

drying cabinet

MP DRY CABINET

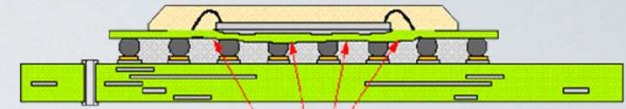


TECHNOLOGY AND MATERIALS FOR ELECTRONIC PRODUCTION

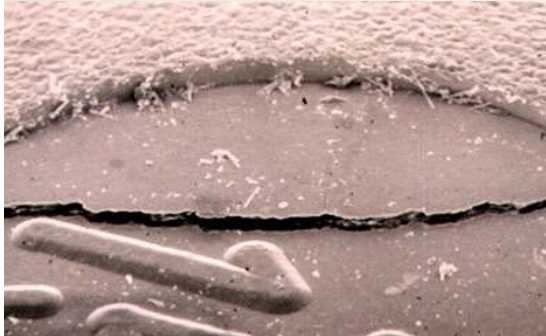
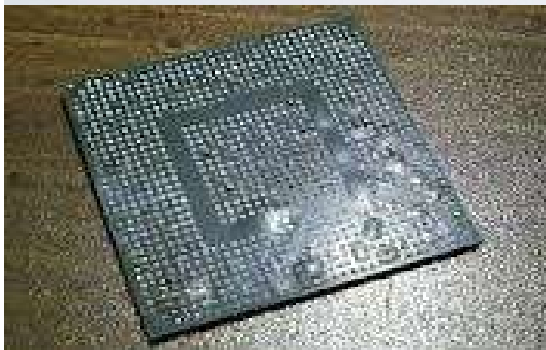
Why MSD issues?

Moist components / PCBs can cause serious problems in the production

Production failures can be dangerous, in every possible way irritating and can even lead to customers looking for different suppliers



BGAs are „popcorning“ mostly down



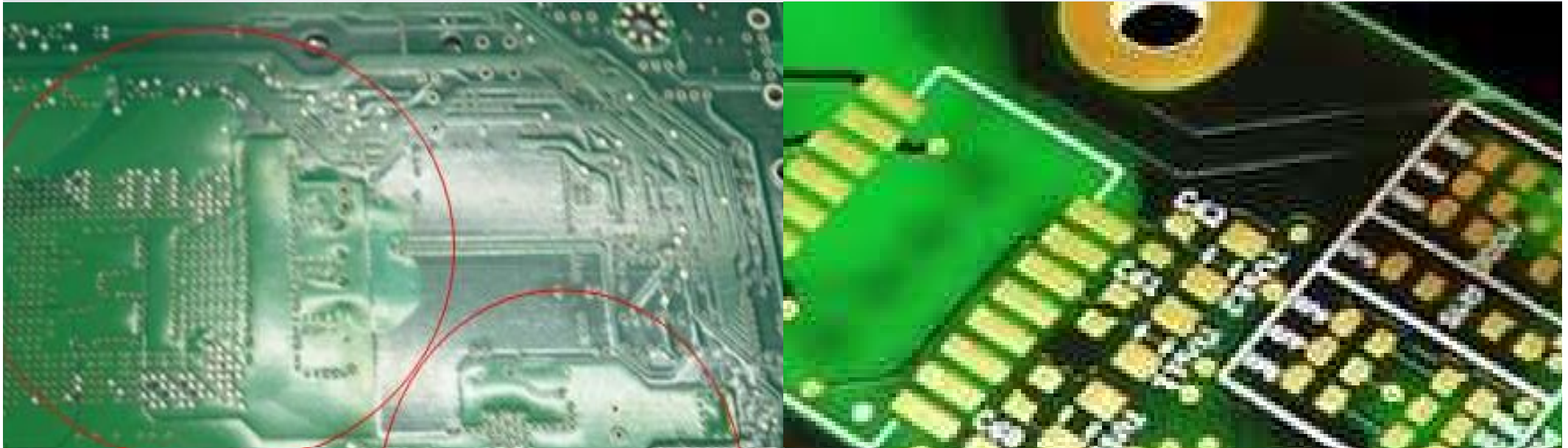
- Moisture and components do not mix
- Packing materials made from plastic often accumulate moisture
- If the critical point of moisture penetrating the plastic packing is reached, the component can be damaged during the soldering process („Popcorning / Popcorn effect “)
- These failures are often hard to visibly detect and lead to massive product damage in a long time period
- Lead free - higher temperatures increase the risk of damage

