



# Analog, MEMS & Sensors Group

**Benedetto Vigna**

President

Analog, MEMS & Sensors Group



**34%**

of 2019 ST revenues

# AMS group at a glance

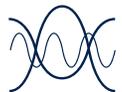
## Key financial data

9 months 2020 revenues

9 Months - YoY evolution

**\$ 2.5B**

Analog, MEMS & Sensors Group

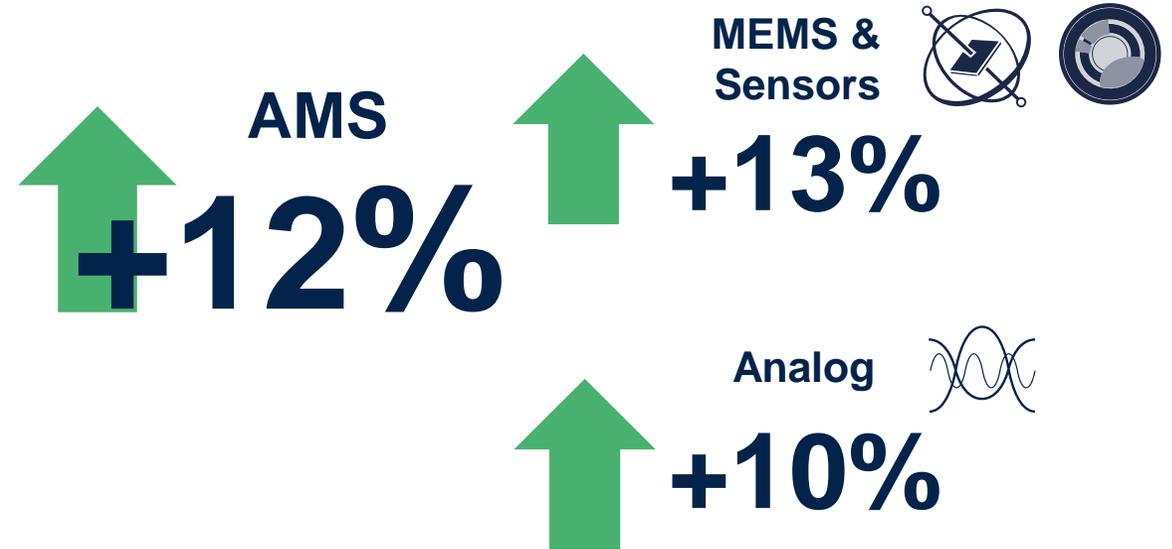


**\$1B**

Analog

**\$1.5B**

MEMS & Sensors

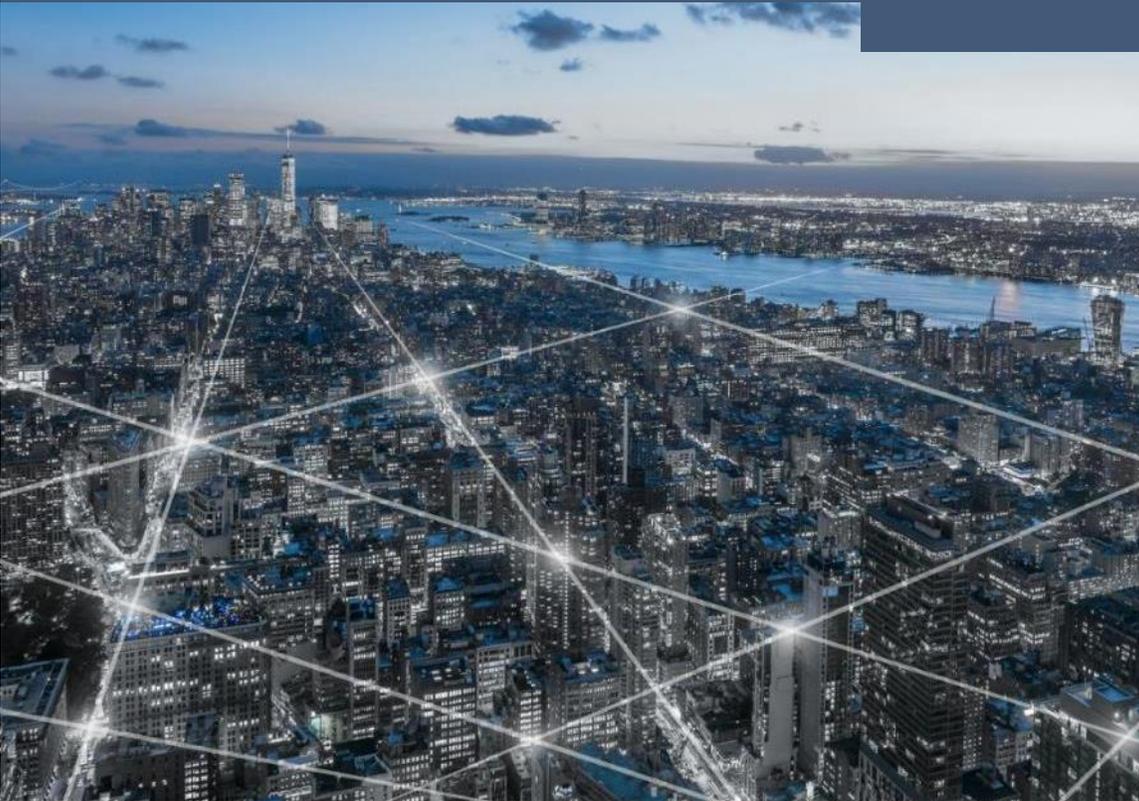


A wide range and diversified product portfolio to support a large customers base

Serving more than **70,000** Customers

# AMS strategy addressing underlying trends

## Sensorization of the world around us



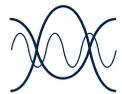
## Smarter and more efficient energy use



## Products

### Analog

- Application Specific
- General Purpose



### MEMS & Sensors

- MEMS Sensors & Actuators
- Optical Sensing Solutions

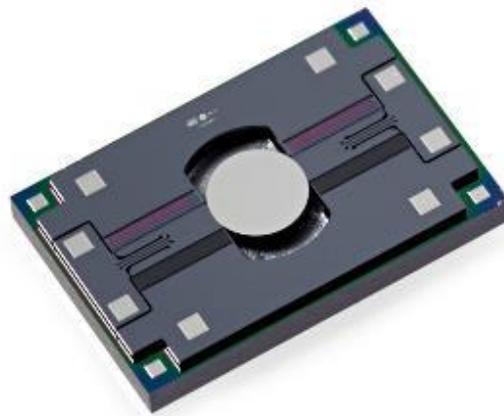


## Markets



- Strategic **focus** on industrial & automotive end markets
- Address specific high-volume **opportunities** in personal electronics
- **Selective** approach in Communications Equipment and Computers & Peripherals focusing on advanced power management
- OEMs and distribution

# From zero to billions...



# MEMS Sensors & actuators Technology & products

## Differentiated Technologies [Thelma\*, Bastille\* ...]

\*ST proprietary MEMS technologies

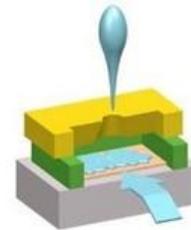
Motion and pressure sensors  
for multiple markets and applications

