

Product Index

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Messe München GmbH, Am Messesee 2, 81829 München, Germany

A Cluster Semiconductor

- | | |
|---|--|
| 1 Semiconductor production | 1.1 Wafer front-end processing
1.2 Wafer back-end processing
1.3 Production of power electronics (IGBT, Power MOSFET, Thyristors, etc.)
1.4 Measurement, detection and control systems for semiconductor production
1.5 Packaging and assembly materials
1.6 Electronic components
1.7 Electronic applications |
| 2 Production of displays, LEDs and discretes | 2.1 Display manufacturing
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| 5 Clean room technology | 5.1 Clean rooms
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| 6 Materials processing | 6.1 Mechanical processing other than PCB
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6.3 Welding
6.4 Chemical and electroplate processing
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6.6 Laser material-processing systems
6.7 System periphery for laser-based manufacturing |

B Cluster PCB & EMS

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| 7 PCB and circuit-carrier manufacturing | 7.1 Base materials
7.2 Circuit-printing tools and photomasters
7.3 Tools, machines and accessories for PCB processing
7.4 Generating circuit structure
7.5 Chemical processing of PCBs
7.6 Heat treatment, drying
7.7 Solder-resist technology
7.8 Legend printing
7.9 Molded Interconnect Device (MID) production
7.10 Printed Circuit Board (PCB) handling
7.11 Special machines for power electronics
7.12 Special machines for the production of high frequency devices |
| 8 Electronic Manufacturing Services (EMS) | 8.1 EMS for component/chip carrier manufacturing
8.2 EMS for component assembly and device manufacturing
8.3 Development-related services |

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C Cluster SMT

- 9 Component mount technology, pick & place**
- 9.1 Component preparation
 - 9.2 Component mount techniques, component mounting
 - 9.3 Production
 - 9.4 Handling technology

- 10 Soldering and joining technology for PCBs**
- 10.1 Solders and soldering aids
 - 10.2 Paste application systems and stencils
 - 10.3 Soldering units
 - 10.4 Soldering equipment
 - 10.5 Soldering accessories
 - 10.6 Gluing, dispensing, varnishing, coating

- 11 Test and measurement, quality assurance**
- 11.1 Visual inspection, image processing
 - 11.2 Materials testing
 - 11.3 Measurement technology for non-electrical parameters
 - 11.4 Measurement technology for electrical parameters
 - 11.5 Test and measurement systems
 - 11.6 Conveyors, handling systems, test adapters
 - 11.7 Laboratory/test station equipment

- 12 Product finishing**
- 12.1 Repair and rework
 - 12.2 Programming equipment, memory components
 - 12.3 Protective coating and potting
 - 12.4 Hybrids
 - 12.5 Housings
 - 12.6 Electronic protective devices (EMC/ESD)

- 13 Production subsystems**
- 13.1 Assembly and handling technology
 - 13.2 Drive technology
 - 13.3 Systems for production data acquisition (PDA)

- 14 Production logistics and material-flow technology**
- 14.1 Information acquisition
 - 14.2 Purchasing, Supply Chain Management
 - 14.3 Merchandise management systems
 - 14.4 Logistics management
 - 14.5 Material-flow control
 - 14.6 Transportation and conveyor technology
 - 14.7 Storage technology and commissioning systems
 - 14.8 Packaging technology
 - 14.9 Complete solutions and turnkey systems for logistics

D Cluster Cables, Coils & Hybrids

- 15 Production technologies for cables and connectors**
- 15.1 Cable and wire processing
 - 15.2 Tools for wiring
 - 15.3 Cable-processing equipment
 - 15.4 Others
 - 15.5 Cable-protection devices
 - 15.6 Processing equipment for cable-protection devices
 - 15.7 Technology for detachable connections, connectors

- 16 Coilware production**
- 16.1 Materials for coilware
 - 16.2 Production equipment for coilware
 - 16.3 Applications for coilware

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17 Hybrid-component manufacturing

- 17.1 Tooling and mouldmaking
- 17.2 Tools, tool equipment
- 17.3 Assembly and handling technology, periphery
- 17.4 Stamping
- 17.5 Shaping
- 17.6 Surface-finishing equipment, refinement
- 17.7 Injection molding for plastics
- 17.8 Metal/plastic composite technologies
- 17.9 Process and quality control/Automation

E Cluster Future Production—Smart Factory

18 Industry 4.0

- 18.1 Autonomous inter-connected micro systems, sensor and actuator networks, cyber physical systems
- 18.2 Software: basic systems and development tools
- 18.3 Machine software
- 18.4 Manufacturing software
- 18.5 Business software
- 18.6 Software services
- 18.7 Application specific software

19 Production technologies for batteries and electrical energy storage

- 19.1 Materials and components for batteries and electrical energy storage
- 19.2 Equipment for batteries and electrical energy storage
- 19.3 Inspection and test systems for batteries and electrical energy storage
- 19.4 Accumulators

20 Organic and printed electronics

- 20.1 Materials and components
- 20.2 Manufacturing equipment
- 20.3 Inspection and test systems
- 20.4 Applications and devices

21 3D Printing, Additive Manufacturing

- 21.1 Production equipment and process technology
- 21.2 Sub systems and machine components
- 21.3 Materials

F Overall Production Support

22 Production materials/equipment and environmental technology

- 22.1 Preliminary products and semi-finished goods, metallic
- 22.2 Preliminary products and semi-finished goods, non-metallic
- 22.3 Process materials
- 22.4 Plant equipment
- 22.5 Decontamination, cleaning, disposal (environmental management)
- 22.6 Recirculation systems, supply, recycling

23 Services

- 23.1 Information provision
- 23.2 Production services except EMS
- 23.3 Used machines, systems, plants
- 23.4 Brainware and Sales
- 23.5 Other services