HUMIDITY vs. PCB

DELAMINATION of PCB

The next problem of long time exposure to moisture can be the delamination of the non-solder mask after the reflow process

PAD OXIDATION

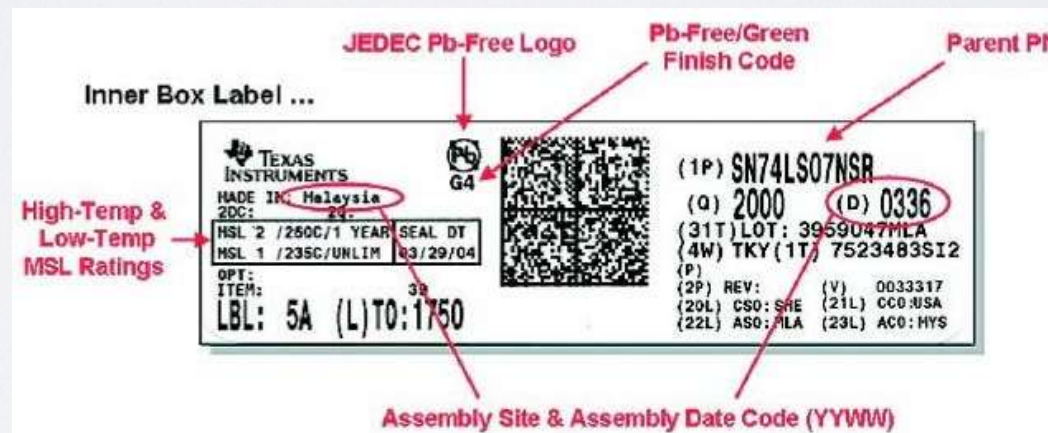


MSL Levels acc. IPC

Table 5-1 Moisture Classification Level and Floor Life

Level	Floor Life (out of bag) at Factory Ambient $\leq 30^{\circ}\text{C}/60\% \text{ RH}$ or as Stated
1	Unlimited at $\leq 30^{\circ}\text{C}/85\% \text{ RH}$
2	1 year
2a	4 weeks
3	168 hours
4	72 hours
5	48 hours
5a	24 hours
6	Mandatory bake before use. After bake, must be reflowed within the time limit specified on the label.

MSD Label example



MP DRY CABINET ST series

Fast and very effective way of components/PCB drying and storage with a very low RH

MP DRY CABINET LT series

Cost effective solution for longtime storage with a very low RH



Why MP DRY CABINET

- Perfectly dries out all stored components and PCBs
- Absolutely no maintenance
- Low running costs
 - perfect insulation (ST series)
 - perfect airtightness
 - no purchase of consumable materials needed (MBB bags, dessicant bags)
- Fully controlled process – **PLC INTEGRATED LOGGER** for data recording and traceability
- Fast access => flexibility => time saving => higher effectivity

Two independent chambers system

Four independent chambers system



Why MP DRY CABINET

**SENSOR LOCATION IN A CABINET, TOP OR BOTTOM??
VS. ACCURACY OF INTERNAL RH MEASUREMENTS?**

Increased moisture content will reduce the density of the moist air - Dry air is more dense than moist air.

This occurs because the molar mass of water (18 g/mol) is less than the molar mass of dry air (around 29 g/mol)

Dry air is heavier than a moist air!!!

