Chip and Wire Bonding

1. General Description
Chip and wire bonding processes belong to packaging level one and are mainly serial performed. To assemble prefabricated and diced chips on substrates or packages and to contact them electrically, these techniques are needed necessarily. Several technologies and certain equipment for chip and wire bonding are available within our labs and are introduced in the following.

2. Chip Bonding
For chip bonding processes techniques like eutectic bonding or adhesive bonding can be used. As bonding layers epoxies, ceramic adhesives or pastes as well as solders (Si/Au, Sn, Pb free) could be used. Almost every modern packaging technique could be applied for sensors and actuators as well as for micromechanical systems focused on prototype fabrication but also for low volume production. For chip bonding a T-3002-M die bonder manufactured by Dr. Tresky AG is available. Its precise X-Y adjustment allows an accurate placement of the chips using substrates with sizes up to 8”.

- Bonding Technologies:
  - Flip-Chip (FC)
  - Chip-to-Chip (C2C)
  - Chip-to-Wafer (C2W)
  - Multi-Chip-Module (MCM)
  - Chip-on-Board (COB)
  - Surface Mounted Devices (SMD)

- Substrates:
  - Lead frames
  - Silicon wafers
  - Electronic housings
  - Ceramics up to 50x50 mm²

Fig. 1: C2C bonded ASIC and sensor on FR4 board

3. Wire Bonding
Wire bonding techniques are used for contacting of micromechanical and electrical structures after the assembly to a subordinate wiring level. Within the department wire bonding equipment for ultrasonic bonding, thermo compression bonding and thermo sonic bonding is available. Several bond wires made of gold, copper, and aluminum with wire diameters between 32 µm (thin wire bond) and 250 µm (thick wire bond) could be processed. Both ball/wedge and wedge/wedge contacts depending on the material are processible with different equipment. Therewith substrates like lead frames, electronic packages and ceramic substrates as well as special formed substrates can be handled for prototype production.

- Bonding Technologies:
  - Ultra Sonic Bonding
  - Thermo Compression Bonding
  - Thermo Sonic Bonding

- Chip Metallization:
  - Aluminum
  - Gold
  - Copper

- Bond Wires:
  - Aluminum (Ø: 32, 125, 250 µm)
  - Gold (Ø: 32, 125, 250 µm)
  - Copper (Ø: 32 µm)

Fig. 2: Mounted chip contacted by 125 µm thick Al wires

4. Contact
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