

## WAFER LEVEL CHIP SCALE PACKAGE (WLCSP)

Product Family: **Any SOC using this package**

Part Number: All

Keywords: WLCSP, assembly, light sensitivity

### 1. INTRODUCTION

This application note provides guidelines on how to handle the WLCSP devices in order to get the best performances.

### 2. PACKAGE DESCRIPTION

WLCSP packages are extremely small and this is achieved by delimiting the package size by the IC itself. Consequently, the four sides where the IC is sawn on the wafer are not protected from the light. The top side where the solder balls are located are also exposed and this is a significant difference compared to moulded packages.

The following picture shows typical WLCSP package, where we see that only the marking side is coated:

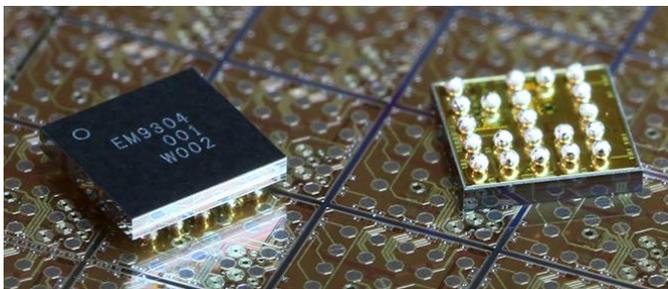


Figure 1

### 3. UNWANTED PHOTODIODE EFFECT

Any p–n junction, if illuminated, is potentially a photodiode. Semiconductor devices such as diodes, transistors and ICs contain p–n junctions and will not function correctly if they are illuminated by unwanted electromagnetic radiation (light) of wavelength suitable to produce a photocurrent. This is avoided by encapsulating devices in opaque housings. If these housings are not completely opaque to high-energy radiation (ultraviolet, X-rays, gamma rays), diodes, transistors and ICs can malfunction due to induced photocurrents.

The sensitivity of the IC depends on many parameters. Exposing light on digital circuits will mainly increase consumption and functions might be affected with a very strong light power.

All SOC devices also include analogue blocks such as reference voltages, oscillators and amplifiers which are operating with bias current in the nA range. These are most sensitive to light radiation and even a small light power can degrade their operation or their consumption.

The following chart shows the gain of a typical photodiode generating power when exposed to different light wavelengths.

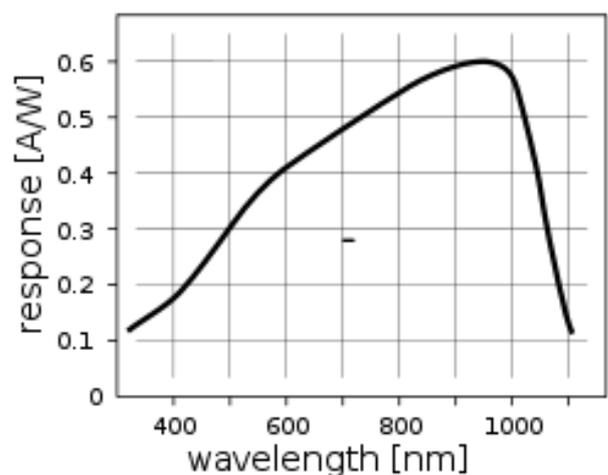


Figure 2

It is also in the infrared range where the silicon is becoming transparent and this is the reason why the light coming from the IC edges will transmit the light to the junctions.

From the solder ball side, the light reflects on the PCB to the IC area.

To ensure proper operation as specified, WLCSP IC's must be protected from any light source. This is particularly true when using red LED's or when the PCB is not in an opaque case.

For local protection, glob-top must be properly selected to avoid mechanical constraints and good opacity, which is not the case for all materials.

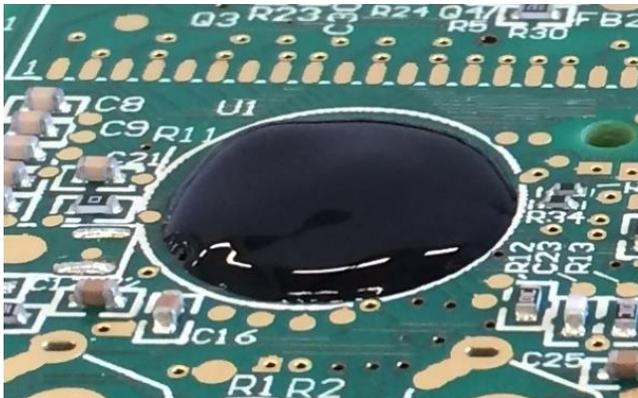


Figure 3

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