

## LEDs and 7-Segment Displays

## Application Note

# How to Avoid ChipLEDs Sticking to Cover Tape During Automated Tape-and-Reel Assembly

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### INTRODUCTION

Customers have informed Vishay that 0603 LEDs (ChipLEDs) supplied in tape and reel format sometimes stick to the PSA cover tape that is peeled off from the carrier tape during the assembly process. This application note describes the problem and provides a summary of precautions that can be used to prevent this unwanted effect from happening.

### DESCRIPTION OF THE PHENOMENON

As precautionary measure against ESD damage, a certain surface resistivity of the inner cover tape has to be assured. The slightly conductive plastic material protects the electronic components from ESD damage, but it probably does not completely avoid triboelectric charging. Since a ChipLED is very tiny and light, it can become more vulnerable to sticking on the cover tape if precautionary actions addressing the triboelectric effect are not well taken.

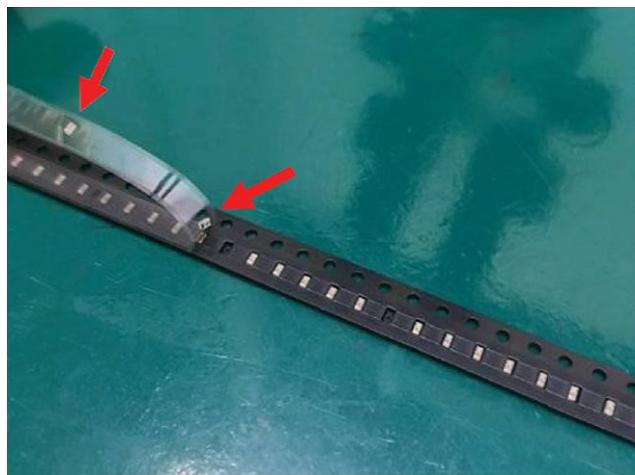


Fig. 1 - LEDs Stuck on Cover Tape During Peeling off the Tape

### COVER TAPE - GENERAL FEATURES

The cover tape in use is a conductive, high shear force adhesive cover tape designed with a pressure sensitive adhesive (PSA) layer along each edge that adheres it to the carrier tape to protect components from dropping out of the

tape after taping process. PSA cover tape is widely used by component manufacturers and it is made to have a consistent peeling force over the whole tape length.

This schematic diagram shows the relationship between the carrier tape and cover tape:

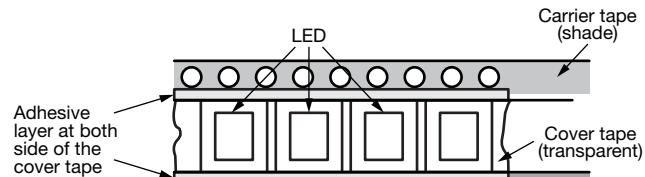


Fig. 2 - Carrier Tape and Cover Tape

### VERIFICATION ON COVER TAPE AND LED COMPONENTS - VISUAL ASSESSMENT

An optical inspection using a high power microscope verifies that there is no contamination or glue residue on the center of the inner surface of the cover tape and on the surface of the LED components.

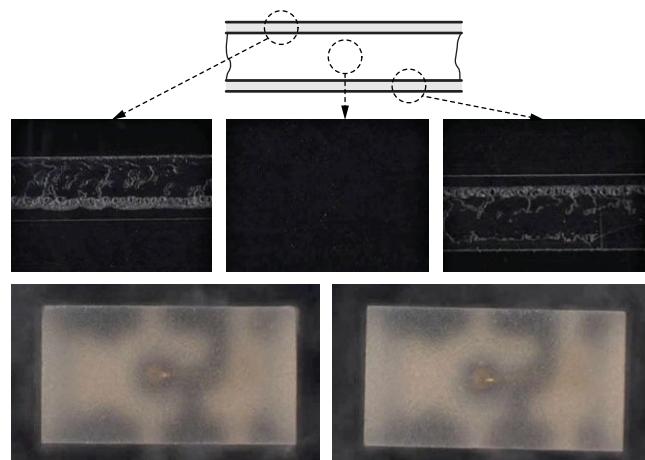


Fig. 3 - Close up View of Cover Tape and LED Surface

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### **VERIFICATION ON COVER TAPE - SURFACE RESISTANCE**

A surface resistance measurement on the cover tape using a surface resistance meter confirms that the resistance value of the inner surface, which is in direct contact with the LEDs, is within the specification of 10 kΩ to 1 MΩ.



Fig. 4 - Typical Surface Resistance Values of the Cover Tape

### **PREVENTING THE TRIBOELECTRIC EFFECT**

In order to prevent the triboelectric effect it is highly recommended to use an ionizer fan blowing directly to the LED during removal of the cover tape.

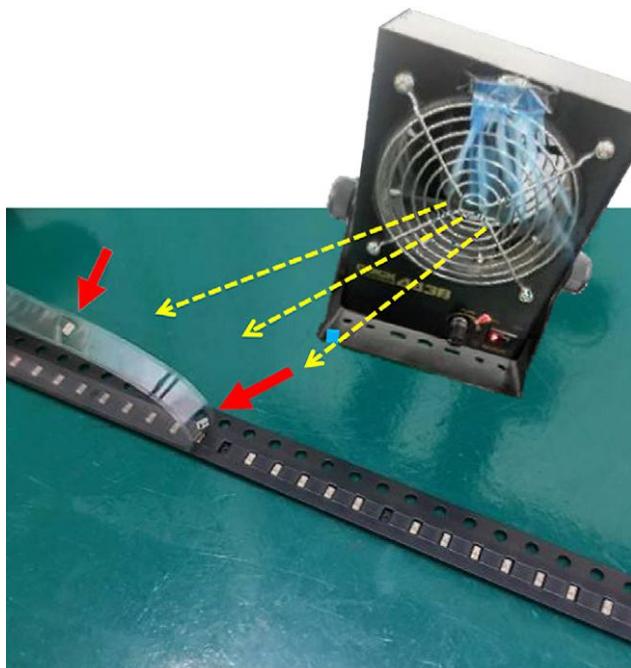


Fig. 5 - Ionizer Fan Directed to the LEDs

The ionizer creates positive and negative ions and distributes them across the objects in the air flow. The ions are attracted to their opposite charges which will be neutralized as soon as they bind to the charges.

Blowing at the LEDs with the ionizer fan they will no longer stick onto the cover tape after being neutralized:



Fig. 6 - After Neutralization

### **SUMMARY OF PREVENTIVE ACTIONS**

- Proper machine grounding
- Use of an ionizer fan, with air flow directed to the LEDs during removal of cover tape
- Sufficient clearance between machine cover plate and reel cover tape to avoid friction process
- Use of ESD protective machine parts only
- Proper storage conditions