

ADVANCED
TECHNOLOGIES
& SOLUTIONS

March 2023



WHAT GUIDES US

VISION

FIRST CHOICE FOR ADVANCED SOLUTIONS

MISSION

We set the highest quality standards in our industry
We industrialize leading-edge technology
We care about people
We reduce our ecological footprint
We create value





WORLD LEADING HIGH-TECH PCB & IC SUBSTRATES COMPANY









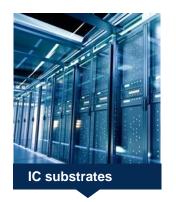
GLOBAL FOOTPRINT FOR FAST SUPPLY CHAIN



Leoben, headquarters Austria **1,746*** Fehring Austria 450* Nanjangud India 1,462* Chongqing China 6,891* Shanghai China 3,983*

Ansan Korea 347* Kulim Malaysia Start of Production 2024

MARKET SEGMENTS & PRODUCT APPLICATIONS



- High-performance computers
- Servers
- Client PCs
- Cloud & Edge computing
- 5G base stations
- Networking & gaming

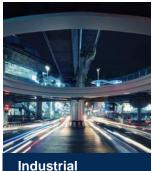


- Smartphones
- Wearables
- Notebooks & tablets
- Consumer electronics (action cameras and drones)



Dependable ADAS Sensors

- Connected vehicles and V2X
- Infotainment
- Satellites



Diagnostics and imaging systems

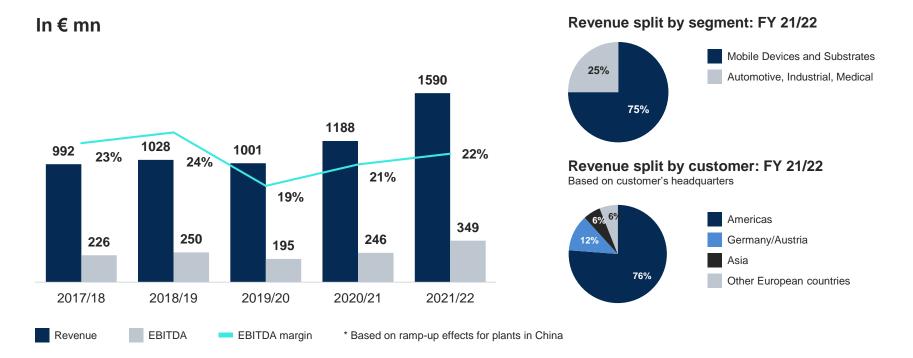
Medical

- Therapy application (pacemakers, hearing aids, drug delivery ...)
- Patient monitoring
- Smart building, grid, lighting, manufacturing, transportation & retail
- Telecom infrastructure Power management
- Robots

BU Microelectronics

BU Electronics Solutions

A SUSTAINABLY GROWING COMPANY



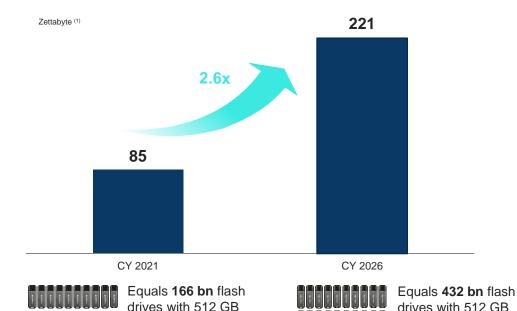




DATA AS THE KEY GROWTH DRIVER

... IN THE MICROELECTRONICS INDUSTRY

Global Data Volume



memory

Source: IDC (2022)

1. One zettabyte corresponds to 2⁷⁰ bytes, i.e. 1 bn terabytes

memory

SIGNIFICANT DATA VOLUME GROWTH

Digitalisation requires data management

Consumer electronics | ADAS | HDDs | DRAMs | NANDs Industry 4.0 | Medical applications | Internet of Things | ... Wireless infrastructure | Data centres | Servers | Wireline infrastructure Big Data | In-Memory