**SENSORS LOCATED IN THE BOTTOM PART OF CABINETS
DO NOT REFLECT THE REAL CONDITIONS OF INTERNAL
AIR HUMIDITY!!!**

**THE SENSOR LOCATION IN OUR MP DRY CABINETS
GUARANTEES THE REAL REST HUMIDITY VALUES OVER
THE ENTIRE CABINET VOLUME!!!**



ROTRONIC SENSOR

accuracy +/-0.8% RH, +/- 0.1K (standard)

MP DRY CABINET ST

≤ 0.5% RH

Ø ≤ 1%RH/24h

MAX. 60°C

MP DRY CABINET I ST

260 l / 1x door

MP DRY CABINET II ST

550 l / 2x doors

MP DRY CABINET IV ST

1010 l / 4x doors



Two or four doors for II and IV = reduced cabinet ventilation

MP DRY CABINET ST

Standard equipment

- Full graphic touch screen display
- Complete stainless steel ESD safe body with a ESD grounding point
- Stainless steel shelves 3 / 5 / 10, adjustable in 20mm steps (ESD safe)
- Insulation of 30mm
- Di-thermal metal coated glass - saves energy, safe to touch even at 60°C
- ESD wheels for easy handling + ESD safe stainless steel legs
- Acoustic alarm for drying unit errors
- Acoustic alarm of opened doors, time defined by user
- Internal Data Logger with memory and USB connector for recording the running conditions and door openings with the duration and interval defined by the user
- LAN connection for data download via ethernet
- 2x drying unit MPDRY5 for MP DRY CABINET IV ST !!

MP DRY CABINET ST

Options

- Lockable doors with mechanic locks (1 / 2 / 4)
- Status lamp (red/green)
- Insulation 45mm / 60mm (for even greater energy savings)
- Internal LED Light
- Slide out shelves
- **Electromagnetic lock with timer function or password protection for each door**
- **Electromagnetic lock with RFID function and access SW**
- temperature increase up to 70°C
- 2x drying unit MPDRY5 and heaters for MP DRY CABINET II !!
- Up to 4x drying unit MPDRY5 and heaters for MP DRY CABINET IV !!
- **Two independent chambers system for MP DRY CABINET II and IV**
- **Four independent chambers system for MP DRY CABINET IV**

- **Custom made solutions**

MP DRY CABINET LT

Effective **solution**
for longtime
storage

≤ 0.5% RH

Ø ≤1%RH/24h

MAX. 40°C (option)

MP DRY CABINET I LT

315 l / 1x door

MP DRY CABINET II LT

690 l / 2x doors

MP DRY CABINET IV LT

1385 l / 4x doors



Two or four doors for II LT and IV LT = reduced cabinet ventilation

MP DRY CABINET LT

Standard equipment

- Full graphic touch screen display
- Complete ESD safe body (RAL7016) with an ESD grounding point
- ESD safe shelves 3 / 5 / 10, adjustable in 20mm steps
- ESD wheels for an easy handling + ESD safe stainless steel legs
- Acoustic alarm for drying unit error
- Acoustic alarm of opened doors, time defined by user
- Internal Data Logger with memory and USB connector for recording of running conditions and door openings with duration, interval defined by user
- LAN connection for data download via ethernet
- 2x drying unit MPDRY5 for MP DRY CABINET IV LT

MP DRY CABINET LT

Options

- Internal heating unit, max 40°C
- Lockable doors with mechanic locks (1 / 2 / 4)
- Status lamp (red/green)
- Internal LED light
- Slide out shelves
- **Electromagnetic lock with timer function or password protection for each door**
- **Electromagnetic lock with RFID function and access SW**
- 2x drying unit MPDRY5 and/or heatings for MP DRY CABINET II LT
- Up to 4x drying unit MPDRY5 and/or heatings for MP DRY CABINET IV LT
- **Two independent chambers system for MP DRY CABINET II LT and IV LT**
- **Four independent chambers system for MP DRY CABINET IV LT**

- **Custom made solutions**

Two and four independent chambers system

- each chamber is thermally and hermetically separated
- each chamber is equipped with its own drying unit, sensor and touch screen control panel
- different parameters can be set up in every chamber separately
- data from each chamber are tracked via LAN or USB separately
- electromagnetic lock for each chamber with own time parameters possible



