or units and becomes an important link in the production and supply chain process.

Labels designed for electronic assembly and PC board identification must last the life of the product and keep the data intact. This requires durable labels designed to withstand harsh environment processing including contact with chemicals, aqueous washes, extreme high temperatures, wave flow soldering, or reducing ESD.

Lean Manufacturing

Lean manufacturing requires manufacturers to do more with less, making it imperative to keep a close watch on critical inventory levels to avoid delays in production or deliverables. With mobile computing, RFID, and wireless equipment, companies are doing more at the point of activity to provide real-time information for better business decisions.
High Density Bar Codes For Electronics

Because of shrinking real estate on the electronic components, two-dimensional (2D) symbologies have gained popularity. 2D bar codes offer greater data storage capacity using high-density identification and error correction features. As a result, 2D symbologies are commonly used to store data needed to track parts, WIP, provide traceability and more.

What Is The Data Matrix Code?

The Data Matrix code is a two-dimensional matrix symbology containing dark and light square data modules that make up a larger square or rectangular shaped symbol. It has a finder pattern of two solid lines and two alternating dark and light lines on the perimeter of the symbol.

A two dimensional imaging device is necessary to scan the symbology, which is different from linear bar code scanners used today. Data Matrix is designed with a fixed level of error correction capability. Data Matrix is used for item marking applications using a wide variety of printing and marking technologies. The Data Matrix symbol looks like this:

The Data Matrix code can withstand a fair amount of destruction and have the encoded data remain readable. For example, a whole section of the code can be scratched or completely gone and the mark will still read.

The other feature of the Data Matrix code is that it can be read from different angles, making it easier and far more efficient to scan marked objects.

Typically 1/10th to 2/10th of an inch, 2D symbologies contain a substantial amount of data and powerful error correction characteristics, making it easier to mark parts, accurately and process quickly. (not shown to actual size.)
Labels Designed To Your Specifications

Label specifications can require the smallest sizes to fit electronic components and subassemblies, have specific corner radius, be durable enough to withstand exposure to harsh chemicals, and have aggressive adhesives that last the life of the product.

The size and shape of the label is made from cutting dies. Some label manufacturers have more standard dies on hand to provide a wide selection of “standard” size labels. Some of the most demanding specifications and unique labeling applications may require that a cutting die be created to produce a specific label. This may add to the cost and delivery time of a label.

A knowledgeable label manufacturer can be a great help when involved early in the design and specification process. Once specs are submitted, it is harder and more costly to change when labels fail. Consider choosing a label manufacturer to be sure the labels you spec out will perform before you loose valuable product data or have a dissatisfied customer.

When ordering your label, consider the following points.

- Material: Kapton® and Polyester materials are proven to withstand harsh environments. Specific types of materials are chosen based on extremes the label will be exposed to.

- Adhesives: Aggressive, temporary, or removable adhesives are defined according to the application.

- Top Coating: To protect your printing information and bar codes, a top coating may be applied during manufacturing.

- Exact size, substrates, corner radius, label gap, size, mil-thickness.

- Color to your specifications for strong visual or brand recognition.

Are your labels in compliance with your drawings?

Do they meet strict requirements?

Need a specific label size and shape to match a drawing?

Do you want one approved vendor to help with all your labeling projects?

Be sure your thermal transfer ribbon is matched to the label material, topcoat, and is rated to withstand the labels environment to ensure that the printing on the label remains readable throughout the life of the product.

Nothing replaces testing in the actual production environment. Ask your vendor for testing samples when you have a new product to be labeled, need a different label or something in your production cycle changes.
Dataplates: Made of sturdy materials including plastic, aluminum, custom steel, and stainless steel, these dataplates are most commonly used on larger machinery, aircraft, tanks, and when exposure to the elements is expected. Ordering dataplates preprinted using a label printing service can provide quick, easy and economical delivery.

New, high performance black polyimide labels that match a dark or black background to enhance aesthetic appeal can also be a solution when reflected light from white labels cause problems in your electronic product.