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A Cluster Semiconductor

1 Semiconductor production

1.1 Wafer front-end processing

1.1.1 Wafers and substrates

1.1.1.1 Materials

- 1.1.1.1.1 Wafers made of semiconductor material
- 1.1.1.1.2 Ceramic substrates
- 1.1.1.1.3 Thin-film substrates (glass/ceramic)
- 1.1.1.1.4 Glass wafers
- 1.1.1.1.5 Semiconductor semi-finished parts, miscellaneous
- 1.1.1.1.6 Ceramic foils
- 1.1.1.1.7 Process gases

1.1.1.2 Production equipment

1.1.1.2.1 Crystal growing systems and substrate treatment

- 1.1.1.2.1.1 Melt growth
- 1.1.1.2.1.2 Gas-phase growth
- 1.1.1.2.1.3 Tempering ovens
- 1.1.1.2.2 Polishing tools
- 1.1.1.2.3 Other tools for wafer processing

1.1.2 Mask and artwork generation

- 1.1.2.1 Mask production equipment
- 1.1.2.2 Resist-coating systems
- 1.1.2.3 Beam sources for exposure equipment

- 1.1.2.3.1 Lasers for exposure equipment
- 1.1.2.3.2 UV exposure light sources

1.1.3 Lithography

1.1.3.1 Lithography equipment

- 1.1.3.1.1 Microlithography equipment
- 1.1.3.1.2 Contact exposure equipment
- 1.1.3.1.3 Optical steppers
- 1.1.3.1.4 Laser writing equipment

1.1.3.2 Lithography materials

- 1.1.3.2.1 Resists, Developers & Ancillaries (incl. Adhesion promoter HMDS); Primer
- 1.1.3.2.2 AR coatings
- 1.1.3.2.3 Developers

1.1.4 Thin-film generation

1.1.4.1 Materials

- 1.1.4.1.1 Epitaxial materials
- 1.1.4.1.2 Process materials, thin-film technology, miscellaneous
- 1.1.4.1.3 Quartzware (silicon carbide, fused quartz glass, sapphire), ceramics
- 1.1.4.1.4 Vapor deposition materials
- 1.1.4.1.5 Strippers
- 1.1.4.1.6 Sputter targets
- 1.1.4.1.7 Lapping, polishing and grinding agents
- 1.1.4.1.8 Process chemicals, Cleaning Chemicals, Solvents, miscellaneous

1.1.4.2 Production equipment

- 1.1.4.2.1 Diffusion ovens
- 1.1.4.2.2 Dosing devices
- 1.1.4.2.3 Heat treatment equipment for microstructuring, miscellaneous
- 1.1.4.2.4 Cathode sputter equipment, PVD
- 1.1.4.2.5 CVD equipment, MOCVD; PECVD; LPCVD; ALD; REALD; MVD
- 1.1.4.2.6 Electron-beam deposition equipment
- 1.1.4.2.7 High-vacuum evaporation equipment
- 1.1.4.2.8 Ion-beam coating equipment
- 1.1.4.2.9 Oxidation equipment
- 1.1.4.2.10 Plasma coating systems
- 1.1.4.2.11 Plasma polymerization units
- 1.1.4.2.12 Vacuum coating equipment
- 1.1.4.2.13 Vacuum components

- 1.1.4.2.14 Evaporator inserts
- 1.1.4.2.15 Reactors for epitaxy

1.1.5 Etching equipment

- 1.1.5.1 Ion-etching equipment
- 1.1.5.2 Wet-etching equipment
- 1.1.5.3 Etching plasma generators
- 1.1.5.4 Spray etchers
- 1.1.5.5 Plasma-, sputter-etching equipment

1.1.6 Drying equipment

- 1.1.6.1 Continuous dryers
- 1.1.6.2 UV dryers
- 1.1.6.3 IR dryers
- 1.1.6.4 Vacuum dryers

1.1.7 Equipment for mechanical machining

- 1.1.7.1 Polishing devices/machines for semiconductor technology
- 1.1.7.2 Scribes and automatic scribes
- 1.1.7.3 Lapping equipment
- 1.1.7.4 Separating/trimming/scribing lasers
- 1.1.7.5 Wafer-cleaning systems
- 1.1.7.6 Wafer saws
- 1.1.7.7 Wafer dicing equipment

1.1.8 Manufacturing and machining equipment, miscellaneous

- 1.1.8.1 Plasma equipment, miscellaneous
- 1.1.8.2 Spray process machines, miscellaneous
- 1.1.8.3 Photoresist stripping systems
- 1.1.8.4 Substrate-cleaning systems
- 1.1.8.5 Wafer washers
- 1.1.8.6 Semiconductor technology process equipment, miscellaneous
- 1.1.8.6.1 Gas; liquid delivery panels as subsystems
- 1.1.8.6.2 Handling; transfer; loading systems; lifting devices
- 1.1.8.6.3 Temperature sensing; control; recirculators; chillers; heat exchangers

1.1.9 Wafer/substrate handling

- 1.1.9.1 CTC wafer-handling equipment
- 1.1.9.2 Wafer-cassette equipment
- 1.1.9.3 Wafer storage/shipping containers
- 1.1.9.4 Wafer mounters
- 1.1.9.5 Wafer/tape laminators/de-laminators
- 1.1.9.6 Wafer transfer systems
- 1.1.9.7 Wafer/chip manipulators
- 1.1.9.8 Marking equipment
- 1.1.9.9 Wafer/substrate handling systems, miscellaneous

1.2 Wafer back-end processing

1.2.1 Chip handling

- 1.2.1.1 Component handlers
- 1.2.1.2 Component-handling machines, specialized
- 1.2.1.3 Die sorters
- 1.2.1.4 Sorting equipment for components
- 1.2.1.5 Lifter modules
- 1.2.1.6 Coordinate tables
- 1.2.1.7 Piezo actuators
- 1.2.1.8 Process carriers
- 1.2.1.9 Transport carriers
- 1.2.1.10 Micromanipulators
- 1.2.1.11 Micropositioning
- 1.2.1.12 Positioning systems, miscellaneous
- 1.2.1.13 Chip-handling equipment, miscellaneous

1.2.2 Bonding

- 1.2.2.1 Pre-contacting processes
- 1.2.2.2 Plasma cleaning and activation equipment