- Higher accuracy
- Ultra-low power
- Embedded Machine Learning Core



Micro-actuators for inkjet printing,  
AR/VR and LiDAR

- Innovative materials
- Higher efficiency
- Lower cost

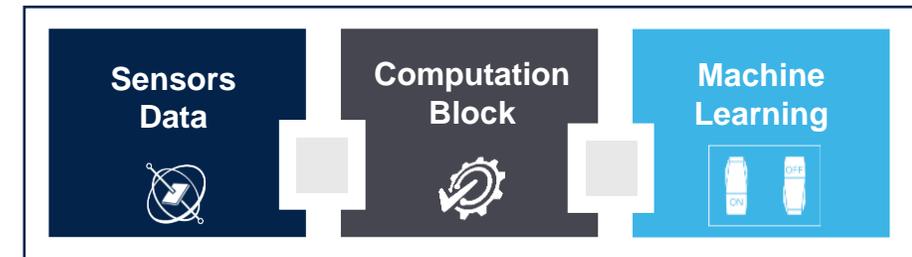


**#1** 50% Market Share\*\* in Motion MEMS in  
Personal Electronics & Automotive telematics

**#1** Micromachined actuators  
For ink-jet printing

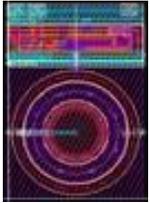
\*\*Source: OMDIA

## AI at the Edge of the Edge



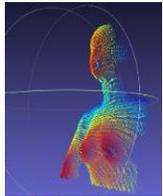
**100X** Power reduction

# Optical sensing solutions diversification Technology & products



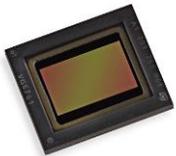
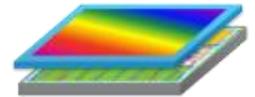
**Direct Time-of-Flight**  
40 nm SPAD, 3D-SPAD

**All-in-one Time-of-Flight modules**  
Longer ranging, wider field-of-view



**Indirect Time-of-Flight**  
4.6  $\mu\text{m}$  fast photodiode

**Time-of-Flight sensors**  
Higher resolution, 3D - BSI



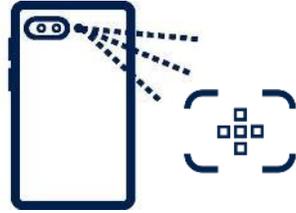
**Global Shutter**  
2.6  $\mu\text{m}$  down to 2.2  $\mu\text{m}$  pixel

