Packaging and System Facility (PASF)

Packaging and Design Services Capabilities

1. Wafer Dicing

1.1 Automatic Dicing Saw

i. Wafer/sample size can handle from 2 cm to 6-inch wafers.

ii. Capable of performing both full cuts and half cuts.

iii. Sample types: silicon wafers, ITO, STO, LNO, glass wafers and bonded wafers (Si on Si and glass on Si).

iv. Maximum wafer/sample thickness: 1 mm.

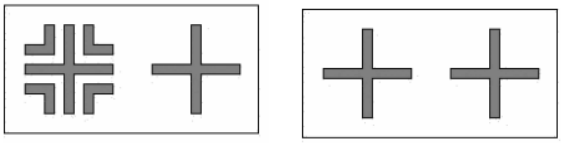
v. Minimum dicing sample size: 2 mm × 2 mm.

vi. Minimum saw street between devices: 500 µm (no metallization on saw street).

vii. Device placement on the wafer/sample must follow a uniform index.

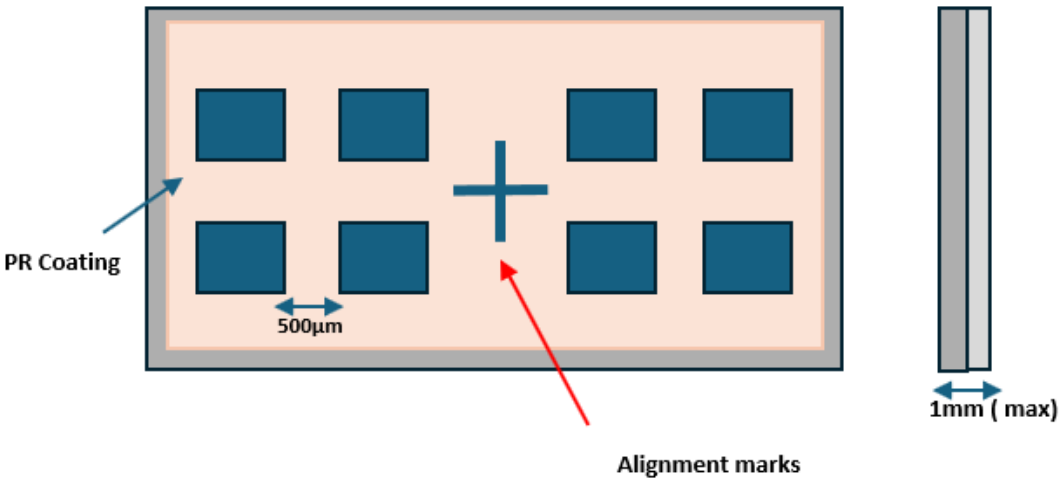
viii. Wafer/samples with released structures are not acceptable.

ix. Alignment marks are mandatory on the wafer/sample.



x. The dicing side of the sample must be coated with PR (photoresist) material (maximum 1µm thick).

Figure1 : Wafer Profile for Automatic Dicing



1.2 MTI Precision CNC Dicing machine

i. Wafer/sample size can range from 2 cm to 3-inch wafers.
ii. Allowed only fresh/unprocessed wafers.
iii. Wafer/sample types: silicon wafers, glass wafers, ceramics and sapphires.
iv. Maximum wafer/sample thickness: 3 mm.
v. Minimum dicing sample size: 2 mm × 2 mm.
vi. Minimum cut line width between devices: 500 µm (without metallization).
vii. Device placement on the wafer/sample must follow a uniform index
viii. Samples with released structures are not acceptable. (Patterned wafers are not allowed)
ix. Alignment marks are not a mandatory on the dicing sample.
x. The dicing side of the sample must be coated with PR (photoresist) material (maximum 1µm thick).

