ANTISTAT™
ESD & PRODUCTION CONSUMABLES

INTEGRITY™
CLEANROOM PRODUCTION SOLUTIONS

Learning about Electrostatic Discharge - Part 6:

Dry Packaging of SMDs

Contents

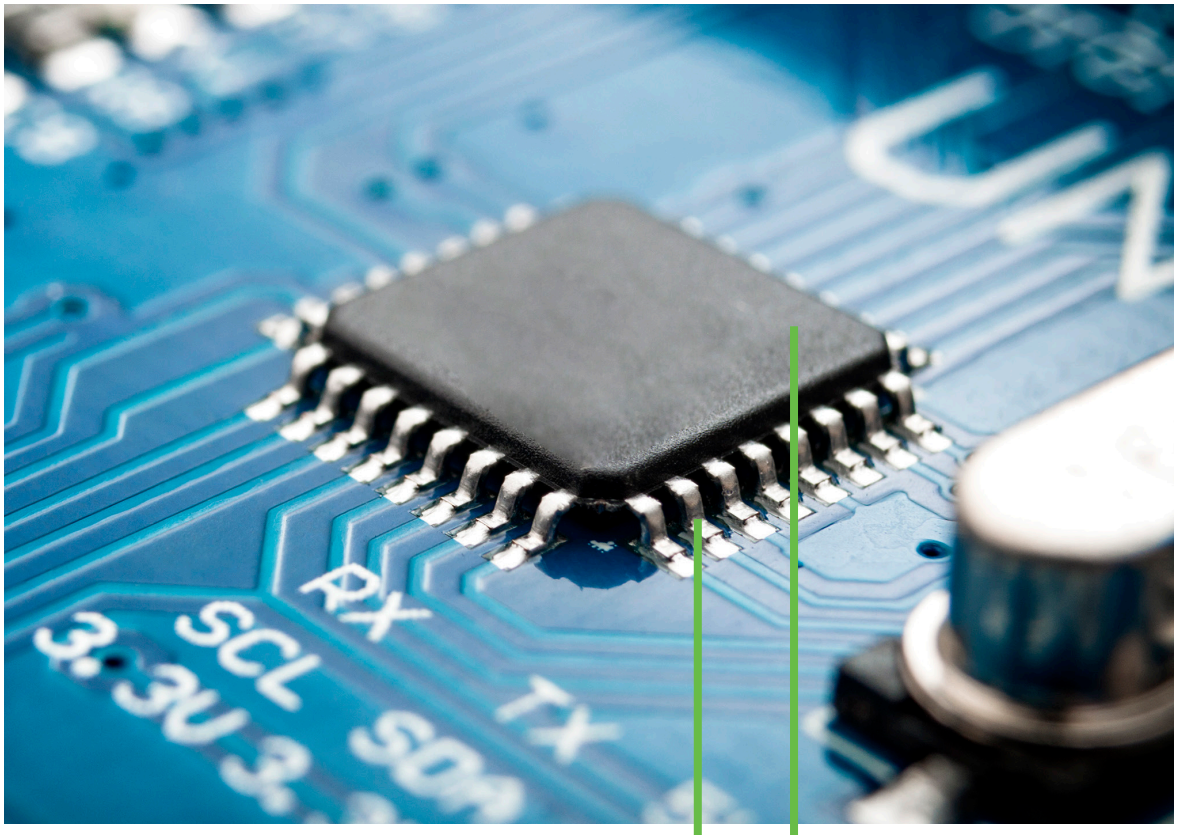
Why do SMD's need to be Dry Packaged?

Why is dry packaging needed?