HIGH-PERFORMANCE PROCESSORS NEED HIGH-PERFORMANCE ABF SUBSTRATES

Growing demand supports AT&S growth strategy



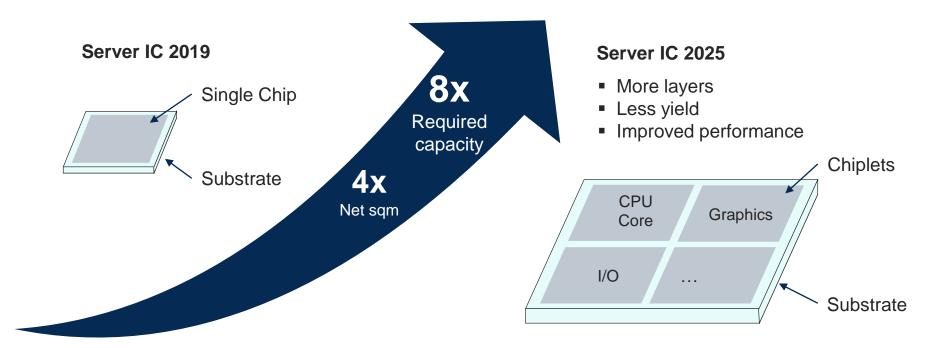
Servers, networking, AI and gaming are driving the trend towards significantly bigger and more complex substrates

- Increased substrate size
- Increased layer count
- Increased speed

AT&S is significantly increasing capacities for highly complex substrates to support these technology developments

IMPACT OF CHIPLETS ON ABF SUBSTRATE CAPACITY

More capacity is needed due to larger form factor and increasing layer count of ABF substrates



AT&S IS ENABLING GLOBAL DIGITALISATION



Miniaturisation

Increased computing power for fast data processing



Modularisation

More functionality at same or reduced space



Increased speed / Low latency

Communication of high data volumes (5G, Autonomous Driving)

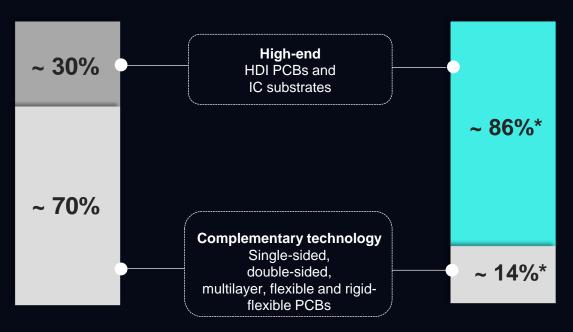


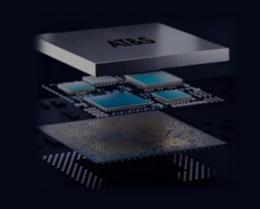
Increased power / Power efficiency

Reducing non-value adding electrical loss



STRATEGIC FOCUS ON HIGH-END TECHNOLOGIES





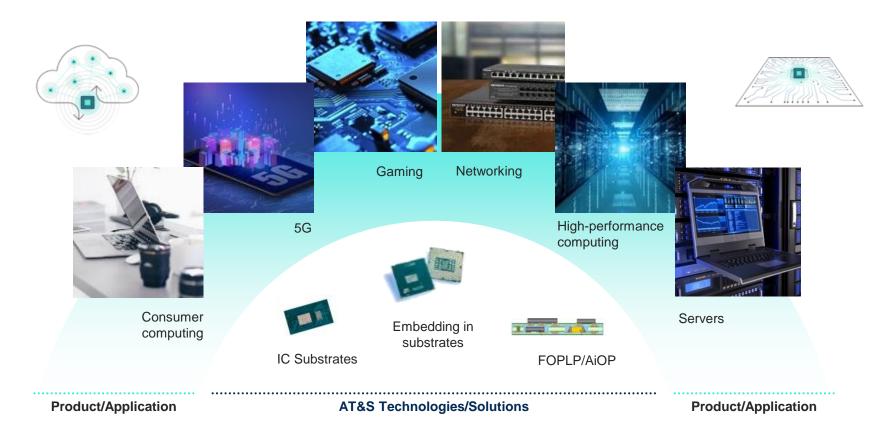
General PCB and IC substrates market

AT&S revenue





BU MICROELECTRONICS





R&D – BASIS FOR TECHNOLOGY LEADERSHIP

R&D 11,4% **HQ** Austria **R&D** rate Development up to (corresponds to series production at € 181 mn) the production sites 44% 600 Vitality Index* **Patents**

International R&D partners



Status: FY 2021/22

^{*}Share of revenue of technologically innovative products made in the last three years (previously: Innovation Revenue Rate)