**Ambient Light Sensors**  
Small size, low power, flicker detection



# Optical sensing solutions diversification Customers

World Facing



5<sup>th</sup> Generation of Time-of-Flight solutions

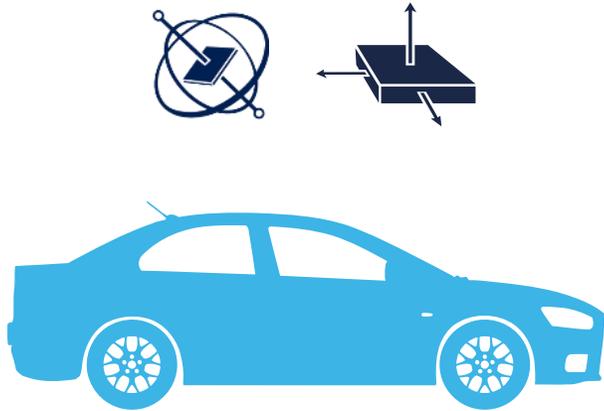
40 nm SPAD Multi-zone

~200 smartphones including ST FlightSense™



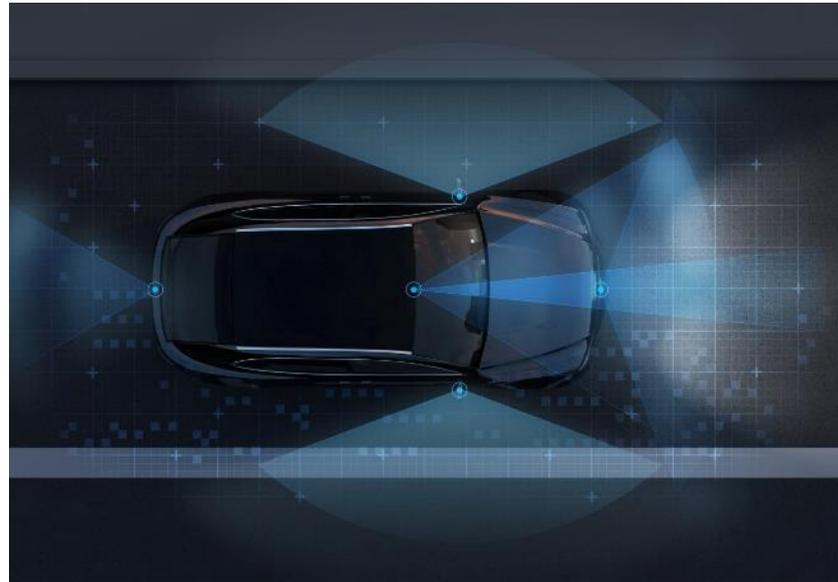
# MEMS & sensors for automotive

**Motion MEMS**  
for safety & telematics

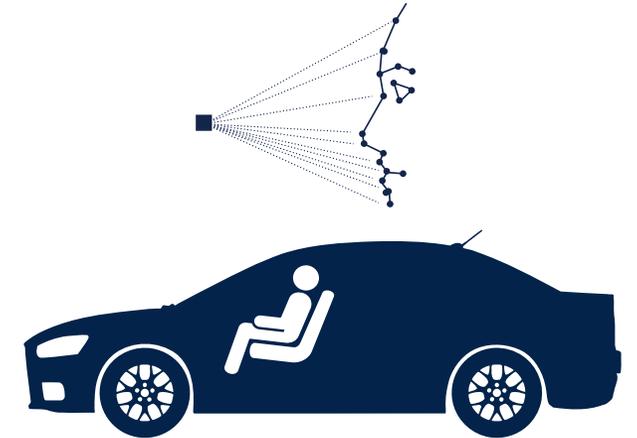


**#1** In MEMS for Automotive telematics

**LiDAR**  
for ADAS & autonomous driving



**Global Shutter sensors**  
for in-cabin monitoring



**Leadership** in global shutter sensors



# MEMS & sensors for industrial IoT

## High performance sensors



High Accuracy  
Ultra Low Power  
Machine Learning



Asset tracking



Predictive maintenance



Real-time monitoring



Metering  
Electricity,  
Gas, Water

# ST MEMS mirrors for Augmented Reality

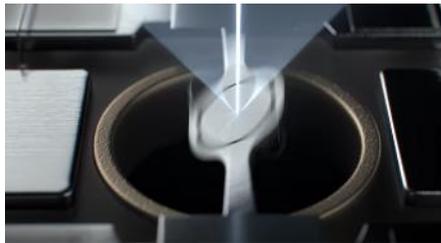
Microsoft  
HoloLens 2

(1)



