ZIGMA- Super High Performance Rigid Contacting Solution

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INTRODUCTION

The world is changing abruptly. In today's semiconductor world, test technology is improving and moving forward dramatically. With the continuous increase of market needs and complexities, the problem of integrated circuit (IC) testing has become much more challenging. IC testing is now a front-end burning issue, which needs an economic solution with reliable and sustainable performance. Through various analysis on the test field challenges and customer pains, the solution Zigma is introduced to meet the above mentioned.

ABOUT ZIGMA

ZIGMA, the rigid contactor with its unique (SWS) short wipe stroke technology enables the various plated device to test millions of insertions with longer MTBA, less cleaning, and high first pass yield. While designing, it is meant to be the Contactor designer's duty to ensure the life of the DUT boards which is one of the most discussed issue in the test industry, ZIGMA with its ACF (Advanced contact finish) and motion dynamics ensures and takes cares the DUT board even after millions of cycles of insertions.

The main objective of any production test is to be able to rely on test data and not spent time by repetitive tests, and to avoid test failures. To determine the contact resistance of a rigid pin, we need to understand the internal mechanics of the pin assembly as well as the resistance network that allows the flow of current. ZIGMA rigid pins are primarily comprised of two elastomers (front and back), which directly removes false failure phenomena in the final production test. When assembled, with an increased pre-tension, the bottom elastomer is compressed to the operating height. This will accommodate standard pad height variations on the target PCB. Similarly, on the top side, the device compresses the top elastomer to its operating height to accommodate the device's co-planarity. In this compressed state, the tips of the pin penetrates through the layer of oxides of tin on the DUT allowing current to flow through the advanced profile. Because the device has wide co-planarity, not all of the pins in the market are compressed to exactly the operating height. If the plungers are not compressed to the same operating height, the engagement to the device pads will be different, which in turn results in large variation in contact resistance. This enhanced feature allows production workers to test and verify without multiple repeat testing.

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DEVELOPMENT OBJECTIVES

There are several factors that need to be taken into account in highlighting product configuration for various plated device applications. First is the Contact pin profile itself. Different device platings such as Matte tin, NiPd/NiPdAu may require different contact profiles and motion dynamics. For matte tin, it needs to break through the oxides, maintain an effective wipe action, and provide good contact resistance readings. Second is the Contact force, the amount of contact force need to be different according to the type of plating. For example the force required to matte-tin is different to NiPd plated devices. Due to the high hardness of NiPd and prolonged plunger force, the contact tip wears prematurely. Zigma, having no housing body as tail end stopper, with the rear elastomer as the tail stopper and acting as a force dissipater helps the pressure that builds up at the contact tip and DUT board are tremendously reduced increasing the life span of the contact pin. Third is the Surface roughness, this is a key parameter. Contact pins that have a rough surface will tend to fill up with solder material when used with tin plated devices. A smoother surface will tend to keep the contact tip clean with minimal tin migration. Having such smoother, softer gold finish on the contact, it will too reduce chafing when in contact with the gold plating of the load board.

PACKAGING CONSIDERATIONS

There are many implications packaging has on test such as the issue of sawn vs. molded packages for high frequency devices. One type with burr free smooth edges; the other with "ragged" edges. Due to tolerance factors on the alignment pocket opening and the DUT, the sharp burrs from the sawn packages hits the contact tip of the pin and gets dislodged from the DUT up on vibrations causing severe damage to the contact tip up and the burr particle that falls on the DUT board leads to have a "sand paper" effect with the pin contact surface to the DUT board leaving the board severely damaged. Zigma with its SWS technology, the contact tip is placed much inside of the device pad edge (Inside to CCL) avoiding the sharp burrs from the sawn packages thus leading to less contamination formation and debris collection and increased pin contact life.

Trends in packaging such as Dimple pads/Wettable flank , corner chamfer pads, short pads are increasing and is highly challenging to test with the market available rigid contact solutions as the pad length available to make a good scrub exceeds the wipe length leading to contact failure. Zigma with its SWS technology addresses this issue by providing a good wipe length of ≤0.10mm that well lands inside the very short pads of the devices.

CONCLUSION

In conclusion, the major aspects of this paper can be summarized as follows.

Zigma is designed to meet the most test field challenges out in the semiconductor test industries providing sustainable and super high performance in terms of less cleaning, reduced cost of test, longer MTBA/MTBR, higher OEE and high first pass yield.