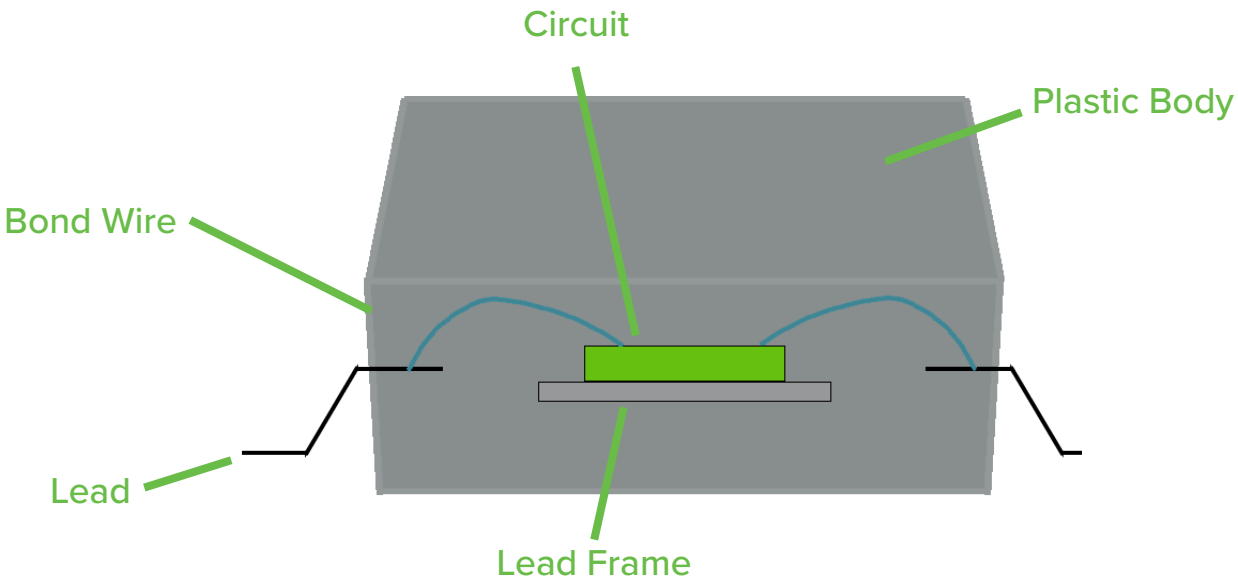
Dry packaging for SMDs (Surface Mounted Devices) is important for several reasons:

- Moisture sensitivity - many SMDs are sensitive to moisture which can damage their integrity, this only becomes apparent when the device is used
- Solderability - excess moisture can create issues with soldering
- Shelf Life - dry packaging helps to extend the shelf life of components
- Reliability - helps to prevent long term reliability problems
- Consistency in manufacturing - eliminates variability caused by moisture-related issues.

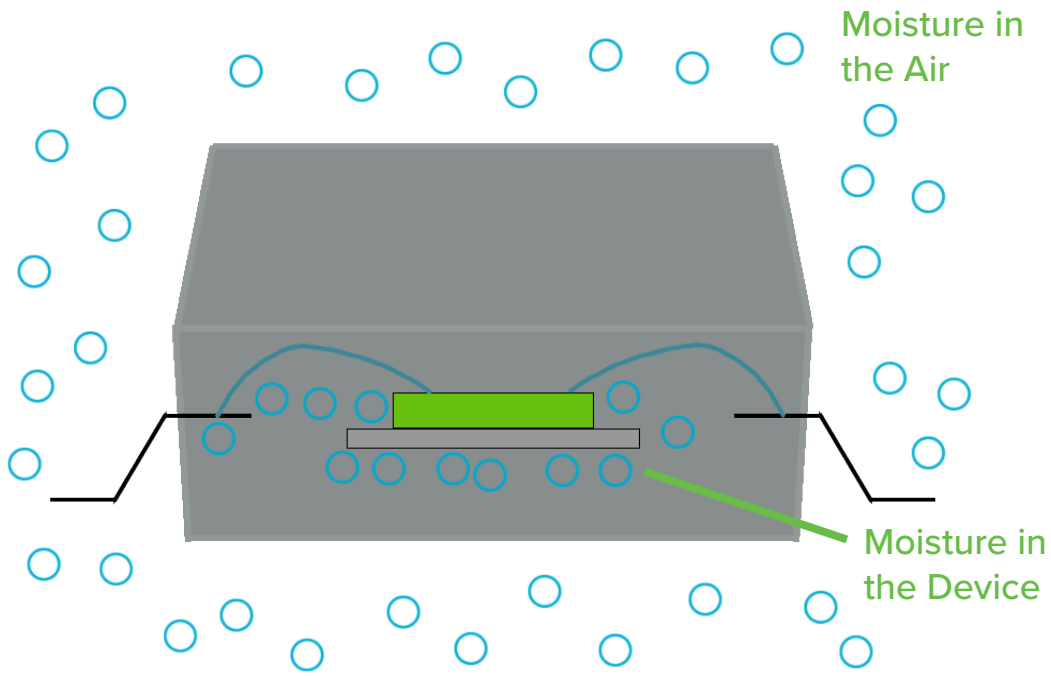
Below is an example of plastic packaged integrated circuit; (also called an "IC", "Chip" or a "Device"). Electronic devices are made up of a circuit (or die) packaged inside a plastic body with leads to connect the circuit to the board. The plastic body can absorb moisture (humidity) from the air.