This matte black polyimide label material features a 1.0 mil black film capable of withstanding temperatures as high as 900°F/500°C, which makes it an excellent choice for electronics assembly or durable product applications. The permanent acrylic adhesive offers excellent bond strength to a wide range of surfaces required for industrial applications and can be die cut to your specifications.

Used with white resin ribbons, this material can be printed with thermal transfer printers to create high quality bar codes and images that resist abrasion and chemicals.

Shown here are the effects of time and temperature 315°C/600°F for 50 minutes) on a standard polyimide labels compared to a new generation lead free polyimide labels. This new polyimide material is designed for the higher temperatures required for the lead free soldering processes.

After Testing Results: New generation Polyimide Label (left) vs Standard Polyimide (right)
Durable Labels For Harsh Environments

Electronic assembly labels are designed to withstand the high IR & vapor phase of solder re-flow and for surface mount on either top or bottom side of the board without burning, curling, or damage to the printed output.

**Kapton® Labels** - The most common type of Kapton® label is available in high gloss with superior bar code contrast and permanent adhesives to withstand high heat processing (up to 480°, ) chemical exposure and abrasion of PCB processing.

Variations of this material are available for printing small, high resolution (600 dpi) bar codes commonly found on PCB labels. Be sure to mention this specific printing need when you order your labels.

**Applications:**

- Surface mount process tracking (SMT)
- Wave solder (through hole) applications
- Product identification of electronic components

**Polyester Labels** - This class of labeling materials has come a long way in durability and availability. Choose from high gloss or matte, silver, white and colors, and various shapes and sizes. With the higher temperature ratings of today’s polyester labeling materials, a polyester can often be used to lower your cost of labeling in place of some Polyimide material labels.

**Features:**

- High gloss, excellent print quality, good tear, smear and abrasion resistance.
- Suitable for product marking and hazardous material labeling, and component tracking and traceability.

**ESD Protection Includes Your Label**

A possible reason for electronic device failure is an electrostatic discharge (ESD) event at the board level. The damage may be so minor that the chip will appear to function normally in some cases but not others.

ESD damage affects production yield, product reliability and profitability in the electronics market.

As electronic devices become smaller and more complex the more sensitive to ESD they become.

It's more important to use label materials that address two major ESD concerns that standard labels can present.

Labels must eliminate the charge generated when the label is removed from the liner that can discharge and destroy sensitive components during application.

Once the label has been applied and during the label life, the label must prevent significant charge build-up on the label surface which can result in a static discharge event.

Every level of labeling products specifically for the electronics industry can play a role in offering anti-static protection:

- Electrostatic dissipative, RoHS compliant materials
- Humidity and temperature indicating inks
- Anti-static adhesives

Durable label materials can withstand PC board manufacturing processes and conform to REACH, RoHS, and HALOGEN FREE requirements of the electronics industry.
Ordering Your Thermal Transfer Labels

When purchasing your Thermal Transfer labels, you will want to consider a label vendor who:

- Can offer a wide selection of standard sizes.
- Offers short runs and can handle large volume label orders.
- Helps you select the right labeling material to perform in your application even in the harshest environments such as chemical exposure, outdoor elements, moisture, freezing and high temperature.
- Has a proven track record for providing creative labeling solutions within your budget.
- Has unique die cuts and shapes, roll, fanfold, sheet fed labels.
- Provides the turn around time to meet your needs.

Your label vendor should understand your application as well as the anatomy of the label. Each layer of the label should be considered when matching the label to your application. A label converter has control over the entire label process to ensure quality controls or help you meet strict deadlines.

Thermal Transfer Labels are available in any size, shape, mil-thickness, Type of adhesives, label materials, top coating, colors, and pre-printed or blank. Knowing your application is key to determining the label that will perform reliably.

Working with a creative label vendor can help you define labels with multi-purpose, preprinted labels that allow for printing variable data on demand, and labels that can enhance your brand image.

What ever the purpose of your label, your label vendor should be an important member of your design team and contribute to your success.
Using Preprinted Labels To Save

In addition to offering bright, colorful graphics, preprinted labels can be used in many different ways. Whether your application calls for graphics, multiple colors, paper or durable labels as printed or combined with printing on demand, your labeling jobs can become more efficient and economical.

