

April 2002

## Introduction

It is common knowledge throughout the electronics industry that certain plastic packages are susceptible to moisture-related failure mechanisms during board assembly. Excess moisture in these packages can turn to steam during the board solder process, causing package blistering and mechanical problems. This sensitivity to the moisture content of a plastic package led to the implementation of the industry standard practice known as Dry Pack.

## What is Dry Pack?

Dry Pack is a process whereby plastic encapsulated semiconductors are first baked to drive all moisture out of the package and then vacuum-sealed in a waterproof bag by the manufacturer to prevent any subsequent absorption of moisture. As a further precaution, a desiccant (moisture absorbing) material and a Humidity Indicator Card (see Figure 1) are sealed in the bag as well. The desiccant absorbs any residual moisture in the sealed bag. The Humidity Indicator Card indicates the relative humidity inside the sealed bag and provides an instant alert to any user who opens a sealed bag and finds a Humidity Indicator Card reading of 20% or higher.

## Lattice's Dry Pack Procedures

Lattice Semiconductor Dry Packs all moisture sensitive plastic packages in compliance with this industry standard practice. Unfortunately, Dry Packed shipments alone can't guarantee trouble-free use of these moisture sensitive packages. Special handling procedures must be followed by all who handle this product after initial shipment by Lattice Semiconductor. If these Dry-Pack handling procedures are followed, unwanted moisture will not be absorbed by the packages and a vapor-phase or infrared solder reflow process will not cause any moisture induced quality problems.

Lattice Semiconductor documents proper Dry Pack handling procedures on a label (see Figure 2) placed on the outside of every Dry Packed bag shipped. Since handling procedures may vary due to the differences in the moisture sensitivity level of each package, customers should reference the dry pack label for handling information specific to the product within.