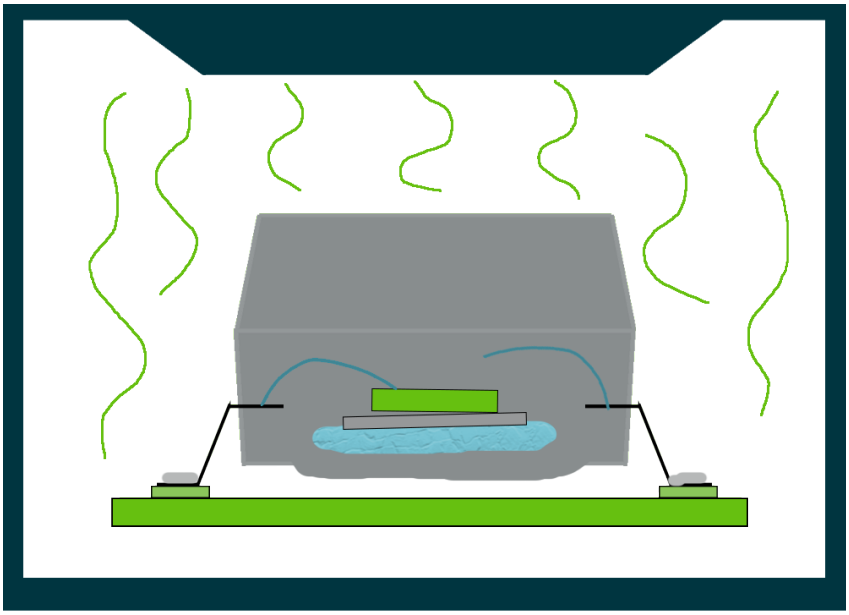
Here is a different view of the device. We can see the body, the circuit and the leads.



Moisture (or humidity) from the air diffuses inside the plastic body and collects around the spaces between the body and the circuit, lead frame, and wires.

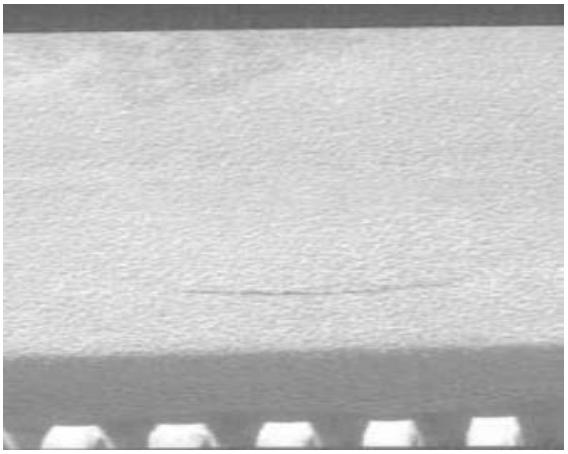


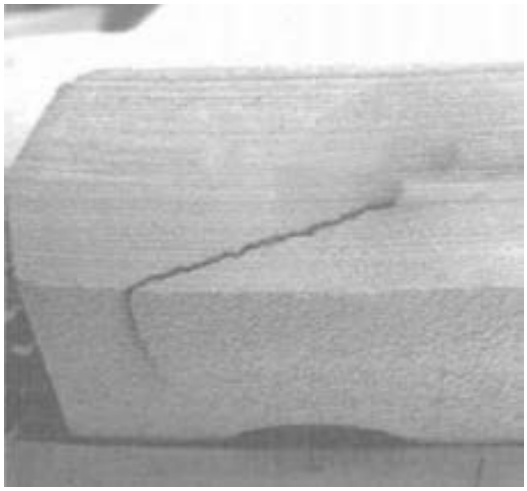
Surface Mount Devices (SMD's) are mounted to printed circuit boards by reheating solder on the pads. This technique, called reflow soldering, heats the circuit board, device leads, and the device case.