MANAGEMENT BOARD

Andreas Gerstenmayer CEO



- Joined AT&S as CEO in 2010
- Previous positions include:
 - 18 years of work experience at Siemens, including Managing Director with Siemens Transportation Systems GmbH Austria and CEO of the Drive Technology business unit in Graz from 2003 to 2008
 - Partner at FOCUSON Business
 Consulting GmbH after leaving Siemens
- Education:
 - Degree in Production Engineering from Rosenheim University of Applied Sciences

Petra Preining CFO



- CFO since 2022
- Previous positions include:
 - 24 years of experience in supervisory and management functions, including Supervisory Board Member, Audit Committee Member, CEO responsibilities (on an interim basis), Managing Director, CFO
 - Extensive work experience at Semperit AG Holding, B&C Holding, Deloitte Tax, TRC Ltd., Wyeth, Kraft Jacobs Suchard and Unilever
- Education:
 - Master's degree in Business Administration from the Vienna University of Economics and Business

Ingolf Schröder COO



- COO since 2020
- Previous positions include:
- 24 years of work experience at Osram, holding various different positions in the company, Senior Vice President Operations & Quality responsible for 23 locations.
- COO of the Business Unit Automotive
- Education:
- Master's degree in Material Sciences from TU Berlin, Germany

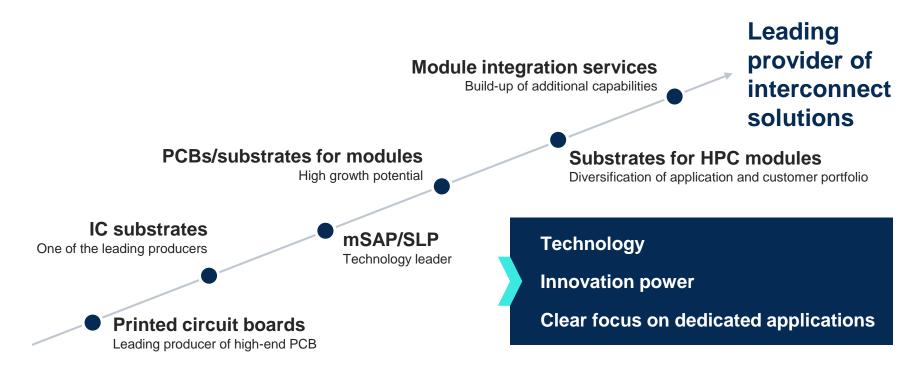
Peter Schneider CSO



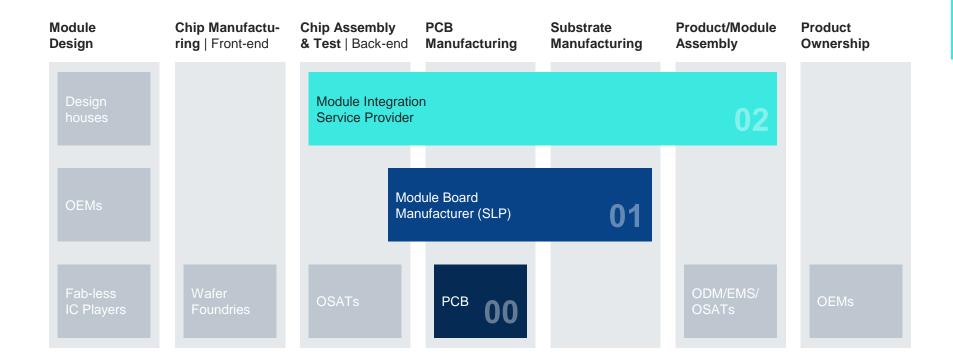
- CSO since 2021
- Previous positions include:
- Many years of work experience at Wacker-Chemie and Mayr-Melnhof Karton. Extensive international experience as a result of his work, which often included having global responsibility for several production sites and sales teams, and has successfully set up, restructured and reorganized various businesses
- Education:
- Degree in Technical Chemistry from the Vienna University of Technology and a doctorate degree in Industrial Management Economics

MORE THAN AT&S

Broadening the service range and opening up of new business opportunities



AT&S SOLUTIONS FOR THE ELECTRONICS INDUSTRY



MILESTONES IN THE GROUP'S HISTORY (1/2)

Group is founded, emerging from several companies owned by the Austrian State



Indal Electronics Ltd.. largest Indian printed circuit board plant (Nanjangud) is acquired - today, AT&S India Private Limited

Korean flexible PCB manufacturer, Tofic Co. Ltd. is acquired - today, AT&S Korea Co., Ltd.