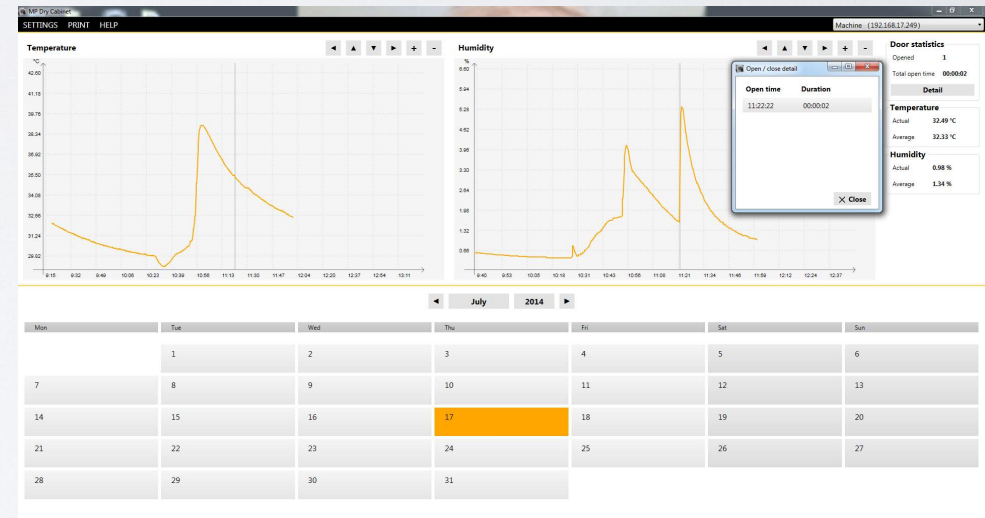
Software for internal parameters recording

DryCabinet SW

SW for graphical display of temperature and humidity inside the cabinet in a time curve.

It also shows the number of door openings per day with a timestamp, total open time and an average of the days measured values.

Connection via LAN for on-line data transfer

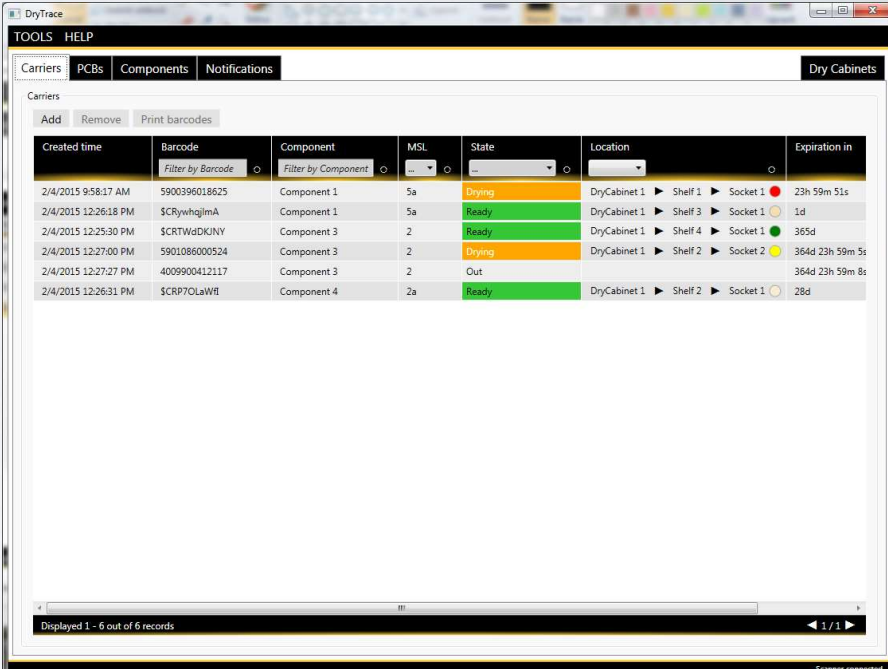


Software for Storage Management and Traceability

DRYTrace

-SW for storage management of carriers and PCBs inside the drying cabinet. The User is informed what is in which cabinet and where the materials are in a specific cabinet by using names and color codes for each shelf and shelving compartment. There is also the expiry time for each component being shown and how long it will take, under current conditions to dry out completely.