The device is placed on a printed circuit board (PCB) and heated in an oven to melt (reflow) solder. Solder connects the leads to the pads on the board. Moisture trapped inside the device case expands at a rate faster than the case causing the case to rupture. If the device case becomes broken it may cause immediate failure of, or damage to the device

Featured below are photos of damaged SMD's. These were not protected by a dry package. This is why it is important to keep SMD's dry before soldering.





When should dry packaging be used

SMD's must either be kept dry or slowly baked under controlled conditions removing any moisture on the device. Devices shipped without low moisture packaging must be baked, this can take up to 24 hours, delaying production, and the added expense of equipment to control temperature and humidity.

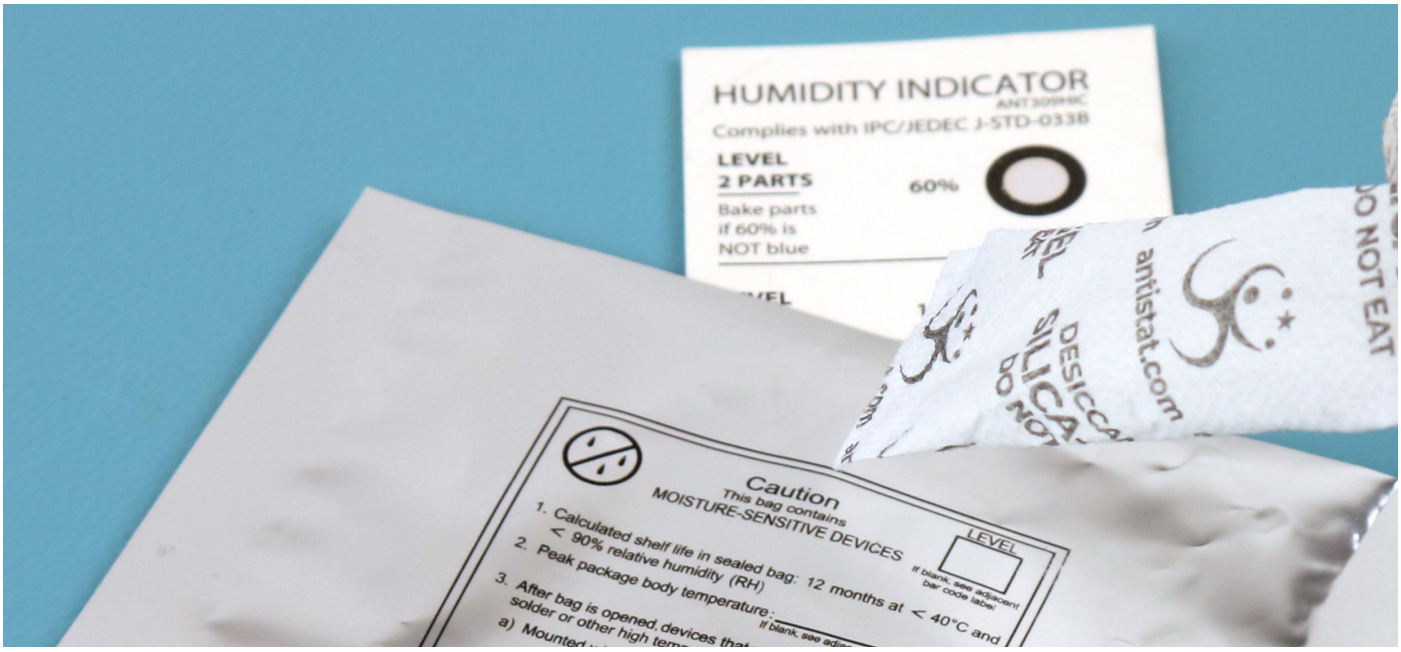
Keeping SMD's dry between manufacture and the point of reflow soldering has lead to the development of moisture barrier bags. These types of bags may also be referred to as vapour barrier bags.

Barrier bags are not moisture vapour proof nor do they remove moisture and over a period of time moisture vapour may leak into the bag.