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- 1.2.2.3 Chip carriers**
 - 1.2.2.3.1 Semi-finished CC goods (metal/plastic)
 - 1.2.2.3.2 Plastic-chip carriers (PCC)
 - 1.2.2.3.3 Ceramic-chip carriers (including LTCC configurations)
- 1.2.2.4 Internal connections**
 - 1.2.2.4.1 Bonding wires/tapes
 - 1.2.2.4.2 Die bonders
 - 1.2.2.4.3 Flip-chip bonders
 - 1.2.2.4.4 Bonders, miscellaneous
 - 1.2.2.4.5 Bumping systems
 - 1.2.2.4.6 Dispensing systems
- 1.2.2.5 Tools**
 - 1.2.2.5.1 Ultrasonic bonders
 - 1.2.2.5.2 Ultrasonic generators
 - 1.2.2.5.3 Ultrasonic transducers
 - 1.2.2.5.4 Ultrasound metrology
 - 1.2.2.5.5 Contacting equipment, miscellaneous
 - 1.2.2.5.6 Welding equipment for microconnections
 - 1.2.2.5.7 Resistance soldering/welding equipment
 - 1.2.2.5.8 Bonding tools, miscellaneous
- 1.2.3 Chip packaging**
 - 1.2.3.1 Housings
 - 1.2.3.2 Caps and encapsulations, encapsulation equipment**
 - 1.2.3.2.1 Protective component caps
 - 1.2.3.2.2 Glass, passivation/encapsulation
 - 1.2.3.2.3 Ball-grid array packages
 - 1.2.3.2.4 Potting compounds, encapsulations
 - 1.2.3.2.5 Encapsulation materials, miscellaneous
 - 1.2.3.2.6 Encapsulations and encapsulation equipment, miscellaneous
 - 1.2.3.2.7 Epoxy-processing equipment
 - 1.2.3.2.8 Sealants
 - 1.2.3.2.9 Molding presses
 - 1.2.3.2.10 Molding tools
 - 1.2.3.3 Protective coatings for devices**
 - 1.2.3.3.1 Impregnating equipment for devices**
 - 1.2.3.3.1.1 Impregnating machines for metal
 - 1.2.3.3.1.2 Vacuum pressure impregnating machines
 - 1.2.3.3.1.3 Atmospheric pressure impregnating machines
 - 1.2.3.3.1.4 Impregnating machines for laboratory and special applications
 - 1.2.3.4 Potting equipment**
 - 1.2.3.4.1 Potting mixing/dosing equipment
 - 1.2.3.4.2 Vacuum potting systems
 - 1.2.3.4.3 Atmospheric potting systems
 - 1.2.3.4.4 R&D and specialized potting systems
 - 1.2.3.4.5 Automatic pressure gelation (APG)
 - 1.2.3.4.6 Bearings and conveyor equipment for cast resins
 - 1.2.3.4.7 Additional potting equipment, miscellaneous
 - 1.2.3.5 Drying and hardening systems
- 1.3 Production of power electronics (IGBT, Power MOSFET, Thyristors, etc.)**
 - 1.3.1 Materials
 - 1.3.2 Machines and production equipment
 - 1.3.3 Housing and components
- 1.4 Measurement, detection and control systems for semiconductor production**
 - 1.4.1 Monitoring and control units for clean-room technology
 - 1.4.2 Monitoring systems, process-specific
 - 1.4.3 Positioning controllers
 - 1.4.4 Control equipment, miscellaneous, application-specific
 - 1.4.5 Computer; control; communication; data acquisition systems
- 1.5 Packaging and assembly materials**
- 1.6 Electronic components**
- 1.7 Electronic applications**
 - 2 Production of displays, LEDs and discretes**
 - 2.1 Display manufacturing**
 - 2.1.1 Substrate processing for displays**
 - 2.1.1.1 Aligners, exposer systems for displays
 - 2.1.1.2 CVD equipment for displays
 - 2.1.1.3 Laser-annealing systems
 - 2.1.1.4 Substrate processing for displays, miscellaneous
 - 2.1.2 Materials, parts**
 - 2.1.2.1 Substrate materials
 - 2.1.2.2 Spacers for displays
 - 2.1.2.3 Functional organic materials (OLED)
 - 2.1.2.4 Photomasks
 - 2.1.2.5 Functional films, laminates for displays
 - 2.1.2.6 Resins, adhesives for displays
 - 2.1.2.7 Materials, parts, miscellaneous
 - 2.1.3 Panel processing**
 - 2.1.3.1 Printers**
 - 2.1.3.1.1 Screen printers
 - 2.1.3.1.2 Inkjet printers
 - 2.1.3.1.3 Flexo printers
 - 2.1.3.1.4 Display separation equipment
 - 2.2 Manufacturing of Light Emitting Diodes (LED)**
 - 2.2.1 Materials, components**
 - 2.2.1.1 Substrates (Sapphire, SiC, bulk Si, bulk GaN, composites, InP, SiGe, etc.)
 - 2.2.1.2 Material for buffer layers
 - 2.2.1.3 Material for emitter layers, compound semiconductors
 - 2.2.1.4 Optical components
 - 2.2.1.5 Reflectors
 - 2.2.1.6 Components for LED Package
 - 2.2.1.7 Resins, material for sealing
 - 2.2.2 Manufacturing equipment**
 - 2.2.2.1 Sapphire wafer equipment (crystal growth, sawing, grinding)
 - 2.2.2.2 Silicon carbide wafer equipment (crystal growth, sawing, grinding)
 - 2.2.2.3 Wafer equipment for other LED-related semiconductors
 - 2.2.2.4 Lithography
 - 2.2.2.5 Etching
 - 2.2.2.6 Metallization
 - 2.2.2.7 Dicing
 - 2.2.2.8 Pick-and-place
 - 2.2.2.9 Die attach
 - 2.2.2.10 Bonding
 - 2.2.2.11 Phosphor coating
 - 2.2.2.12 Packaging, sealing, housing
 - 2.2.2.13 Equipment for epitaxy**
 - 2.2.2.13.1 Organic/Organo-metallic vapour phase deposition (OMVPE, MOCVD)
 - 2.2.3 Test systems**
 - 2.2.3.1 Life time test systems
 - 2.2.3.2 Photometric test systems
 - 2.2.3.3 LED test systems, miscellaneous
 - 2.3 Manufacturing of discrete components (resistors, capacitors, transistors, diodes)**
 - 2.3.1 Materials for discrete components
 - 2.3.2 Equipment for manufacturing of discrete components**
 - 2.3.2.1 Small parts precision manufacturing equipment
 - 2.3.2.2 Vacuum technology equipment
 - 2.3.2.3 Laser-processing equipment for discrete components