- Data input via 1D / 2D scanner
- Material library for easy identification
- User defined MSL level and current dry cabinet settings (temperature + humidity)
- Alarm for expired components
- Quantity can be manually added
- Scanner for locations outside of the cabinet is also possible



The screenshot shows the DRYTrace software interface. At the top, there are tabs for 'Carriers', 'PCBs', 'Components', and 'Notifications'. Below the tabs, there are buttons for 'Add', 'Remove', and 'Print barcodes'. The main area contains a table with the following columns: 'Created time', 'Barcode', 'Component', 'MSL', 'State', 'Location', and 'Expiration in'. The table contains six rows of data, each representing a component with its respective details and status.

Created time	Barcode	Component	MSL	State	Location	Expiration in
2/4/2015 9:58:17 AM	5900396018625	Component 1	5a	Drying	DryCabinet 1 ▶ Shelf 1 ▶ Socket 1	23h 59m 51s
2/4/2015 12:26:18 PM	\$CRywhqjlmA	Component 1	5a	Ready	DryCabinet 1 ▶ Shelf 3 ▶ Socket 1	1d
2/4/2015 12:25:30 PM	\$CRTWgDKJNY	Component 3	2	Ready	DryCabinet 1 ▶ Shelf 4 ▶ Socket 1	365d
2/4/2015 12:27:00 PM	5901086000524	Component 3	2	Drying	DryCabinet 1 ▶ Shelf 2 ▶ Socket 2	364d 23h 59m 5s
2/4/2015 12:27:27 PM	4009900412117	Component 3	2	Out		364d 23h 59m 8s
2/4/2015 12:26:31 PM	\$CRP7OLaWfH	Component 4	2a	Ready	DryCabinet 1 ▶ Shelf 2 ▶ Socket 1	28d

At the bottom of the interface, it says 'Displayed 1 - 6 out of 6 records' and 'Scanner connected'.

DryTrace SW - Carriers List

DryTrace

TOOLS HELP

Carriers PCBs Components Notifications Dry Cabinets

Carriers

Add Remove Print barcodes

Created time	Barcode <i>Filter by Barcode</i>	Component <i>Filter by Component</i>	MSL	State	Location	Expiration in
2/4/2015 9:58:17 AM	5900396018625	Component 1	5a	Drying	DryCabinet 1 ▶ Shelf 1 ▶ Socket 1	23h 59m 51s
2/4/2015 12:26:18 PM	\$CRywhqjlmA	Component 1	5a	Ready	DryCabinet 1 ▶ Shelf 3 ▶ Socket 1	1d
2/4/2015 12:25:30 PM	\$CRTWdDKJNY	Component 3	2	Ready	DryCabinet 1 ▶ Shelf 4 ▶ Socket 1	365d
2/4/2015 12:27:00 PM	5901086000524	Component 3	2	Drying	DryCabinet 1 ▶ Shelf 2 ▶ Socket 2	364d 23h 59m 5s
2/4/2015 12:27:27 PM	4009900412117	Component 3	2	Out		364d 23h 59m 8s
2/4/2015 12:26:31 PM	\$CRP7OLaWfi	Component 4	2a	Ready	DryCabinet 1 ▶ Shelf 2 ▶ Socket 1	28d

Displayed 1 - 6 out of 6 records

Scanner connected

RFID Access control system

RFID SW

- This software is a combination of our DRY CABINET SW (on-line graphical display of temperature and humidity inside of the cabinet + count of door openings) and a cabinet equipped with electromagnetic locks and a RFID reader.
- Operator has to scan his/her RFID card to get access to the cabinet. The operator will have the possibility to open only the doors, which are assigned to his/her RFID card, all other doors remain locked.
- The details about time, duration and operator's name are collected and can be shown.

The only real time Access Control System on the market.



Thank you!