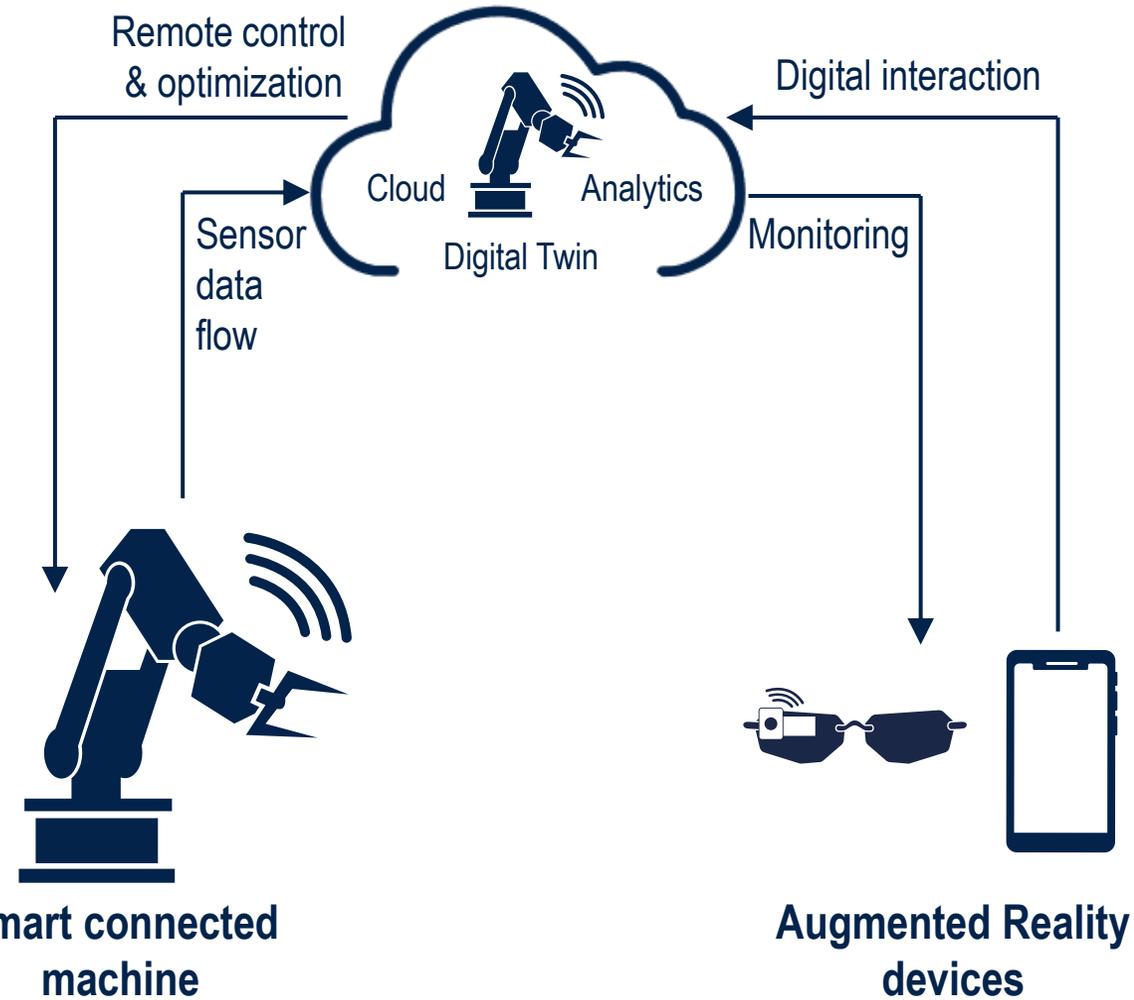
intel REALSENSE  
TECHNOLOGY

(2)



Remote control  
& optimization