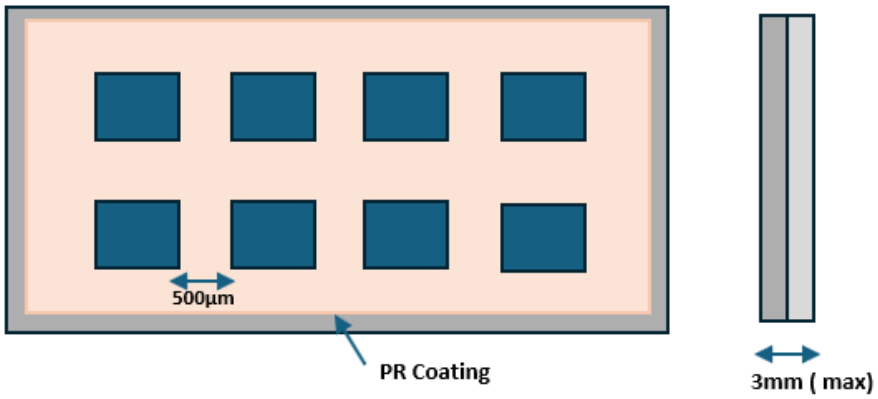


Figure 2: Wafer Profile for Manual Dicing

2. Wire bonding

2.1 Die attachment

i. User should provide the package (PCB with ENIG/ENPIG finish, Chip carrier, TO)
ii. Epoxy available: (Curing Temperature as per data sheet)
    H70E: Thermally conductive
    H20E: Thermally and electrically conductive
    H70E2: Thermally conductive
iii. Process type - manual

2.2 Wire bonder

i. Diced devices are recommended, or devices that can fit within the package dimensions.

ii. Bonding Type & Material:

- Wedge bonding: 25 µm Au wire, 33 µm Al wire
- Ball bonding: 25 µm Au wire

iii. Minimum Bond Pad Dimension: 100 µm × 100 µm

iv. Minimum Bond Pad Pitch: 200 µm

v. Device Metallization: Al, Cr/Au, Ti/Pt or Ti/Au (seed layer thickness > 10 nm and metallization > 100 nm)

vi. Bond pad surface must be free from contamination, photoresist (PR) and oxide layers.

3. Parylene Deposition

i. Substrates allowed ranging from small samples up to 4-inch wafers.

ii. Samples: silicon wafers, glass, ceramics, metals, MEMS devices, electronic components, medical implants, polymers, plastics, and optical parts.

iii. Parylene Type: Parylene C, Parylene N

iv. Capable of depositing thickness: 500nm to 5µm.

v. Provides uniform coatings on substrates of various shapes and sizes, including non-flat samples, facilitated by a rotating sample holder.

vi. Deposition pressure approximately 15mTorr, enabling the formation of high-quality conformal coatings.

4. Hot air Oven

i. Samples allowed for baking/curing: Silicon, glassware, metal tools, electronic components, polymers, powders, and small mechanical parts.

ii. Internal Dimension: 30cm × 30cm × 30cm

iii. Temperature range: 150°C to 180°C

iv. Temperature uniformity: ± 3°C

v. Ramp Rate: 3°C /min

5. Vacuum Oven

i. Samples allowed for baking/curing: Silicon, glassware, metal tools, electronic components, polymers, powders, and small mechanical parts.
ii. Internal Dimension: 35cm × 35cm × 35cm
iii. Vacuum Range: 5mTorr
iv. Temperature range: 25°C to 250°C
v. Temperature uniformity: ± 3°C
vi. Ramp Rate: 2°C /min

6. High Power Plasma Cleaner

i. Samples allowed for surface cleaning /Bonding: silicon wafers, glass, metals, polymers, ceramics, MEMS devices, and PDMS
ii. Sample size: < 65 mm
iii. Adjustable RF power: Low (8W), Medium (14W), High (40W)
iv. Vacuum range: 5mTorr
v. Gas exposure: N_2, Ar, O_2
vi. Gas Flow meter range: 50 mL/min
vii. Samples with greasy residues, oily films, unbaked resists or uncured polymers are not allowed
viii. Two slots for gas flow meters.

7. DC Probe station

i. Samples allowed with metal layer: Silicon wafers, Glass and MEMS devices
ii. Sample size: < 50 mm
iii. Probing Pad size: 100 µm
iv. Microscope Magnification: 10x – 50x
v. Micro Positioners: 6 units with magnet on/off bases
vi. Measurement Capabilities: Resistance, Inductance, Capacitance
vii. Probe tip size: 50 µm

8. Ultra Probe sonication

i. Samples allowed for dispersion: RGO, CNT, Graphene, Nanoparticles
ii. Frequency Range: Typically, 20–40 kHz
iii. Probe Tip size: 0.3mm and 18mm
iv. Power Output: Ranges from 50 W to 500 W RMS
v. Mode of operation: Continuous /Pulse Mode
vi. Probe/Tip Material: Titanium due to its durability and chemical resistance
vii. Tab/PC operation.

9. Centrifuge system

i. Samples allowed for separation and concentration of nanoparticles, carbon nanotubes (CNTs), graphene.
ii. Maximum Speed: 10,000 RPM
iii. Speed Accuracy: ±100 RPM
iv. Maximum Tube Size: 100 mL
v. No. of. tube slot: 8 no's

10. Chemical Wet bench

i. Samples allowed for cleaning: Silicon, glass, PCB, Metal components
ii. Allowed process chemicals: IPA and Acetone
iii. Support for sample dehydration and preheating processes.
iv. Ultrasonic bath cleaning for effective removal of contaminants.
v. Equipped with exhaust ventilation, chemical-resistant surfaces and splash guards for safe operation.
vi. Equipped with DI water, N_2 gas and CDA lines for sample cleaning.