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2.3.2.4	Surface-finishing equipment	3.2.2.11	Equipment for thin-film production, miscellaneous
2.3.2.5	Continuous furnaces	3.2.3	Equipment for new generation solar cells
2.3.2.6	Drying/curing equipment, miscellaneous	3.2.3.1	Equipment for concentrator photovoltaics (CPV)
2.3.2.7	Finishing equipment for discrete components	3.2.3.2	Equipment for other novel solar concepts
2.3.2.8	Manufacturing equipment for capacitors	3.3	Factory planning and -equipment for photovoltaics
2.3.2.9	Manufacturing equipment for resistors	3.3.1	Waste-gas abatement/Waste-water treatment
2.3.2.10	Manufacturing equipment for transistors/diodes	3.3.2	Turnkey solutions
2.3.2.11	Film casting equipment	4	micronano-production/MEMS
2.3.2.12	Processing equipment for discrete component manufacture, miscellaneous	4.1	Materials/substances
3	Photovoltaics production	4.1.1	Substrate materials for microtechnology
3.1	Materials for Photovoltaics	4.1.2	Nanomaterials
3.1.1	Polysilicon, wafers (silicon, III-V semiconductors, aso.)	4.1.3	Materials for micro/nano technology, miscellaneous
3.1.2	Materials for organic photovoltaics and novel solar cells	4.2	Production equipment
3.1.3	Glass substrates for thin-film photovoltaics	4.2.1	Mask and artwork generation
3.1.4	Process chemicals	4.2.1.1	CA mask generation
3.1.5	Sputter targets	4.2.1.2	Resist-coating systems
3.1.6	Materials for evaporation and CVD	4.2.1.3	Exposure tools
3.1.7	Solder pastes	4.2.1.3.1	Pattern generators
3.1.8	Ribbons	4.2.1.3.2	Laser writing equipment
3.1.9	Adhesives	4.2.1.3.3	Exposure equipment, miscellaneous
3.1.10	Foils, laminates for encapsulation/modular technology	4.2.1.4	Mask handling systems
3.2	Photovoltaic production technology	4.2.2	Lithography, substrate processing
3.2.1	Equipment for wafer-based photovoltaics	4.2.2.1	Microlithography equipment
3.2.1.1	Ingot and wafer production	4.2.2.2	Contact-printing equipment
3.2.1.1.1	Crystal growing equipment	4.2.2.3	Laser writing equipment
3.2.1.1.2	Wafer inspection	4.2.2.4	E-beam writers
3.2.1.2	Cell production	4.2.3	Production technology for microsystems
3.2.1.2.1	Wafer texturing	4.2.3.1	Photo lithography
3.2.1.2.2	Diffusion furnaces	4.2.3.2	Double-sided lithography
3.2.1.2.3	Etching equipment (wet etch, laser)	4.2.3.3	UV depth lithography systems
3.2.1.2.4	Deposition equipment (PECVD, Sputtering)	4.2.3.4	Thin-film technology
3.2.1.2.5	Printers for front and backside contacts	4.2.3.5	Etching techniques
3.2.1.2.6	Print screens for metallisation	4.2.3.6	RIE (reactive ion etching)
3.2.1.2.7	Drying furnaces/Fast-firing furnaces	4.2.3.7	Laser ablation systems
3.2.1.2.8	Equipment for cell production, miscellaneous	4.2.3.8	Doping techniques
3.2.1.3	Module production	4.2.4	Tool and mould making
3.2.1.3.1	Tabbers/Stringers/Soldering ovens/Bonder	4.2.4.1	Micro tools
3.2.1.3.2	Laminators	4.2.4.2	Prototype/sample manufacturing
3.2.1.3.3	Framing units	4.2.4.3	Rapid prototyping
3.2.1.3.4	Module test/Quality inspection	4.2.4.4	Rapid tooling
3.2.1.3.5	Equipment for module production, miscellaneous	4.2.5	Micromachining and ultra-precision manufacturing
3.2.1.4	Equipment for crystalline photovoltaics, miscellaneous	4.2.5.1	Micro tools
3.2.1.4.1	Loaders/Unloaders	4.2.5.2	Micro milling machines
3.2.1.4.2	Automation, assembly and handling equipment	4.2.5.3	Drills for micromechanics
3.2.1.4.3	Laser processing equipment (sawing, drilling, edge isolation, marking)	4.2.5.4	Grinders, micromechanical
3.2.1.4.4	Resistance-/laser-welding equipment	4.2.5.5	Welding equipment for microconnections
3.2.1.4.5	Vacuum technology	4.2.5.6	Saw blades for microtechnology
3.2.1.4.6	Measurement tools/process control/environmental monitoring	4.2.5.7	Lasers for microtechnology materials
3.2.2	Equipment for thin-film module production	4.2.5.8	Ultrasonic machines
3.2.2.1	Cleaning equipment	4.2.5.9	Micro-optic production machines
3.2.2.2	Deposition equipment (CVD, PVD)	4.2.5.10	Production machines for micro hot stamping
3.2.2.3	Surface processing equipment/Priming/Conditioning/Resin coating	4.2.5.11	Production machines for micro system technology, miscellaneous
3.2.2.4	Laser processing equipment (sawing, drilling, edge isolation, marking)	4.2.5.12	Micro reaction systems
3.2.2.5	Encapsulation systems/Laminators	4.2.5.13	Microdosing systems
3.2.2.6	Soldering equipment	4.2.5.14	Production tools for microsystem technology, miscellaneous
3.2.2.7	Module test/Quality inspection	4.2.6	Bonding for microtechnology
3.2.2.8	Automation and handling equipment	4.2.6.1	Substrate bonding
3.2.2.9	Vacuum technology	4.2.6.2	Anodic bonding
3.2.2.10	Measurement tools/process control/environmental monitoring	4.2.6.3	Fusion bonding
		4.2.6.4	Glass reflow bonding
		4.2.6.5	Adhesive bonding