Variable Data on Preprinted Labels

When serial numbers, lot numbers, expiration dates, and other variable data is required for your labeling jobs, preprinted labels may be an economical and efficient way to go and still offer you the flexibility to print variable information on demand.

You can still have labels with top coats, overlaminates, and other finishes by specifying this at the time of your order. Specific areas will be allowed in the design for Thermal Transfer printing later on.

Preprinted, Two Color Labels for Printing On Demand

Printed on a glossy, silver polyester label material, this label can be used in two ways. One application is to use it as is. The durable material lasts, and the two color graphical layout enhances the corporate image. This same label can also be printed on demand. When variable data is required in a labeling job, the customer uses their existing thermal transfer printers and prints in the blank area at the bottom. The customer has consistent, high quality image that 1) saves time because they don’t have to change rolls of labels in printers 2) cuts costs with efficient ordering, and 3) reduces waste by using one label for two applications.

Preprinted labels are just one example of how you can improve your labeling process and business operations. When was the last time you took a close look at your labeling? Are you experiencing slow downs in production? Do you need to improve your ability to track work-in-process or provide traceability throughout your supply chain?

Case Study

Preprinted Labels with Preprinted Variable Data

This supplier is mandated by the Department of Defense under MIL-STD-130 mandate to provide unit-level labels. Each label requires a unique data string. This particular label would be costly for the supplier to print themselves because 1) it uses reverse print black on silver matte polyester label stock 2) has an overlam for protecting the print and 3) must last the entire life-cycle of the product. By pre-printing the part of the label which does not contain variable data (what you see here) the cost per label is reduced while still allowing for variable data.

The bottom section of the label is blank where variable data, in this case the Unique Identification string of data containing the serial number in a Data Matrix 2D barcode, will be printed in batches when needed.

The customer saves money, keeps less inventory and is in compliance with MIL-STD-130.
Labeling Solutions For Electronic Manufacturing

Compliance Labels - Labels to comply with the RoHS directive for lead-free manufacturing processes, EIA-standard marking and UL-listed and CSA-certified labels.

Printed Circuit Board Labels - Bar code or alphanumeric identification of printed circuit boards track production lots, warranty information, product authentication, and registration applications.

Cable and Wire Identification - Wrap around, ties and specialty labels for cables, wire harnesses and assemblies.

Kitted Labels speed production labeling, increases the accuracy of complete parts labeling, and drives down label costs.

DoD Military Compliance Labels for MIL-STD-129 including RFID for shipping cartons, pallets, and containers as well as MIL-STD-130 Unit Labels including UID. Preprinted labels are available for quick turnaround and 100% compliance.

Preprinted Labels - with eye-catching warnings, graphics, logos, with room to print lot number and other variable information on demand.
The Complete Solution with ID Technology

ID Technology delivers innovative and reliable bar code and specialty label printing solutions to meet your specific business application. We can assist you in selecting the right product, the proper ribbon, the correct labeling materials, exact sizes, and even distinctive shapes - all backed by our after-the-sale field service to simplify your label and bar coding experience. What makes ID Technology different?

ID Technology manufacturers labels and understands how every aspect of the label must be designed to meet and exceed longevity, performance and formatting requirements of your application.

We have been designing bar code and labeling systems for decades in many different industries. We understand the challenges of the most demanding client applications. Our six label converting and printing operations across the US deliver the kind of service to ensure your labeling success.
Nationwide Service & Support

We pride ourselves in providing responsive nationwide customer service and support from any of our 17 regional sales, service and stocking facilities.

ID Technology technicians are PMMI Certified Trainers to ensure the highest standards of quality training are being met and unparalleled value is being given to the customer.

Our field service personnel are factory trained to service and support our full range of labeling, coding and marking equipment.

In addition to the field service team, ID Technology employs factory trained bench service technicians to accommodate timely depot service.

ID Technology boasts six label converting plants across the US and Canada that produce top quality labels and tags with local support.

Complimentary Limited Lifetime Equipment Warranty

For customers using ID Technology labels with our labeling systems, we provide a lifetime limited equipment warranty free of charge. Just ask us for details!