To assist with this issue desiccant may be into the bag reducing humidity. Desiccants are perfect for protecting enclosed items that are susceptible to damage from moisture like electronic components, computer chips, loaded & vacuum packed JEDEC trays.

A humidity indicator card (HIC) may also be put into the bag to show the relative humidity with moisture-sensitive, colour-changing chemical dots.

As a final moisture impediment, vacuum packing may be used to remove air-containing moisture before the bag is heat-sealed.



The Major Components of the Dry Packaging Process

Moisture Barrier Bags*

Moisture Barrier Bags (MBB) work by enclosing a device with a metal or plastic shield that keeps moisture vapour from getting inside the bag. The bag also provides static protection.

Desiccants

Desiccant is a drying agent, which is packaged inside a porous pouch so that the moisture can get through the pouch and be absorbed by the desiccant.

Desiccant absorbs moisture vapour (humidity) from the air left inside the barrier bag after it has been sealed. Moisture that penetrates the bag will also be absorbed. Desiccant remains dry to the touch even when it is fully saturated with moisture vapour.

Humidity Indicator Cards

Humidity Indicator Cards (HIC's) are printed with moisture sensitive spots which respond to various levels of humidity with a visible colour change from blue to pink. The humidity inside barrier bags can be monitored by the HIC inside. When the bag is opened, the card is examined for proper dryness inside the bag. This indicates that the barrier bag and desiccant functioned correctly.

Bag Labels*

The moisture sensitive level (MSL) label tells us how long the devices can stay outside the bag before they have to be soldered onto the board. This label is applied to the outside of the bag. If the "level" box is blank, look on the barcode label nearby.

*For more information on bag and labels, please check out Part 3 of our guides
Part 3 - Choosing the Right ESD Bag

How to make a dry package

Step 1
Before placing the mat down you must wipe the area, leaving enough time for the surface to dry.

Step 2
Place the MSL label on the bag and note the proper level on the label.

Step 3
Place the tray stack (with desiccant and HIC) into the moisture barrier bag.

Step 4
Using a vacuum sealer*, remove **some** of the air from the bag. Only slight evacuation is needed.

Step 5
Use a heat sealer* to seal the bag closed.

Step 6
Now your devices are safe from moisture and static.

*Both vacuum and heat sealers can be ordered upon request. Please use the contact form via the QR code to the left to talk to a member of our staff.

Our Range

Moisture Barrier Bags

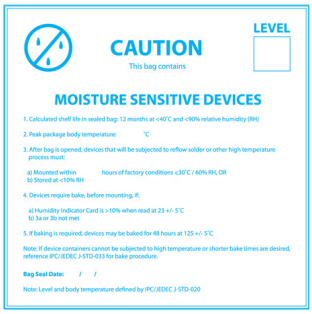
Moisture Barrier Bag (3.6, 4.4 & 6 Mil)

Desiccants

Silica Gel Desiccant

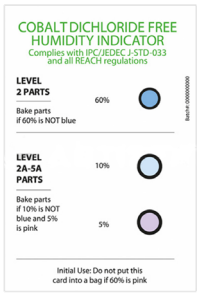
Bag Labels

Moisture Sensitive Device Labels

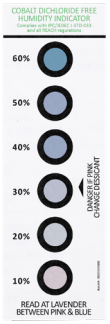


Humidity Indicator Cards

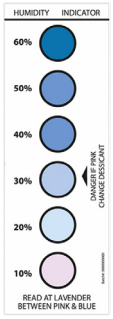
Cobalt Dichloride Free (3 Spot)



Cobalt Dichloride Free (6 Spot)



Standard (6 Spot)



For our full moisture control range follow the QR code to the left.
Contact our team for any further moisture control advice.

Notes:

ANTISTAT™ ESD & PRODUCTION CONSUMABLES

INTEGRITY™ CLEANROOM PRODUCTION SOLUTIONS

ISO 9001 QUALITY ASSURED

We are focused on meeting our customer's expectations and delivering exceptional customer satisfaction.

CUSTOMER FOCUSED APPROACH

With over 35 years' experience, our service culture is the very core of our customer's success.

STANDARD OF EXCELLENCE

From beginning to end our team of knowledgeable experts are here to help.

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