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- 4.2.6.6 Eutectic bonding
- 4.2.7 Micro-assembly**
- 4.2.7.1 Component mount techniques
- 4.2.7.2 Component mounting in microsystems
- 4.2.7.3 Micro technology mounting & assembly systems
- 4.2.7.4 Joining and interconnection techniques
- 4.2.7.5 Micro filters
- 4.2.7.6 Microrobotics
- 4.2.7.7 Nanorobotics
- 4.2.8 Microdrive technology**
- 4.2.8.1 Piezo-electric actuators
- 4.2.8.2 Micro motors
- 4.2.8.3 Micro gears
- 4.2.8.4 Micro positionings
- 4.3 Test, measurement and adaptation equipment for microtechnology**
- 4.4 Assembly and packaging technology for microintegration**
- 4.4.1 On-Chip Integration, System-on-chip (SoC), Wafer-level packaging
- 4.4.2 On-Board Integration, Chip-on-Board (CoB)
- 4.4.3 Flip-chip assembly
- 4.4.4 System-in-Package (SiP), Multi-chip modules, 3D integration
- 4.5 Microtechnology applications**
- 4.5.1 Micro manufacturing, precision technology
- 4.5.2 Lab-on-Chip, micro-process technology
- 4.6 Nanotechnology**
- 4.6.1 Nanochemistry, -materials, -substances
- 4.6.2 Nano tools, Nano analysis
- 4.6.3 Nanomanufacturing
- 4.6.4 Nanoelements/Nanosystems
- 5 Clean room technology**
- 5.1 Clean rooms**
- 5.1.1 Clean rooms, built-in
- 5.1.2 Clean-room boxes, incl. walk-in
- 5.1.3 Clean hoods
- 5.1.4 Flow boxes
- 5.1.5 Laminar flow equipment
- 5.1.6 Dust-free workstations
- 5.2 Clean-room maintenance and control**
- 5.2.1 Clean-room filter elements
- 5.2.2 Particle-monitoring equipment
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- 15.3.2 Bench-top crimping presses
- 15.3.3 Crimping units/machines, miscellaneous
- 15.3.4 Post crimp soldering equipment
- 15.3.5 IDC tools
- 15.3.6 Coax stripping tools
- 15.3.7 Optical-fiber stripping tools

15.4 Others

- 15.4.1 Cable ring binder equipment
- 15.4.2 Contacting units, miscellaneous
- 15.4.3 Control systems for cable-assembly systems

15.5 Cable-protection devices

- 15.5.1 Corrugated sheath processing machines
- 15.5.2 Heat shrinkable sleeves
- 15.5.3 Protective devices for cable harnesses, miscellaneous

15.6 Processing equipment for cable-protection devices

- 15.6.1 Corrugated sheaths
- 15.6.2 Corrugated sheaths, slotted

15.7 Technology for detachable connections, connectors

- 15.7.1 Connector strips
- 15.7.2 Single-conductor connectors
- 15.7.3 Ribbon cable connectors
- 15.7.4 Cables with connectors
- 15.7.5 Cable terminals
- 15.7.6 Wire end ferrules
- 15.7.7 Crimp connectors and accessories
- 15.7.8 Terminals
- 15.7.9 Enameled-wire connectors
- 15.7.10 Plugs and sockets
- 15.7.11 Plug sockets, all types
- 15.7.12 Plug connectors for household appliances
- 15.7.13 Plug connectors for industrial electronics
- 15.7.14 Plug connectors for automotive electronics
- 15.7.15 Plug connectors for laboratory/test equipment
- 15.7.16 Plug connectors for aerospace
- 15.7.17 Plug connector parts, miscellaneous
- 15.7.18 Plug connectors, miscellaneous complete

16 Coilware production

16.1 Materials for coilware

- 16.1.1 Coil cores
- 16.1.2 Cut and toroidal coil cores
- 16.1.3 Enameled wire, copper-, silver-
- 16.1.4 Superconducting wires
- 16.1.5 Transformer production aids, miscellaneous
- 16.1.6 Coil-winding technology materials, miscellaneous

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16.2 Production equipment for coilware

- 16.2.1 Stator coil winders
- 16.2.2 Fine-wire coil winders, automatic
- 16.2.3 Coiled-product assembly lines
- 16.2.4 Manual coil winders
- 16.2.5 Layer winders
- 16.2.6 Linear winders, automatic
- 16.2.7 Modular winding systems
- 16.2.8 Toroidal coil winders
- 16.2.9 Welding/soldering equipment for coiled-product connections
- 16.2.10 Transfer winding robots
- 16.2.11 Bench-type coil winders
- 16.2.12 Bobbin winders
- 16.2.13 Coil winders, miscellaneous
- 16.2.14 Coil-manufacturing aids, miscellaneous
- 16.2.15 Coil-winding technology tools, miscellaneous

16.3 Applications for coilware

- 16.3.1 Electric motor
- 16.3.2 Generators
- 16.3.3 Transformers
- 16.3.4 Relays
- 16.3.5 Electric magnets
- 16.3.6 Coilware for actuators, miscellaneous
- 16.3.7 Coilware for sensors, miscellaneous

17 Hybrid-component manufacturing

17.1 Tooling and mouldmaking

- 17.1.1 Die making, tool making
- 17.1.2 Rapid prototyping
- 17.1.3 Tooling and mouldmaking, miscellaneous