New production setup: Austrian plants produce for high-value niches in the automotive and industrial segment; Shanghai focuses on the high-end mobile devices segment

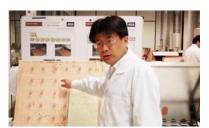
1987 94

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Group is privatized and acquired by Androsch, Dörflinger, Zoidl

Initial public offering on Frankfurt Stock Exchange.



Move to Shanghai – to set up one of the leading HDI production sites in the world

AT&S changes to Vienna Stock Exchange

MILESTONES IN THE GROUP'S HISTORY (2/2)



Construction on new plant in Chongqing, China starts. Capacity increase in Shanghai by 30%

After record high sales and earnings, AT&S decides to increase the investment program in Chongqing

AT&S introduces mSAP technology in Shanghai and Chongqing Construction of plant 3 in Chongging for IC substrates starts

2010 11 13 15 16 17 18 19 21

Production starts at plant II in India

AT&S enters the IC substrate market in cooperation with a leading manufacturer of semiconductors



AT&S starts serial production of IC substrates at the plant in Chongqing

Second expansion phase at plant 1 in Chongging starts

> Construction of plant in Kulim, Malaysia, starts



PROJECT UPDATE - CHONGQING III (CN)

- High volume manufacturing already started
- Ramp-up of capacities fully on track
- Full capacities available as of the beginning of Q3 23/24



PROJECT UPDATE – CAMPUS KULIM (MY)

- Groundbreaking done
- Construction/piling started November 1st
- Piling of the first production building is already 100% complete and civil construction has begun.
- High volume production scheduled for the end of CY 2024



€ 500 MN INVESTMENT IN AUSTRIA AT&S SETS A NEW BENCHMARK IN EUROPE

Main Investments Leoben-Hinterberg 2020-2025

2020 - 2023

- Technology upgrade
- Substrate cores



2021 - 2022

- New office building
- Space for 300 employees



2021 - 2025

- R&D center for substrates
- Capacity for upscaling





AT&S PRODUCT PORTFOLIO

Wide range of products for interconnect solutions



IC Substrates

Allow complex integrated circuits to be connected to PCBs while saving space. Also known as flip-chiptechnology.



Modules

Modules fulfill a specific electrical function within a system. Miniaturized modules help to reduce overall system-size.



Can be installed in twisted. folded or bent configurations. This allows designs that get by without cables or plugconnections.

Flexible & Rigid Flexible PCBs



Inlay PCBs, provided with copper-coin-inlavs which allow heat to be dissipated selectively and prevent overheating.

Thermal Enhanced PCBs



Cavity PCBs

Cavity PCBs allow single components to be integrated into cavities inside the PCB instead of on the surface of the circuit board..



More compact PCBs with a multi-laver-structure can connect components with shorter and faster signal paths.

High Density Interconnect PCBs

AT&S PRODUCT PORTFOLIO

Wide range of products for interconnect solutions



A wide variety of microelectronic components can be integrated directly into the PCB in several layers.

Used to test processors or

components can be tested

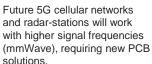
with one base test layout.

other chips. Different

Embedded Component Packaging PCBs



High Frequency & High Speed PCBs





Consist of several layers, are space-saving and ensure fast connections between components.

Multilayer PCBs



Test- & Reference **Boards**



Double Sided PCB

Double-sided, platedthrough printed circuit boards are ubiquitous in the electronics industry.

IC SUBSTRATES



IC substrates allow complex integrated circuits such as computer processors to be connected to printed circuit boards in a space-saving manner. This process, also known as flip-chip technology, allows short lines, compact designs and high data rates.

Applications:

- Data centres
- Microservers
- 5G base stations
- Servers & cloud computing
- High performance computers
- Notebooks and 2-in-1-devices
- 3D sensing module

- High performance and reliability
- Flexible structure
- Can be adapted for many applications









MODULES



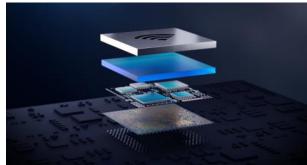
Modules fulfill a specific electrical function within a system. The high level of integration requires high-end manufacturing processes. Additionally, miniaturized modules help to reduce overall system size. Specific technologies like ECP® or mSAP and additional services in terms of design, simulation and supply chain are key enabling factors for providing high end modules.

