



Fingerprint Sensor IC SW6888 Protective Coating user guide

Version 0.1

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1.0 Introduction

Symwave BioPrint sensors are applied in a mechanically abrasive condition where finger print registration and matching are executed through physical swiping of a human finger on the BioPrint sensor surface. A special swiping surface was developed to withstand the wear and tear nature of finger print swiping. This layer also serves as a protect covering for the exposed die area from scratches and miss-handling.

2.0 Special Protective Coating for finger swiping.

To ensure original die surface (SiO_2+Ni) integrity is maintained and to extend the durability and reliability of BioPrint sensors during its life, all sensors are coated with a Symwave special protective coating layer (yellowish in color). This layer not only is used for serving as the application layer during finger swiping but also serves as a protective shielding against minor abrasive scratches to the die surface. The coating layer can withstand greater than 1M of repeated swipes of a human finger without any degradation of the finger capture image and sensor quality. Experiment results also showed the protective coating layer remains on the sensor surface after greater than 1.2M physical swipes. Original die surface coating of SiO_2 (passivation) remains undisturbed after greater than 1.2M physical swipes.

2.1 Coating Condition and Quality

Due to the nature of BioPrint sensor applications, the sensor area of the die is exposed for application used and thus, subject to potential physical abrasion on the coating surface. Fine scratches from handling, testing, dry/ rough human skin, air borne particles and dirt are often observed on the coating surface. These scratches are normal causes of physical and mechanical abrasions to a surface. Although the coating is transparent, and the sensor area is apparent under low magnification microscope, the sensor is actually protected by the coating layer just as if it is covered by mold compound found in standard ICs. Fig A shows a cross section of SW6888 with the protective coating covering over the original die passivation. Refer to fig 1 and 2.

(It is recommended that the sensor surface be covered during its transportation and when it is non-operating to avoid sharp hard objects of damaging the coating and the under laying passivation).

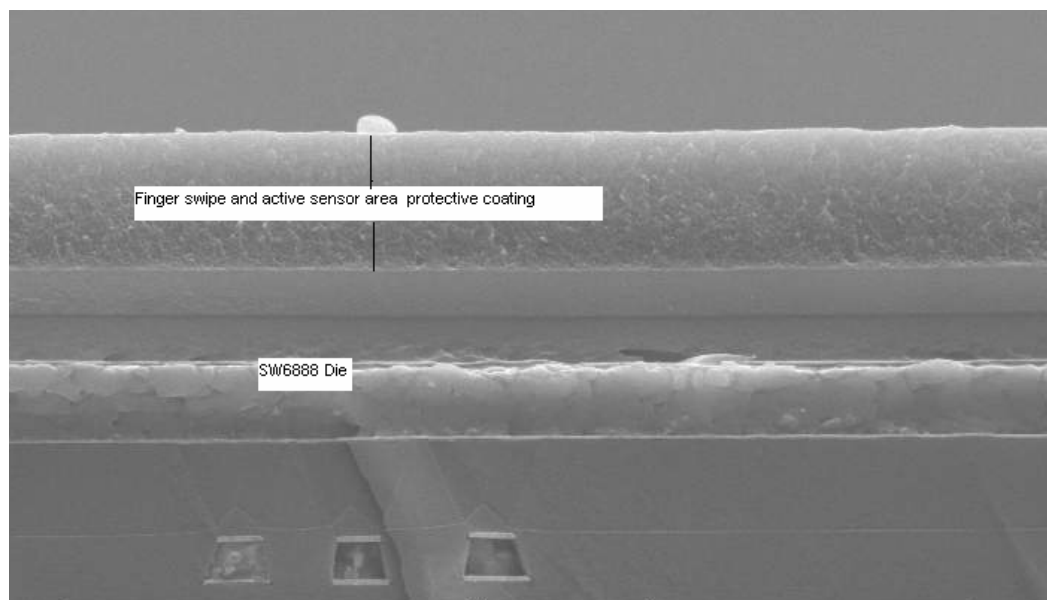


Fig A. SW6888 Die Cross Section

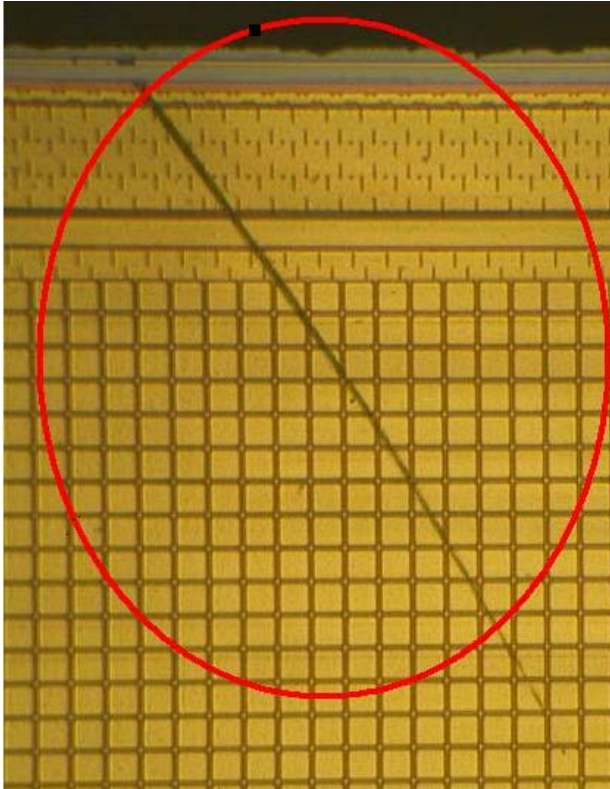


Fig 1. Scratches due to handling. or rough swiping.