17.2 Tools, tool equipment

- 17.2.1 Follow-on assembly tools
- 17.2.2 Press tools
- 17.2.3 Cutting tools
- 17.2.4 Injection moulding tools
- 17.2.5 Stamping tools
- 17.2.6 Deep-drawing tools
- 17.2.7 Separating tools
- 17.2.8 Bending tools
- 17.2.9 Tools, miscellaneous

17.3 Assembly and handling technology, periphery

- 17.3.1 Reeling/unreeeling machines
- 17.3.2 Destacking systems
- 17.3.3 Feeders, feed technology
- 17.3.4 Conveyor systems
- 17.3.5 Reels
- 17.3.6 Cooling equipment and systems
- 17.3.7 Assembly equipment and systems
- 17.3.8 Robots

- 17.3.9 Cleaning equipment

17.4 Stamping

- 17.4.1 Presses
- 17.4.2 Stamping presses
- 17.4.3 Stamping machines and systems
- 17.4.4 Service-providers—stamping

17.5 Shaping

- 17.5.1 Bending machines and systems
- 17.5.2 Lathes
- 17.5.3 Roll bending machines
- 17.5.4 Special-purpose machines
- 17.5.5 Service-providers—shaping
- 17.5.6 Equipment, spare parts and accessories for shaping, miscellaneous

17.6 Surface-finishing equipment, refinement

- 17.6.1 Etching machines and systems
- 17.6.2 Coating machines and systems
- 17.6.3 Electroplating machines and systems
- 17.6.4 Marking systems and equipment
- 17.6.5 Polishing machines and systems
- 17.6.6 Cleaning machines and systems
- 17.6.7 Grinding machines and systems
- 17.6.8 Service-providers—surface technology
- 17.6.9 Equipment, spare parts and accessories for surface treatment and refinement, miscellaneous

17.7 Injection molding for plastics

- 17.7.1 Processing machines and systems
- 17.7.2 Extruders
- 17.7.3 Cooling equipment
- 17.7.4 Injection molding machines and systems
- 17.7.5 Service-providers—injection molding
- 17.7.6 Equipment, spare parts and accessories for injection molding for plastics, miscellaneous

17.8 Metal/plastic composite technologies

- 17.8.1 Assemblies (mounted in plastic)
- 17.8.2 Inserts (plastic injection around inserted part)
- 17.8.3 Metal/plastic composite technologies, miscellaneous

17.9 Process and quality control/Automation

- 17.9.1 Production data-acquisition (PDA) systems
- 17.9.2 Measuring, testing and inspection equipment
- 17.9.3 Process measuring technology
- 17.9.4 Process control and automation
- 17.9.5 Process monitoring
- 17.9.6 Traceability equipment
- 17.9.7 Sensors
- 17.9.8 Regulation and control equipment
- 17.9.9 Equipment, spare parts and accessories for process and quality control, miscellaneous

E Cluster Future Production—Smart Factory

18 Industry 4.0

18.1 Autonomous inter-connected micro systems, sensor and actuator networks, cyber physical systems

- 18.1.1 Autonomous inter-connected micro systems, sensor and actuator networks, wireless sensor networks
- 18.1.2 5G-Technology
- 18.1.3 Machine Learning/Big Data Analytics
- 18.1.4 Cyber Physical Systems (CPS)

- 18.1.5 Energy harvesting
- 18.1.6 Human machine interfaces active/passive (touch panel displays, barcode reader, RFID systems, augmented reality devices, aso.)
- 18.1.7 Information security/IP protection (embedded)
- 18.1.8 Product Security
- 18.1.9 Digital twin
- 18.1.10 **Equipment with integrated sensor and actuator networks, CPS**
 - 18.1.10.1 Condition Monitoring
 - 18.1.10.2 Predictive Maintenance



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18.1.10.3	Process controlling	18.7.7	Software for Material-flow control
18.2	Software: basic systems and development tools	18.7.7.1	Warehouse management and control systems
18.2.1	Embedded systems	18.7.7.2	Commissioning systems
18.2.2	Development tools	18.7.7.3	Production logistics systems
18.2.3	Simulation systems	18.7.7.4	Visualization systems for material flow and warehouse logistics
18.2.4	Programming systems	19	Production technologies for batteries and electrical energy storage
18.2.5	Networks and communication	19.1	Materials and components for batteries and electrical energy storage
18.2.6	Expert systems (AI-technologies)	19.1.1	Cathode material, cathodes
18.3	Machine software	19.1.2	Current Collector
18.3.1	Machine control software	19.1.3	Electrode Foil
18.3.2	Measurement technology (embedded into machines)	19.1.4	Activated Carbon
18.3.3	NC/CNC-path software	19.1.5	Materials and components for battery modules
18.3.4	Bus systems	19.1.6	Materials/Components, miscellaneous
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18.4	Manufacturing software	19.2.1	Electrode and separator manufacturing equipment
18.4.1	Production control center, production data acquisition (PDA), operating and machine data logging	19.2.1.1	Coating equipment
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18.4.3	Advanced Planning & Scheduling (APS)	19.2.1.3	Drying equipment
18.4.4	Process optimisation and simulation	19.2.1.4	Rolling Press Machine
18.4.5	Material flow control	19.2.2	Cell manufacturing equipment
18.4.6	Automated Process Control (APC)	19.2.2.1	Cutter
18.4.7	Factory automation; cell controller software	19.2.2.2	Stamping equipment
18.4.8	Maintenance and service	19.2.2.3	Stacking machines
18.5	Business software	19.2.2.4	Current collector welding machines
18.5.1	Engineering (CAD, CAM, CAE, EDM, PDM, VR, DMU, etc.)	19.2.2.5	Cell packaging machines
18.5.2	Variant configuration	19.2.2.6	Degassing equipment
18.5.3	Supplies/stock/ordering	19.2.3	Automation equipment
18.5.4	Supply Chain Management (SCM)	19.2.4	Assembly and handling equipment
18.5.5	ERP, PPS, order processing	19.2.5	Battery module equipment, battery pack assembly
18.5.6	Business process management	19.2.5.1	Cell current collector contacting equipment (Soldering, welding, screwing)
18.5.7	Project management	19.2.5.2	Battery Management Systems and sensors mounting equipment
18.5.8	Business Intelligence	19.2.5.3	Assembly and handling equipment battery pack
18.5.9	Quality management	19.2.5.4	Screwing equipment battery pack
18.5.10	Technical product documentation	19.2.6	Manufacturing equipment for batteries and energy storage, miscellaneous
18.5.11	Product Lifecycle Management	19.2.7	Clean room technology
18.5.12	E-Business/E-Commerce/E-Market	19.3	Inspection and test systems for batteries and electrical energy storage
18.5.13	Service management	19.3.1	Charge/Discharge Test Equipment
18.6	Software services	19.3.2	Insulation Tester
18.6.1	System development/-integration	19.3.3	Life cycle tester, ageing
18.6.2	Order specific software development	19.3.4	Impedance measuring equipment
18.6.3	Quality and project management	19.3.5	Leak tightness test equipment
18.7	Application specific software	19.3.6	Battery simulators for system test (grid buffers for renewable energy, e-mobility, etc.)
18.7.1	Process control software for semiconductor and display production	19.3.7	Inspection/Testing/Evaluation equipment, miscellaneous
18.7.2	Process control software for photovoltaics production	19.4	Accumulators
18.7.3	Process control software for PCB production	19.4.1	Fuel cells
18.7.3.1	Gerber data processing programs	19.4.2	Supercaps/Ultracaps
18.7.3.2	Drill data processing programs	19.4.3	Usage
18.7.3.3	PCB data generation systems	19.4.3.1	Mobile use, high power (automotive, e-mobility)
18.7.3.4	Check data processing programs	19.4.3.2	Mobile use, low power/consumer (smart phone, laptop, etc.)
18.7.3.5	Software for printing tools, miscellaneous	19.4.3.3	Stationary use (photovoltaics, renewable energy, buffer systems)
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18.7.5.1	Measurement technology software		
18.7.5.2	ATE software/postprocessors		
18.7.5.3	Fault-detection software		
18.7.5.4	Fault-detection software with user prompting		
18.7.6	Control software for material processing		

