GENNUM

Gennum Recommended Dry Packing

Application Note

Background

The need to keep surface-mount devices (SMDs) dry between the time of manufacturing and the point of reflow soldering has driven the development of moisture barrier bags. Also known as vapour barrier bags, these bags are made from multiple layers of plastic and aluminium that control moisture vapour leakage.

Barrier bags are not moisture vapour-proof, nor do they remove moisture. Over time, moisture vapour will leak into the bag. Desiccant is put into the bag to reduce humidity and scavenge moisture that penetrates the bag.

A humidity indicator card (HIC) also may be put into the bag. HICs indicate the relative humidity with moisture-sensitive, color-changing chemical spots. HICs provide assurance the devices are dry when received.

As a final moisture impediment, the bag is evacuated to remove humid ambient air before the bag is heat-sealed.

The dry packing procedure followed by Gennum Corporation was created based on the industry standard Jedec J-STD-033. This standard describes the requirements for moisture barrier bags, desiccants and for humidity indicator cards.

1, Moisture Barrier Bags

The moisture barrier bag shall meet MIL-PRF-81705, TYPE I requirements for flexibility, ESD protection, mechanical strength, and puncture resistance. The bags shall be heat sealable. The Water Vapor Transmission Rate (WVTR) shall be ≤0.002 gm/100 in2 in 24 hrs at 40°C after flex testing per condition "E"ASTM F 392. The WVTR is measured using ASTM F 1249.*

2, Desiccant

The desiccant material shall meet MIL-D-3464, TYPE II. Desiccant shall be dustless, non-corrosive, and absorbent to amounts specified in the standard. The desiccant shall be packaged in moisture permeable bags or pouches. The amount of desiccant used, per moisture barrier bag, shall be based on the bag surface area and WVTR in order to maintain an interior relative humidity in the MBB of less than 10% at 25°C. For comparison between various desiccant types, military specifications adopted the "UNIT" as the basic unit of measure of quantity for desiccant material. A UNIT of desiccant is defined as the amount that will absorb a minimum of 2.85 g of water vapor at 20% RH and 25°C. To meet the dry pack requirements of this standard the amount of water vapor that a UNIT of desiccant can absorb at 10% RH and 25°C must be known.

When the desiccant capacity at 10% RH and 25°C is known the following equation should be used.*

U = (0.304 * M * WVTR * A)/D

where:

U = Amount of desiccant in UNITS
M = Shelf life desired in months
WVTR = Water vapor transmission rate in grams/100 in2 in 24 hrs
A = Total surface area of the MBB in square inches
D = The amount of water in grams, that a UNIT of desiccant will absorb at 10% RH and 25°C

When the desiccant capacity at 10% RH and 25°C is not known the quantity needed can be estimated using the following simplified equation.

U = 5 X 10-3 A

where:

U = Amount of desiccant in UNITS
A = Total surface area of the MBB in square inches

Note: If materials such as trays, tubes, reels, foam end caps, etc., are placed in the bag without baking, additional desiccant will be required to absorb the moisture contained in these materials.

3, Humidity Indicator Card

The HIC shall comply with MIL-I-8835. At minimum, the HIC shall have three color dots with sensitivity values of 5% RH, 10% RH, 15% RH.**

Gennum's recommendations

All moisture sensitive devices from Gennum Corporation or from its distributors will be shipped in a dry pack which meets or exceeds industry requirements. Parts in their original package shall have at least 2 years shelf life against moisture ingress.

If the original sealed package is opened by the customer before actual assembly (reflow) of the devices, the following recommendations should be observed:

- Application of proper ESD protection (grounding of both work station and personnel)
- Controlled environment (temperature/humidity)
- Every time the bag is opened, both the desiccant (proper quality and quantity) and the humidity indicator card should be replaced, even if the HIC is not discoloured before reseal.
- If the cumulative time that the package is open in a controlled environment exceeds 2 hours, it is recommended that the enclosed devices be baked for 24 hours at 125°C or for 48 hours at 90°C prior to reflow.
- If the enclosed humidity indicator card is discoloured it is recommended that the enclosed devices be baked for 24 hours at 125°C or for 48 hours at 90°C prior to reflow.
- The bag should be evacuated and resealed using vacuum sealer. The sealer conditions should be verified to ensure integrity of the bag seal.

Note: Always consult with your desiccant supplier about the proper baking procedure (if applicable) for the actual desiccant before trying to reactivate it.

- Saturated desiccants can be reactivated, by baking them.
- If the dry packing material is replaced by the customer, it is recommended that all dry packing materials meet or exceeds Jedec J-STD-033 standard. For MBB we have qualified the following bags:
  - a, SCC Dri-Shield 3400
  - b, Richmond Drypack 3700 (a.k.a. Protective Pak 3700)

Bag Size

MBB	Shelf Life	10 X 10	6 X 30	10 X 20	16 X 18	10 X 30
		Required unit of desiccant per bag				
SCC Dri-Shield 3400	60 months	1	1	1	1	1
Richmond Drypack 3700	60 months	1	1	1	1	1

CAUTION
ELECTROSTATIC SENSITIVE DEVICES
DO NOT OPEN PACKAGES OR HANDLE
EXCEPT AT A STATIC-FREE WORKSTATION

DOCUMENT IDENTIFICATION
APPLICATION NOTE
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GENNUM CORPORATION
Mailing Address: P.O. Box 489, Stn. A, Burlington, Ontario, Canada L7R 3Y3
Shipping Address: 970 Fraser Drive, Burlington, Ontario, Canada L7L 5P5
Tel. +1 (905) 632-2996 Fax. +1 (905) 632-5946

GENNUM JAPAN CORPORATION
Shinjuku Green Tower Building 27F, 6-14-1, Nishi Shinjuku, Shinjuku-ku, Tokyo, 160-0023 Japan
Tel. +81 (03) 3349-5501, Fax. +81 (03) 3349-5505

GENNUM UK LIMITED
25 Long Garden Walk, Farnham, Surrey, England GU9 7HX
Tel. +44 (0)1252 747 000 Fax +44 (0)1252 726 523

www.gennum.com