Applications:

- V2X communication
- Connectivity modules
- Power modules
- Computing modules

- System size reduction
- System cost reduction
- Easy integration (Plug & Play)
- Reduced time to market







FLEXIBLE & RIGID FLEXIBLE PCBS



Flexible circuit boards can be installed in twisted, folded or bent configurations. This allows novel system designs that get by without cables or plug connections. Flexible PCBs also allow for multi-layer boards.

Applications:

- Hearing aid
- Cochlear implants
- Patches
- Drug delivery
- Sensors (Industrial)

- Increased design freedom
- Move from 2D to 3D
- Foldable solutions
- Miniaturization possibilities
- Provide higher reliability in interconnections











THERMAL ENHANCED PCBS

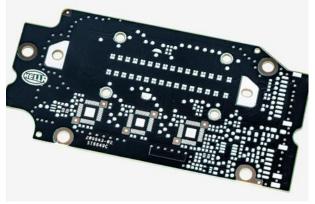


Inlay PCBs are printed circuit boards that are provided with copper-coin-inlays which allow heat to be dissipated selectively and prevent overheating.

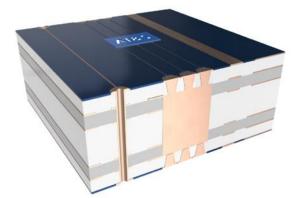
Applications:

- Headlamps (Automotive)
- LiDAR systems

- Allows for the integration of heat generating components on the **PCB**
- Hot-spot cooling and optimized heat transfer from top to bottom side of PCB







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2.5D® TECHNOLOGY (..CAVITY PCBS")

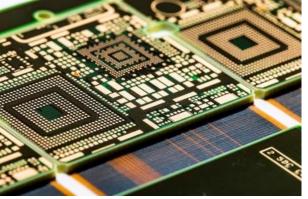


2.50® stands for a process in which tailor-made cavities are created within a multilayer circuit board, which can then be equipped with various electronic components. This ensures a compact design and allows further miniaturization of circuit boards.

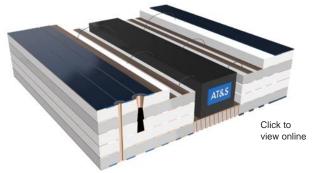
Applications:

- ADAS computing
- Camera (Automotive)
- LiDAR systems
- SSD (Solid-State-Drive)

- Miniaturization
- Cost effective compared to alternative solutions
- Cavities can easily be adapted







HDI PCBS



Due to the increasing demands of the mobile phone industry for miniaturization and higher performance of microelectronic systems, printed circuit boards were developed in 1997 that are more compact thanks to a multi-layer structure and can connect components with shorter and therefore faster signal paths.

Applications:

- Satellite communications
- Commercial launcher
- Ground stations
- ADAS computing
- Infotainment (Automotive)
- Camera (Automotive)
- Flight mission computer

- Flight control
- Engine control
- Pacemaker
- Prostheses
- Action camera
- Smart home appliances
- Smartphone

- Miniaturization
- High data rates
- Short lines
- Adaptable to different requirements
- Material with low halogen content can be used







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EMBEDDED COMPONENT PACKAGING PCBS



A wide variety of microelectronic components such as DC voltage converters can be integrated directly into the PCB. Complex systems can be accommodated in several layers on one circuit board, resulting in significantly reduced space-requirements.

Applications:

- ADAS computing
- Power packages
- Infotainment
- Satellite communications
- Ground stations
- M2M modules
- Smart lighting
- Smart traffic

- High reliability
- Optimized thermal management
- Significant form factor reduction
- Short and fast signal paths
- New design options









HIGH FREQUENCY & HIGH SPEED PCBS



Future 5G cellular networks and radar stations will work with higher signal frequencies (mmWave), requiring new PCB solutions. Usage of special material helps to improve the signal quality. Hybrid stack-ups with standard and high frequency materials help to reduce the costs. Via mSAP technology the geometry of the copper tracks is improved to gain better signal integrity.

Applications:

- Radar
- LiDAR
- V2X communication
- 5G network

- All in one solution
- High level of integration
- Shortened signal paths
- Reduced signal losses





MULTILAYER PCBS

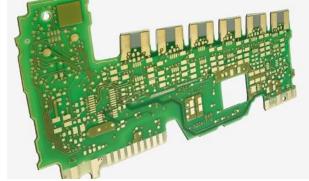


Printed circuit boards that consist of several layers are spacesaving and ensure fast connections between components: AT&S produces circuit boards with four to 28 layers and offers several special variants, providing electronic shielding, highfrequency-capabilities and other customizations.