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- 20.1.2 Conductors
- 20.1.3 Semiconductors
- 20.1.4 Dielectrics
- 20.1.5 Encapsulation materials and resins
- 20.1.6 Components for hybrid systems
- 20.1.7 Materials and components, miscellaneous

20.2 Manufacturing equipment

20.2.1 Print technology

- 20.2.1.1 Screen printing equipment
- 20.2.1.2 Ink-jet printers
- 20.2.2 Vacuum processes
- 20.2.3 Laser deposition equipment
- 20.2.4 Solution coating (spin coating, dip coating, etc.)
- 20.2.5 Roll-to-roll process

20.2.6 Assembly and packaging technology, system integration

- 20.2.6.1 Electrical contacting (flip chip, bonding, etc.)
- 20.2.6.2 Lamination equipment
- 20.2.6.3 System integration
- 20.2.6.4 Hybrid systems (polytronics)
- 20.2.7 Manufacturing equipment, miscellaneous

20.3 Inspection and test systems

- 20.3.1 Optical characterisation
- 20.3.2 Chemical characterisation
- 20.3.3 Quality/Process control
- 20.3.4 Inspection and test systems, miscellaneous

20.4 Applications and devices

- 20.4.1 Integrated Circuits (IC)
- 20.4.2 Passive components
- 20.4.3 Antennas
- 20.4.4 RFID labels
- 20.4.5 Displays and lighting
- 20.4.6 Speakers
- 20.4.7 Smart objects/smart textiles
- 20.4.8 Polymer electronics, other applications

21 3D Printing, Additive Manufacturing

21.1 Production equipment and process technology

- 21.1.1 Laser Sintering
- 21.1.2 Selective Laser Melting
- 21.1.3 3D Printing/Binder Jetting
- 21.1.4 Digital Light Processing
- 21.1.5 other additive manufacturing processes

21.2 Sub systems and machine components

- 21.2.1 Tools, nozzles, print heads
- 21.2.2 Support structures, object platforms, retractable tables
- 21.2.3 Software, CAD platforms
- 21.2.4 other sub systems and machine components

21.3 Materials

- 21.3.1 Plastic filaments
- 21.3.2 Metal granulates

F Overall Production Support

22 Production materials/equipment and environmental technology

22.1 Preliminary products and semi-finished goods, metallic

22.1.1 Sheet metal, strips

- 22.1.1.1 Strips, metal
- 22.1.1.2 Laminations and metal foils

22.1.2 Wires

- 22.1.2.1 Wires, bare
- 22.1.2.2 Wires for component connections
- 22.1.2.3 Copper wires, insulated
- 22.1.2.4 Silver wires, insulated
- 22.1.2.5 Wires, specialized cross-section
- 22.1.3 Springs

22.1.4 Plastics

22.1.5 Cables

- 22.1.5.1 Ribbon cables
- 22.1.5.2 RF cables
- 22.1.5.3 Coaxial cables
- 22.1.5.4 Round cables
- 22.1.5.5 Stranded wires for mains/low frequency
- 22.1.5.6 Cables, miscellaneous

22.1.6 Semi-finished goods

- 22.1.6.1 Etched parts
- 22.1.6.2 Lathed parts
- 22.1.6.3 Punch-pressed flexible parts
- 22.1.6.4 Drawn parts/semi-finished goods
- 22.1.6.5 Contact parts/semi-finished goods
- 22.1.6.6 Molded parts, miscellaneous
- 22.1.6.7 Mechanical components, miscellaneous
- 22.1.6.8 Semi-finished goods in electrical engineering, miscellaneous