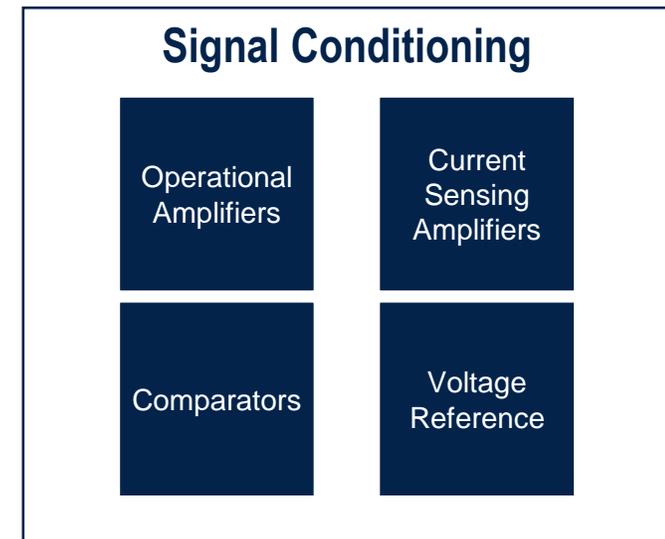
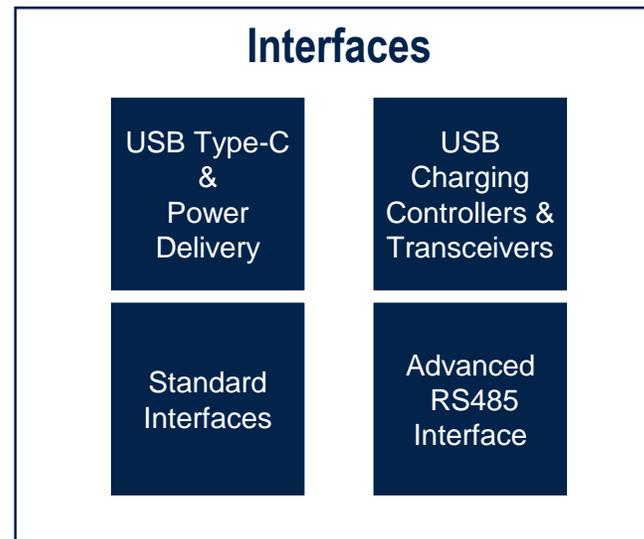
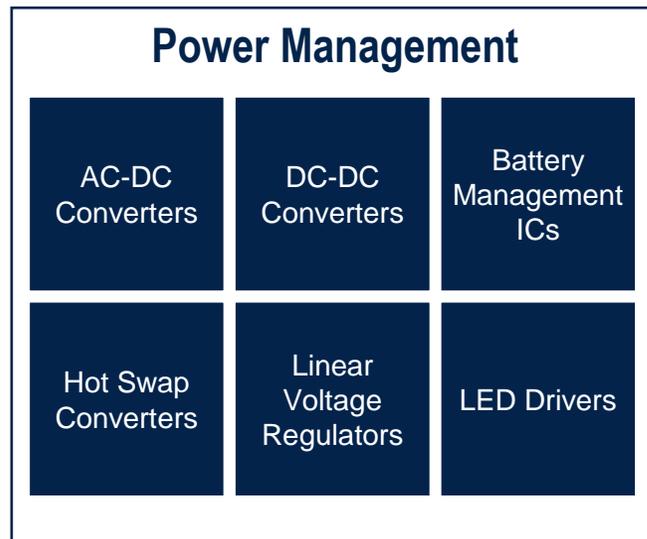
Digital interaction