Applications:

- Satellite communications
- Commercial launcher
- Ground stations
- Flight mission computer
- Flight control
- Engine control
- MRI (magnetic resonance imaging)
- Smart home appliances
- Drug delivery

- Multi-layer structure ensures short and fast connections
- More complex designs
- Miniaturization







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TEST & REFERENCE BOARDS

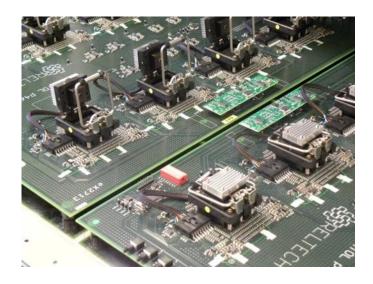


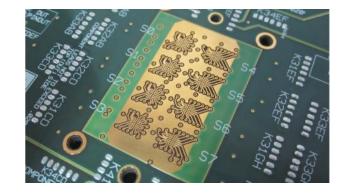
Used to test processors or other microchips. Different components can be tested with one base test layout. Normally there is a large motherboard (often a standard PCB with hard gold connectors), upon which multiple smaller test boards (often a HDI board) with changeable sockets are fixed. In such a socket the IC Substrate with a processor or a carrier board with a chip can be tested. Optical Precision Drilling is needed for the fixing holes of the sockets.

Applications:

- HTOL (high temperature operating life) test boards
- THB (temperature humidity bias) test boards
- HAST (highly-accelerated stress) test boards
- Personality cards
- Semiconductor industry

- With one motherboard different chips/CPUs can be tested
- No need to solder → interchangeable sockets for different chips





DOUBLE SIDED PCBS



Double-sided, plated-through printed circuit boards are in use throughout the electronics sector, particularly for industrial and automotive applications. AT&S specializes in series production of double-sided printed circuit boards with thickness in the 0.1-3.2mm range.

Applications:

Automotive

Sensors

Air-Condition

Switches

ABS

Airbag

Rear Lights LED

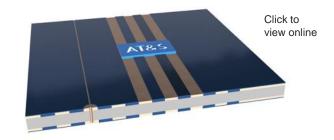
Central Electric Unit Back / Front

Benefits:

Optimized heat dissipation Good cost effectiveness







AT&S SPECIAL TECHNOLOGY PORTFOLIO



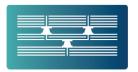
Innovative production-process for radically thin PCBs used in highly compact devices

mSAP Technology



ECP[®] Technology

Space-saving through vertical embedding of components leads to significant form factor reduction



Z-Interconnect is AT&S's answer to the arising challenges of miniaturization, high signal speeds, high density and increasing layer count

Z-Interconnect Technology



2.5D[®] Technology

Cost-effective creation of cavities in multilayer circuit boards for miniaturized designs

MSAP TECHNOLOGY



mSAP (modified Semi-Additive Process) is a process in which the copper conductor tracks are not etched from a thin layer applied to the circuit board. Instead, they are applied directly to the carrier material as conductor tracks. This means that significantly smaller structures can be realized, thus enabling further miniaturization of circuit boards and substrates.

Applications:

- Hearing aids
- M2M Communication
- ADAS
- Automotive infotainment
- Smartphone

- Space-saving conductor tracks
- Miniaturization
- Optimized signal transmission
- Higher performance at reduced mainboard sizes
- Radically thin PCBs for radically thin devices
- More space for sensors, modules, multiple cameras or bigger batteries



Conductor tracks mSAP



Conductor tracks standard





ECP® TECHNOLOGY

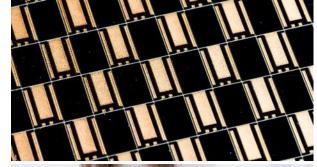


With ECP® (Embedded Component Packaging), several electronic components can be embedded above each other in a circuit board. With this, AT&S brings the printed circuit boards completely into the third dimension and can implement even more space-saving designs.

