Semiconductors

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Handling and processing of sawn wafers on UV dicing tape

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Application note

Document information

Info	Content
Keywords	Sawn wafers, UV dicing tape, handling and processing
Abstract	This application note gives hints and recommendations regarding correct handling and processing of sawn wafers mounted on irradiated UV dicing tape. The recommendations are based on Philips internal assembly experience and must be seen as guideline only. In addition to processing recommendations this document presents the results of various tests which have been performed by Philips in order to ensure damage-free shipment of the delivery type “sawn wafer on FFC with irradiated UV dicing tape”.

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Revision history

Rev	Date	Description
1	2005-02-11	Initial version

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1. Introduction

This application note gives hints and recommendations regarding correct handling and processing of sawn wafers mounted on irradiated UV dicing tape according the “General Specification for 8” Wafer on UV-tape”. The processing recommendations are based on Philips internal assembly experience and must be seen as guideline only. Process fine tuning and optimization remains in the full responsibility of the customer.

In addition to processing recommendations this document presents the results of various tests which have been performed by Philips in order to ensure damage- and yield loss-free shipment of the delivery type “sawn wafer on FFC with irradiated UV dicing tape”.

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2. Handling and processing recommendations

2.1 Differences between irradiated UV dicing tape and conventional tape

The adhesion strength between irradiated UV dicing tape and silicon is approximately three times lower compared to non UV dicing tape (i.e. “sticky tape” or “blue tape”). Furthermore irradiated UV dicing tape almost completely loses its adhesion strength to the silicon in case excessive shear forces are applied to the adhesive layer. This leads to the following important differences for the pick and place process of sawn wafers on irradiated UV dicing tape compared to conventional blue tape:

- No or only minimum spreading of the tape is advised at the pick and place process. This prevents loose dies prior to pick and place.
- Adjustment of the mechanical pick parameters (e.g. push up needle geometry, push up forces and profile) is advised in order to reflect the lower adhesion force of the irradiated UV dicing tape properly.

2.2 General recommendations

- Optimization of the assembly process in general (equipment adaption and accurate process parameter setting) by final product manufacturer is recommended in order to prevent mechanical stress and damage of the ICs.
- Ultrasonic cleaning is not permitted.
- ESD safe working environment and equipment is advised.

2.3 Conventional assembly

2.3.1 Die Attach

- Cleaning of wafer surface by gentle N_2 blow before push up is advised.
- No or minimum spreading of sawn wafer on FFC is advised.
- Any backside damage due to improper push up needle(s), force and profile has to be avoided.
- Even distribution of adhesive under the die is advised (100% of die area should be covered with adhesive).
- Adhesive type: conductive or non-conductive.
- Adhesive thickness: min. 10 μm (standard epoxy material).

2.3.2 Wire Bonding

- Preferable process:
  - thermosonic bonding (Au wire)
- No chip out under bond pad metallization is allowed.
- No bond closer than 2 μm to the adjacent passivation layer at the edge of the bondpad.

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2.4 Flip chip assembly

2.4.1 Pick and place

- Cleaning of wafer surface by gentle N_2 blow before push up is advised.
- No or minimum spreading of sawn wafer on FFC is advised.
- Any backside damage due to improper push up needle(s), force and profile has to be avoided.

2.4.2 Direct chip attach assembly (DCA)

Bumped dies offered by Philips Semiconductors can be assembled by flip chip processes using ACF (anisotropic conductive film), ACP (anisotropic conductive paste), non-conductive and conductive glues. Other compatible DCA processes are TCB (thermo compression bonding) and direct conductive paste printing.

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3. Packing and shipping

3.1 Shipping test program

The use of the specified packing method 3322 845 08351 for customer shipment of sawn wafers on irradiated UV dicing tape has been released based on the results of the following tests and field experience:

1. Standard drop and vibration tests according UN-D 1400.
   a. 3 axis vibration test (frequency 7 Hz, amplitude 5.3 mm, acceleration 1.05 g, 30 min. each axis) + drop test program 1 (7 drops, 1 m drop height).
   b. 3 axis vibration test + drop test program 1 + 2 hours vibration test (most critical axis).
   c. 3 axis vibration test + drop test program 1 + 2 × 2 hours vibration test (most critical axis).
2. Shipment trial of all sample material used in item 1. from Hamburg to Bangkok and back.
3. Field experience from more than 30000 sawn wafers on irradiated UV dicing tape which have been shipped to date.

3.2 Results

3.2.1 Standard drop and vibration tests

The results from the standard drop and vibration test sequences are shown in Table 1.

Table 1: Missing/delaminated dies vs. total dies

	Die size: 1 mm^2		Die size: 0.5 mm^2	
	Adwill D-125	Nitto UE 111 A	Adwill D-125	Nitto UE 111 A
Test sequence a.	5/31k	3/31k	3/62k	0/62k
Test sequence b.	0/31k	0/31k	1/62k	0/62k
Test sequence c.	13/31k	10/31k	24/124k	3/124k

3.2.2 Shipment trial with drop test material

No additional missing or delaminated dies were observed.

3.2.3 Field experience

To date no complaints regarding missing or delaminated dies due to shipment received.

3.3 Conclusion

In case excessive vibration and/or dropping is applied to the packed material few dies may delaminate from the irradiated UV dicing tape. Under normal shipping conditions, however, no delamination was ever seen on more than 30000 shipped wafers. Therefore the risk for yield loss due to wafer shipping can be considered extremely low for sawn wafers on irradiated UV dicing tape.

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5. Contents

1. Introduction 3

2. Handling and processing recommendations 4

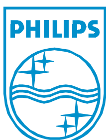
2.1 Differences between irradiated UV dicing tape and conventional tape 4
2.2 General recommendations 4
2.3 Conventional assembly 4
2.3.1 Die Attach 4
2.3.2 Wire Bonding 4
2.4 Flip chip assembly 5
2.4.1 Pick and place 5
2.4.2 Direct chip attach assembly (DCA) 5

3. Packing and shipping 6

3.1 Shipping test program 6
3.2 Results 6
3.2.1 Standard drop and vibration tests 6
3.2.2 Shipment trial with drop test material 6
3.2.3 Field experience 6
3.3 Conclusion 6

4. Disclaimers 7

5. Contents 8



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