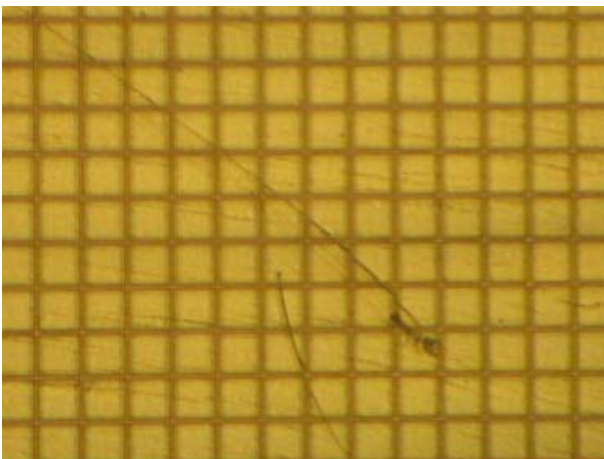


Fig 2. Scratches due to normal finger swiping during test or QA buyoff.

The protective coating serves as an insulating buffer layer for the sensor area, as long as surface damage is on the coating layer (yellowish) and does not penetrate into the SiO₂ layer (white), the sensor quality and performance will be maintained.

Fig 3 shows an extreme case of a working/ functioning (non-degrading image) sensor with the protective coating severely damaged but without damage to the original sensor surface (passivation).

Note: Fig 3 is a Symwave visual reject and does not conform to Symwave OQA visual standards, even though electrically, the part still functions (Fig 4.).

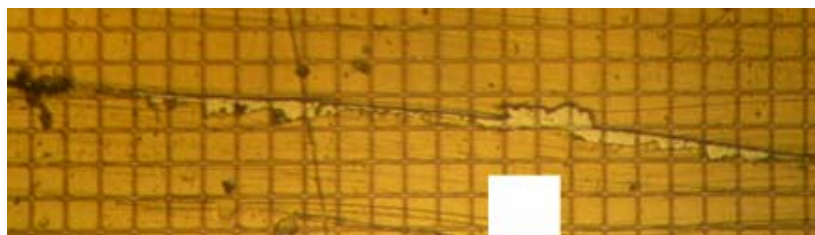


Fig 3. Pencil lead point scratches over the protective coating but not damaging the

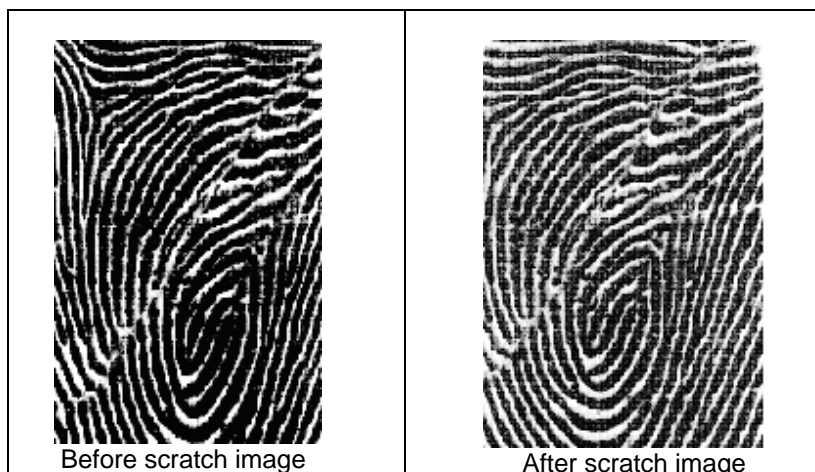


Fig 4. Sensor captured images before and after pencil lead scratch on protective coating.

3.0 Protective Coating durability test:

Greater than 1 Million swipes can be achieved without any damage to the original die surface (SiO2 layer) and without any degradation to the capture image.

NUMBER OF SWIPES	COATING REMAIN	IMAGE QUALITY
200K	YES -90%	EXCELLENT
400K	YES - 80%	EXCELLENT
800K	YES - 60%	EXCELLENT
1000K	YES - 40%	EXCELLENT
1200K	YES -- 20%	EXCELLENT

Table 1. Coating And Image Results After Swipe Test.

A 10 year average product life will allow the protective coating to be swiped 273 times a day to reach 1M swipes and still with 40% of the protective coating remaining on the sensor.

4.0 Sensor Reliability:

BioPrint have gone through Jedec 47A standards for process technology, silicon design and assembly packaging reliability validation and passed. (Refer to Table 2). All qualification vehicle units were subjected to Symwave standard production flow with both ATE and Manual test insertions to ensure sensor functionality prior to reliability stress tests. Minimal ware and tare and fine scratches on the sensor surfaces are normal symptoms of a post production good unit.

TESTS	CONDITION	RESULT
HTOL	1000 HOURS @125C	PASSED
HAST	196 HOURS 60RH/ 80C	PASSED
T/C	500	PASSED
LATCHUP	JEDEC 78	PASSED
ESD	1000V CDM, 2000V HBM	PASSED

Table 2. JEDEC 47A Test Reliability Test Results

The BioPrint sensor has met all Jedec 47A requirements for quality and reliability standards under normal physical and abrasive finger swiping on the sensor coating.