**Figure 1. Humidity Indicator Card**

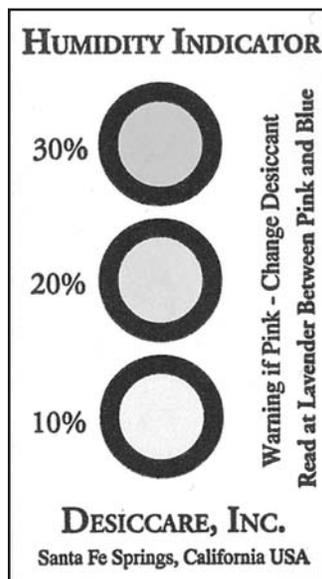


Figure 2. Dry Pack Labels

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <h2 style="margin: 0;">CAUTION</h2> <p style="margin: 0;">This Bag Contains <b>MOISTURE-SENSITIVE DEVICES</b></p> </div> <div style="border: 1px solid black; padding: 2px; text-align: center;"> <small>LEVEL</small>  <span style="font-size: 1.5em; font-weight: bold;">2A</span> </div> </div> <ol style="list-style-type: none"> <li>1. Shelf life in sealed bag: 12 months minimum at &lt;math&gt;-40^{\circ}\text{C}&lt;/math&gt; and &lt;math&gt;&lt;90\%&lt;/math&gt; Relative Humidity (RH).</li> <li>2. UPON opening this bag, devices to be subjected to I.R., V.P.R. or equivalent process must be:             <ol style="list-style-type: none"> <li>a) Mounted within 4 weeks at factory conditions of &lt;math&gt;\leq 30^{\circ}\text{C}/60\%&lt;/math&gt; RH, or</li> <li>b) Stored at &lt;math&gt;\leq 20\%&lt;/math&gt; RH.</li> </ol> </li> <li>3. Devices require baking, before mounting, if:             <ol style="list-style-type: none"> <li>a) Humidity Indicator Card is &gt;20% when read at &lt;math&gt;23^{\circ}\text{C}\pm 5^{\circ}\text{C}&lt;/math&gt;, or if</li> <li>b) 2a or 2b are not met.</li> </ol> </li> <li>4. If baking is required, devices may be baked for:             <ol style="list-style-type: none"> <li>a) 192 hours at &lt;math&gt;40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}&lt;/math&gt; and &lt;math&gt;&lt;5\%&lt;/math&gt; RH for low temperature devices containers, or</li> <li>b) 24 hours at &lt;math&gt;125^{\circ}\text{C}\pm 5^{\circ}\text{C}&lt;/math&gt; for high temperature device containers.</li> </ol> </li> </ol> <p style="margin-top: 5px;">Bag Seal Date: _____</p> <p style="font-size: 0.8em; margin: 0;">LBL-005 (If blank, see bar code label)</p>	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <h2 style="margin: 0;">CAUTION</h2> <p style="margin: 0;">This Bag Contains <b>MOISTURE-SENSITIVE DEVICES</b></p> </div> <div style="border: 1px solid black; padding: 2px; text-align: center;"> <small>LEVEL</small>  <span style="font-size: 1.5em; font-weight: bold;">3</span> </div> </div> <ol style="list-style-type: none"> <li>1. Shelf life in sealed bag: 12 months minimum at &lt;math&gt;-40^{\circ}\text{C}&lt;/math&gt; and &lt;math&gt;&lt;90\%&lt;/math&gt; Relative Humidity (RH).</li> <li>2. UPON opening this bag, devices to be subjected to I.R., V.P.R. or equivalent process must be:             <ol style="list-style-type: none"> <li>a) Mounted within 168 hours at factory conditions of &lt;math&gt;\leq 30^{\circ}\text{C}/60\%&lt;/math&gt; RH, or</li> <li>b) Stored at &lt;math&gt;\leq 20\%&lt;/math&gt; RH.</li> </ol> </li> <li>3. Devices require baking, before mounting, if:             <ol style="list-style-type: none"> <li>a) Humidity Indicator Card is &gt;20% when read at &lt;math&gt;23^{\circ}\text{C}\pm 5^{\circ}\text{C}&lt;/math&gt;, or if</li> <li>b) 2a or 2b are not met.</li> </ol> </li> <li>4. If baking is required, devices may be baked for:             <ol style="list-style-type: none"> <li>a) 192 hours at &lt;math&gt;40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}&lt;/math&gt; and &lt;math&gt;&lt;5\%&lt;/math&gt; RH for low temperature device containers, or</li> <li>b) 24 hours at &lt;math&gt;125^{\circ}\text{C} \pm 5^{\circ}\text{C}&lt;/math&gt; for high temperature device containers.</li> </ol> </li> </ol> <p style="margin-top: 5px;">Bag Seal Date: _____</p> <p style="font-size: 0.8em; margin: 0;">(If blank, see bar code label)</p>	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <h2 style="margin: 0;">CAUTION</h2> <p style="margin: 0;">This Bag Contains <b>MOISTURE-SENSITIVE DEVICES</b></p> </div> <div style="border: 1px solid black; padding: 2px; text-align: center;"> <small>LEVEL</small>  <span style="font-size: 1.5em; font-weight: bold;">4</span> </div> </div> <ol style="list-style-type: none"> <li>1. Shelf life in sealed bag: 12 months minimum at &lt;math&gt;-40^{\circ}\text{C}&lt;/math&gt; and &lt;math&gt;&lt;90\%&lt;/math&gt; Relative Humidity (RH).</li> <li>2. UPON opening this bag, devices to be subjected to I.R., V.P.R. or equivalent process must be:             <ol style="list-style-type: none"> <li>a) Mounted within 72 hours at factory conditions of &lt;math&gt;\leq 30^{\circ}\text{C}/60\%&lt;/math&gt; RH, or</li> <li>b) Stored at &lt;math&gt;\leq 20\%&lt;/math&gt; RH.</li> </ol> </li> <li>3. Devices require baking, before mounting, if:             <ol style="list-style-type: none"> <li>a) Humidity Indicator Card is &gt;20% when read at &lt;math&gt;23^{\circ}\text{C}\pm 5^{\circ}\text{C}&lt;/math&gt;, or if</li> <li>b) 2a or 2b are not met.</li> </ol> </li> <li>4. If baking is required, devices may be baked for:             <ol style="list-style-type: none"> <li>a) 192 hours at &lt;math&gt;40^{\circ}\text{C} + 5^{\circ}\text{C}/-0^{\circ}\text{C}&lt;/math&gt; and &lt;math&gt;&lt;5\%&lt;/math&gt; RH for low temperature devices containers, or</li> <li>b) 24 hours at &lt;math&gt;125^{\circ}\text{C}\pm 5^{\circ}\text{C}&lt;/math&gt; for high temperature device containers.</li> </ol> </li> </ol> <p style="margin-top: 5px;">Bag Seal Date: _____</p> <p style="font-size: 0.8em; margin: 0;">LBL-006 (If blank, see bar code label)</p>
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