(1): <https://www.youtube.com/watch?v=eqFqtAJMtYE>  
(2): <https://www.youtube.com/watch?v=Rx-75ZEAMeg>

# Analog – General purpose

Leverage broad portfolio to address mass market through distribution partners



# Analog – Application specific Leadership in energy management

Smart GaN solutions for higher efficiency and power density



World-first driver w/ GaN transistors enables smaller and faster chargers



Power management solution for ST industrial MPUs



STPMIC

STPMIC1

Fully integrated Power-Management IC



Power management solutions for servers, CPU, GPU, SSD



ST CLOUDPWR



SSDPWR

# Analog – Application specific Metering & motion control

## Metering – 38% Market Share



Powerline Communication

## Motion Control – 11% Market Share



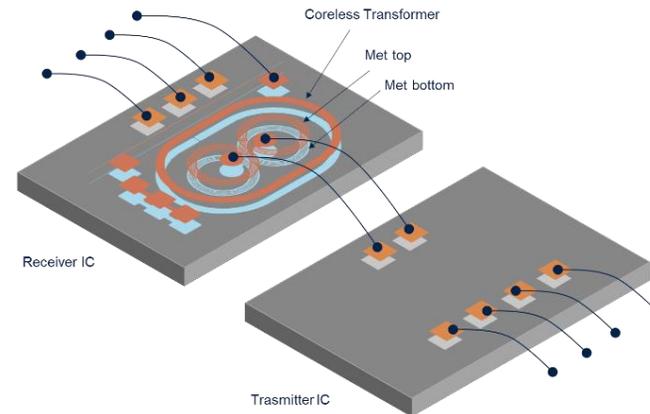
Motor Drivers



25% of industrial business in 2020 coming from products less than 2 years old

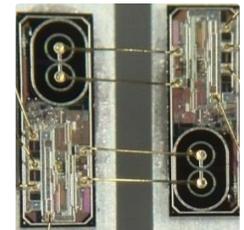
# Analog – Application specific Galvanic isolation

## Galvanic isolation solutions for industrial robots and multiple applications



High Voltage

Low Voltage



# Analog – Application specific Wireless charging solutions

soon...