Applications:

- Hearing aids
- V2X communication
- high efficiency power modules
- integrated wireless modules
- high signal integrity applications e.g. sensors and amplifiers

- Significant form factor reduction
- Simplified thermal management through integration of heat dissipation components
- Fewer electronic components on the surface









Z-INTERCONNECT TECHNOLOGY



Z-Interconnect makes it possible to solve problems regarding miniaturization, higher signal speeds, high density and an increasing layer count by manufacturing the circuit boards for antennas and signal processing separately from one another and then pressing them together through a special process. The Z stands for Z-axis, which in the circuit board industry denotes the thickness of a module.

Applications:

- Satellite communications
- Ground stations
- 5G modules

- High frequencies in mmWave range are possible
- Increased data rates
- Low signal losses and power consumption







2.5D® TECHNOLOGY

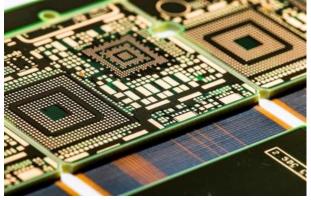


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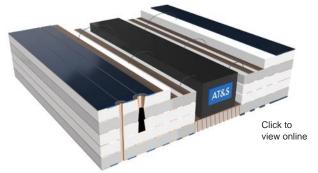
Applications:

- ADAS computing
- Camera (Automotive)
- LiDAR systems
- SSD (Solid-State-Drive)

- Miniaturization
- Cost effective compared to alternative solutions
- Cavities can easily be adapted









FY 2021/22 RESULTS SUMMARY

Revenue +34%

€ 1,590 MM

Slightly positive FX effects

EBITDA margin +130 bps

22.0%

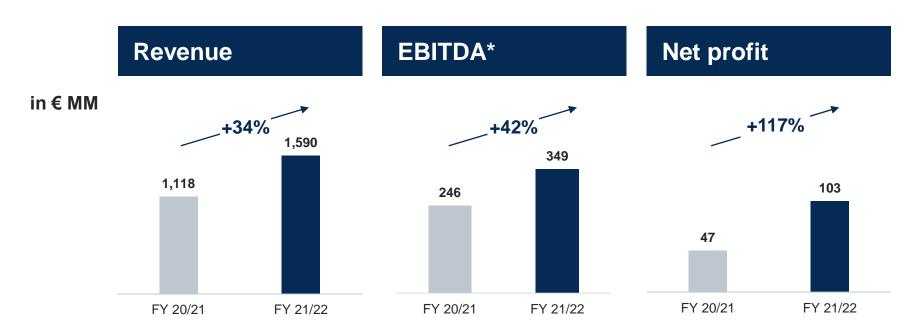
 EBITDA margin burdened by negative FX effects of € 20 MM Adjusted EBITDA margin +230 bps

23.8%

 Start-up costs for materials and wages of € 29 MM excluded



FY 2021/22 RESULTS SUMMARY



^{*} Adjusted EBITDA increase of 48% to € 378 MM (FY 2021/22: € 255 MM)



CURRENT YEAR GUIDANCE

FY 2022/23 – Revenue and adjusted EBITDA margin guidance increased		
Revenue	Approx. € 2.2 bn (previous: approx. € 2.0 bn)	
Profitability	 Adjusted EBITDA margin of 27–30% (previous: 23–26%) Adjustment: Start-up effects of the Chongqing and Kulim projects with an amount of approx. € 75 MM 	
Investments	Net CAPEX of up to € 1,250 MM	

MID-TERM GUIDANCE

FY 2025/26	
Growth	Revenue approx. € 3.5 bn (CAGR +22%)
Profitability	EBITDA margin of 27–32%ROCE of >12% with ramp-up of production
Others	 Net debt/EBITDA: <3 (can be temporarily exceeded) Equity ratio: >30% (may temporarily fall below)

AT&S – STOCK PROFILE

Listing

Vienna Stock Exchange, Prime Standard

Indices

ATX, Vönix, **WBI**

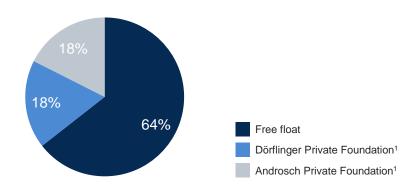
Thomson Reuters (A) ATSV.VI

Bloomberg (A) ATS:AV

of shares outstanding 38.85 m

Dividend for 21/22 € 0.90 per share²

Shareholder structure



1 Including direct and indirect holdings

2 Proposal to the AGM

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E info@ats.net



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