11. Fibre laser marking tool

i. Materials allowed: Metals, Silicon wafers, Plastic, PCB
ii. Process: Metal shadow mask, Text engraving, Pattern transfer and QR code.
iii. Laser type: Fibre Laser (20W), 1064 nm, class 1 safety ring
iv. Marking Area: 100 × 100 mm
v. Minimum line width: 0.05mm
vi. Marking Depth: ≤ 0.3 mm
vii. Supported File Formats: DXF, BMP, JPG, DWG and EZD.

12. Helium leak tester

i. Minimum Detectable Leak Rate: Helium (vacuum mode): < 5×10^{-12} mbar·l/s
ii. Test method: Spray Method
iii. Measurement Range: 1×10^{-12} to 1×10^{-1} mbar·l/s
iv. Helium Pumping Speed (vacuum mode): 2.5 l/s
v. Flange Type: DN 25 ISO-KF
vi. Suitable Materials for Leak Testing: Metals: Stainless steel, aluminium, copper, titanium

13. Pneumatic Pressure Calibrator/controller

i. Pressure range: up to 75 bar
ii. Mode of calibration: Relative, Absolute
iii. Accuracy: ±0.015% of reading
iv. Required test port end fitting (Male): ¼" BSP, M10X1, M14 x1.5
v. Test Medium - N_2 gas

14. Hydraulic Pressure Calibrator

i. Pressure range:1 to 1000 bar
ii. Mode of calibration: Relative/Gauge
iii. Accuracy: ±0.015% of reading
iv. Required test port end fitting (Male): 1/8, 1/4, 3/8 and ½ NPT or BSP
v. Test Medium – Hydraulic oil

15. Pressure Cycle Tester

i. Pressure range: up to 10 bar
ii. Mode of calibration: Relative, Absolute
iii. Test Medium: Compressed Air, N_2 gas
iv. Required test port end fitting (Male): ¼" BSP, M10X, M14 x1.5
v. Programmable total cycles: up to 10,000
vi. Adjustable pressure hold time

16. Dynamic Pressure test (Shock Tube)

i. Shock wave pressure: 1 to 10 bar
ii. Test method: Diaphragm rupture method, Solenoid valve control method
iii. Test medium: Compressed Air, N_2 gas
iv. Required test port end fitting (Male): ¼" BSP, M10X1, M14 x1.5

17. Climatic Test Chamber

i. Temperature Range: -60°C to +170°C
ii. Humidity Range: 10% to 90% RH (at +10°C to +95°C)
iii. Internal Dimensions: 548 × 460 × 447 mm
iv. Cooling Rate: 2.8°C/min (from +170°C to -60°C)
v. Heating Rate: 3.2°C/min (from -60°C to +160°C)
vi. Temperature Fluctuation: ±1°C
vii. Relative Humidity Fluctuation: ±3%
viii. Programmable test profiles for automated sequences
ix. Fed through access port (Dia 50mm) for taking electrical connection

18. Soldering and Desoldering workstation

i. Process type: Manual hand soldering and desoldering
ii. PCB: Rigid, Flex
iii. PCB board dimensions: 80 mm x 80mm
iv. Small PCBs are preferred in panel
v. Component Type: SMD (0603 ,0805,1206), QFN, SSOP, SOIC
vi. Support only for proto unit test and development units.
vii. A stencil is recommended for panels or larger PCBs

19. FDM _ 3D printing

i. Print Filament Material: PLA, ABS
ii. Build part dimension: 180mm x 180mm x 180mm
iii. Layer resolution: 0.16mm to 0.4mm
iv. Required file format: STL file

20. Embedded Design Services

- **Hardware design:**

  Project architecture design, schematic design (Analog, digital, mixed signals, power management), component selection, Custom board design, PCB layout-multi layer, multi-board design, impedance matching, differential pair analysis, and prototyping.

- **Firmware development:**

  Low-level software development for microcontroller (STM32, Analog devices, TI, ATmega) systems (Single, dual-core, multi-controller designs). Device drivers – SPI, I2C, UART, RS232, RS485, RTOS.

- **Software development:**

  Embedded software development using Python, Visual Code Studio, and front-end development.

- **System integration:**

  Seamless hardware, firmware, software, and mechanical components integration.

- **Testing and validation:**

  Rigorous testing procedures to ensure product quality and reliability. Active and passive burn-in testing, temperature cycling, and humidity testing.