22.2 Preliminary products and semi-finished goods, non-metallic

22.2.1 Pre-products

- 22.2.1.1 Duroplastic molded parts/semi-finished goods
- 22.2.1.2 Resin-bonded molded parts/semi-finished goods
- 22.2.1.3 Molded glass parts/semi-finished goods
- 22.2.1.4 Resin-bonded fabric
- 22.2.1.5 Plastic semi-finished goods
- 22.2.1.6 Industrial laminates (sheets, rods, tubes)
- 22.2.1.7 Thermoplastic molded parts/semi-finished goods
- 22.2.1.8 Silicones and silicone parts
- 22.2.1.9 Molded ceramic parts/semi-finished goods, miscellaneous
- 22.2.1.10 Plastic parts, miscellaneous
- 22.2.1.11 Insulated molded parts/semi-finished goods, miscellaneous

22.2.2 Materials, miscellaneous

- 22.2.2.1 Masks (including UV-curable)
- 22.2.2.2 Sealants
- 22.2.2.3 Seals
- 22.2.2.4 Foils, insulating

22.3 Process materials

22.3.1 Lacquers

- 22.3.1.1 Photographic laminates (resists)
- 22.3.1.2 Protective lacquers
- 22.3.1.3 Solder mask lacquers
- 22.3.1.4 Insulating paints/lacquers

22.3.2 Metals

- 22.3.2.1 Precious metals
- 22.3.2.2 Metals/alloys, pure/ultra-pure
- 22.3.2.3 Metallic powders

22.3.3 Chemicals

- 22.3.3.1 Electronics chemicals
- 22.3.3.2 Process chemicals, miscellaneous
- 22.3.3.3 Solvents
- 22.3.3.4 Chemicals, miscellaneous

22.3.4 Insulating materials

- 22.3.4.1 Insulating resins

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- 22.3.4.2 Impregnation insulating materials
- 22.3.4.3 Insulating materials, miscellaneous
- 22.3.5 Plastics**
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- 22.3.5.2 Polyester materials
- 22.3.5.3 Polyamides
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- 22.3.6.1 Gases for semiconductor technology
- 22.3.6.2 Industrial gases
- 22.3.6.3 Gases, miscellaneous
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- 22.4.1.2 Clean-room garments
- 22.4.2 Furniture**
- 22.4.2.1 Office/lab furniture
- 22.4.2.2 Vibration-proof tables
- 22.4.2.3 Lab desks
- 22.4.2.4 Stand-up aids
- 22.4.3 Equipment**
- 22.4.3.1 Workstations, specialized
- 22.4.3.2 Lighting equipment
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- 22.4.3.4 Climate control equipment
- 22.4.3.5 Modular workstation systems
- 22.4.4 ESD protection**
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- 22.4.4.4 ESD clean-room products
- 22.4.4.5 ESD protection
- 22.4.4.6 EGB workstation equipment
- 22.4.4.7 ESD packaging
- 22.4.4.8 Antistatic products, miscellaneous
- 22.4.5 Work safety equipment
- 22.4.6 Plant fittings, miscellaneous**
- 22.4.6.1 Power supplies higher than 3 kW
- 22.4.6.2 Workshop equipment, miscellaneous
- 22.4.6.3 Protection materials, miscellaneous
- 22.5 Decontamination, cleaning, disposal (environmental management)**
- 22.5.1 Decontamination
- 22.5.2 Cleaners**
- 22.5.2.1 Solvents/cleaners
- 22.5.2.2 Defluxers
- 22.5.2.3 Stencil cleaners
- 22.5.2.4 Ultrasonic cleaning equipment
- 22.5.2.5 Cleaning agents, miscellaneous
- 22.5.3 Strippers**
- 22.5.3.1 Photo-laminate strippers
- 22.5.3.2 Tin strippers
- 22.5.3.3 Strippers, miscellaneous
- 22.5.4 Equipment and systems**
- 22.5.4.1 Final-cleaning equipment (before population)
- 22.5.4.2 Sterilization equipment, UV
- 22.5.4.3 Semi-aqueous cleaning systems
- 22.5.4.4 Lead-frame cleaning systems
- 22.5.4.5 Film/surface cleaning units
- 22.5.4.6 Low-profile component cleaning systems
- 22.5.4.7 Plasma-cleaning systems
- 22.5.4.8 Screen-washing equipment
- 22.5.4.9 Underwipe cleaning
- 22.5.4.10 Rinsing equipment, specialized
- 22.5.4.11 Substrate-cleaning equipment
- 22.5.4.12 Reflow cleaning equipment
- 22.5.4.13 In-line washing stations
- 22.5.4.14 Ionizers
- 22.5.4.15 Cleaning equipment, specialized, miscellaneous
- 22.5.4.16 Washing/rinsing equipment, specialized, miscellaneous
- 22.5.5 Peripheral systems
- 22.5.6 Waste gas abatement**
- 22.5.6.1 Waste gas abatement/exhaust extraction equipment
- 22.5.6.2 Chip/dust extraction equipment
- 22.5.6.3 Environmental protection equipment, miscellaneous
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- 22.5.7.1 Scrap-electronics disassembly equipment
- 22.5.7.2 Obsolete electronic parts reprocessing equipment
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- 22.6.2.1 Filter materials
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- 22.6.2.3 Filtration equipment, miscellaneous
- 22.6.2.4 Resist filter systems in recirculation
- 22.6.2.5 Exhaust gas absorbers
- 22.6.2.6 Waste-water treatment chemicals
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- 22.6.3.1 Chemical supply/feed systems
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- 22.6.5.2 Vacuum valves
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- 22.6.5.4 Vacuum pumps
- 22.6.6 Cleaning**
- 22.6.6.1 Process-water purification equipment (recirculation)
- 22.6.6.2 Waste-water treatment equipment
- 22.6.6.3 Etching-solvent reclamation equipment
- 22.6.6.4 Cleaning equipment, miscellaneous
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- 22.6.7.1 Metal recycling
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- 23.1.4 Databases, incl. online accessible
- 23.1.5 Product-information systems
- 23.1.6 Information, miscellaneous
- 23.2 Production services except EMS**
- 23.2.1 Production services for semiconductors**
- 23.2.1.1 Chip bonding
- 23.2.1.2 Chip packaging

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