## > 50 W - Under Development

Suitable for industrial applications e.g. power tools

## 25-50 W Flagship smartphones, tablets, laptops

Ultra fast charging and proprietary protocol

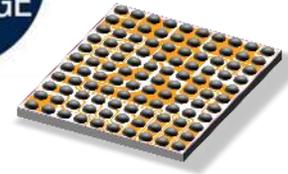
## 10-25 W Entry to Mid smartphones / appliances

Enabling high penetration rate for wireless charging

## 1-10 W Wearable / Hearable Devices

Optimized for ultra-compact battery-operated

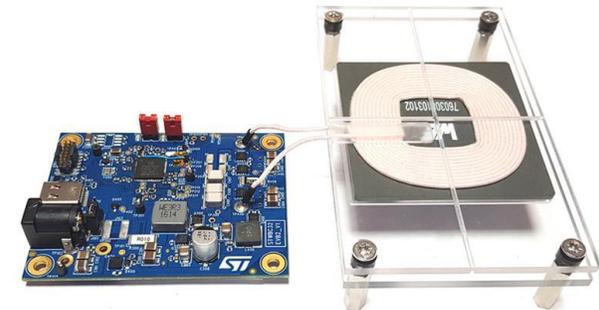
Available on the market



Receive &  
Transmit



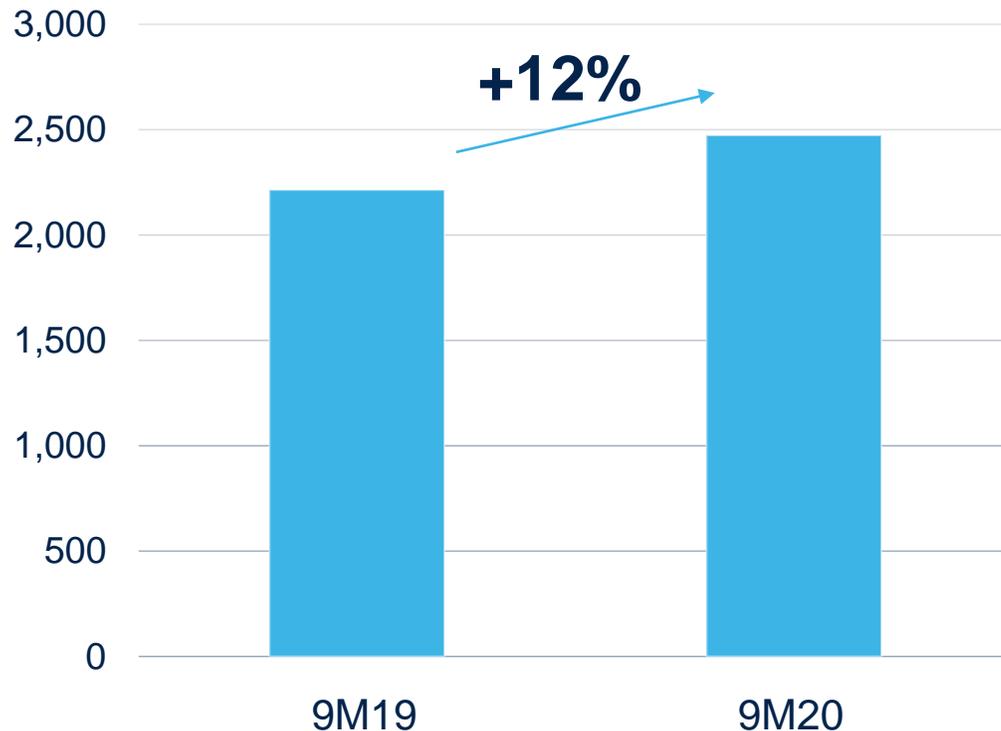
Transmit



Complete ST turnkey Transmitter  
and Receiver solutions

# Takeaways

## AMS revenue growth 9 months YoY



- Broadest portfolio of MEMS and Optical Sensing Solutions rapidly expanding through diversification
- General Purpose & Application Specific Analog products addressing all markets served by ST
- Innovation DNA: Technology + Application knowhow

# Thank you

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