



## WHITE HORSE STRATEGIC SOLUTIONS

### **Inspection Level 2 – Physical Inspection**

This is White Horse’s higher-level inspection service, which includes our Level 1 inspection plus Decapsulation, X-ray, and solderability.

*Decapsulation* is a process by which we remove the plastic or ceramic insulation from the part to examine the internal die and wafer. This is a destructive test (parts cannot be used again after “decap”) but is the best way to determine whether components are counterfeit.

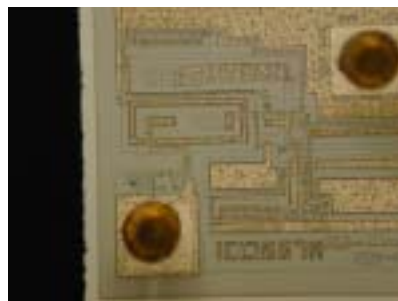
Radiography, or “*X-ray*”, looks through the soft insulation of the part to photograph the hardware of the part (dies, wafers, wires, leadframe) without damaging or destroying. Most internal physical damage to components is caused during their assembly process, when the wafer is attached to the die and terminals and then insulated, which result in electrical failures such as opens and shorts.

*X-ray* identifies cracked dies and wafers, crossed wires (shorts), broken wires or separate wire bonding (opens), and even missing wafers (dummy parts).

White Horse follows the international JEDEC standard for *solderability* using the “dip and look” process. Terminals are submerged in flux and then a solder bath (lead-free or regular leaded) in accordance with the standard. To pass *solderability*, the new solder must cover 95% of the solder pad and show proper wicking on the terminal leg. Parts that fail solderability are difficult to connect to the circuit board.

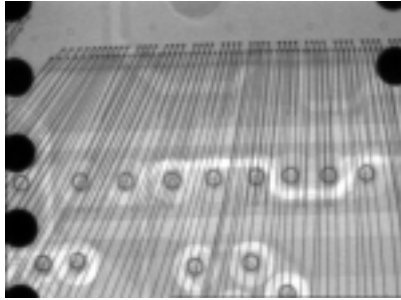
A complete report including photographs and comments is submitted with each order.

### **Decapsulation**

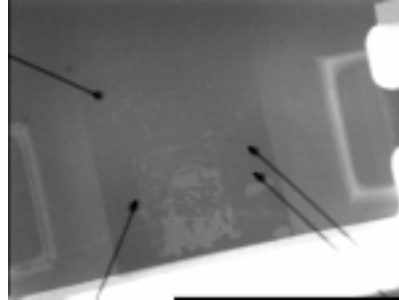


This component was marked as On Semi MC34152P; however Decapsulation revealed that the component was manufactured by Intersil. This component is counterfeit.

## Radiography (X-ray)



**Secure internal structure**



**Grey patches indicate moisture penetration**

X-ray looks through the plastic or ceramic insulation on the part to the hardware inside (wafer, die, wires, substrate, solder joints, etc.). The first photograph shows a complex part with good wire bonding, no damage to wafer or die, and no crossed or broken wires.

The second photograph shows good wire bonding, wire integrity, and no cracks or breaks in the wafer; however, the grey patches between the three wires toward the bottom of the photograph are either water pockets that have penetrated the component insulation. When the part is placed on the circuit board and goes through a reflow oven, the water will heat and turn to steam and try to escape. This rapid expansion causes the insulation of the part to explode, often referred to as “popcorning”.

## Solderability



**Fail**



**Pass**

Using JEDEC standard JESD22-B102D for “dip and look” test, terminals are submerged in flux and then dipped in solder to evaluate solder coverage on the pads and solder wicking. The first component fails solderability at less than 95% and the second has full solder coverage, passing solderability test.

Parts that fail solderability will have difficulties “sticking” to the printed circuit board in application and will have poor electrical connection.

**Inspection Level 2 includes visual inspection and one piece each for Decapsulation, radiography, and solderability. Standard price is USD220.00 with a lead-time of three (3) days.**