



Microchip In Automotive

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Q1FY20 Business Update

- We have no guidance update since our earnings call of May 8th
- The rhetoric on tariffs has gotten more negative since our May 8th call
- Since May 8th the Huawei shipment ban was announced and is in effect
 - Huawei represents between 1% and 2% of our revenue
- The rest of our business is progressing as expected



Corporate Overview

• Leading Total Systems Solutions provider:

- High-performance standard and specialized Microcontrollers, Digital Signal Controllers and Microprocessors
- Mixed-Signal, Analog, Interface and Security solutions
- Clock and Timing solutions
- Wireless and Wired Connectivity solutions
- FPGA solutions
- Non-volatile EEPROM and Flash Memory solutions
- Flash IP solutions
- ~ \$5.5 Billion revenue run rate
- ~18,200 employees
- Headquartered near Phoenix in Chandler, AZ



Our Vision

Be The Very Best Embedded Control Solutions Company Ever



Annual End Market Demand Growth



MICROCHIP



Providing Total System Solutions





Revenue by End Market



Microchip is a top 10 semiconductor player in each of Automotive and Industrial markets and # 1 in the world for Aero & Defense



Expanding Microchip Solutions Through Acquisitions



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Microchip in Automotive

- 25+ years of proven track record in delivering embedded solutions to global automotive OEMs
- #1 supplier of Capacitive Touch Screen Controllers (HMI)
- #1 supplier in USB and Infotainment Connectivity
- Leading supplier of Automotive Networking Solutions
- Leading supplier of Embedded Control Solutions
- Leading supplier of Car Access Solutions
- Emerging supplier for EV high power electronics
- Essential components for highly automated cars

Commitment to Total System Solutions That Enables Success of Our Clients!



Automotive Semiconductor Growth Drivers



Electrification



HMI/Infotainment



Assisted and Autonomous Driving



Automotive Cybersecurity



Electrification



- Emission regulations and incentives are accelerating vehicle electrification
- Electric vehicle sales growth CAGR 2019-2025: 30%
- Car makers announced investment in electrification of > \$300B
- EV Semiconductor content: >2X compared to combustion engine car



Electric Vehicle Production Forecast

Source: Bloomberg New Energy Finance 2018









On Board Charger



- On Board Charger for EVs & Hybrids: AC up to 22kW
- CAGR 2019–22: 52%, Semi SAM: \$150-\$450 / system
- Market leadership in high efficiency digital power conversion, dsPIC
- Silicon Carbide (SiC) Diodes and Transistors higher efficiency





eSound module



- Electric cars are silent = danger for pedestrians => sound generation <30km/h = mandatory safety feature: US (9/2020), EU (7/2021)
- Chimes, Beeps, engine noise simulation, tires on gravel sound, etc.
- Semi SAM: \$8 \$10 / independent eSound module
- Market leadership in infotainment/audio networking and MCUs





HMI / Infotainment



- HMI and Infotainment Systems are key car sales differentiators
- Infotainment growth exceeds the growth in car sales
- Consumer Device connectivity: data and power
- Acoustics: voice commands, noise cancellation, hands free
- Always on: telematics data service, real time maps, etc.



Infotainment & HMI





MICROCHIP

Automotive Touch Market

 In 2019 >70% of all cars will be equipped with a touch surface, 100% by 2024 – Microchip automotive touch controller market share: >70%

140 Mu

Touch

- Multiple screens and touchpads fuel long term growth
- Screen size increases with free form and/or curved displays/overlays
- Haptic feedback, proximity, hover and air gestures

 Merge of capacitive touch and mechanical technologies further improve the HMI







1D - 2D - 3D Touch



- Touch Buttons, Touch Screen, Touchless gestures
- Semi SAM: \$1 \$10 / system
- Driver safety is a major focus in next gen HMI: Haptics, force feedback
- Microchip is the market leader for automotive capacitive touch solutions: ICs, firmware and touch sensor design support





Knobs - Haptics



Maxtouch controllers support Rotary Knobs glued on touch displays – no additonal electronics required





Land Rover Velar







USB C with Power Delivery



- USB C: 5GBit data connection and up to 100W power: reduces charging time from hours to minutes
- CAGR 2019 25: 125%; SAM: \$8 \$12 / system
- Microchip is the market leader for Automotive USB solutions



Wireless Charging

- Wireless phone charging capabilities drive deployment in cars
- CAGR 2019-25: 43%; SAM: \$5 \$7 / automotive wireless charging port
- Digital power conversion leadership, Qi libary, flexible security

Highly Assisted / Autonomous Driving

- L3+ and beyond requires centralized decision making (steering, braking, etc.) => high performing central vehicle computer(s)
- Raw data sent from the sensors to the computer => Low latency and high speed
- Redundancy for safety => multiple "brains" required, connected through PCIe
- Microchip SAM: >\$100 / system

Highly Assisted / Autonomous Driving Vehicle Computer

Everything but...

... the sensors and the main processor:

Automotive Security

- The number of entry points for hackers is rising: Wifi / Bluetooth / cellular / USB ports / C2X / etc.
- Networks and ECUs need to be secured to ensure safety integrity of the car
- HSM (hardware security module) is being established as the automotive security standard
- HSM can be implemented within an MCU or as a stand alone security IC.
- Microchip supports both options

Security @ several levels:

- Secure Boot (ensure only authorized SW is used)
- Message Authentication (only authorized ECUs can talk)
- Message Encryption (secure messages on bus systems)
- Certificate storage and handling (identification of sender)

Security at Many Nodes

HW Security Trust Anchor or Microcontroller with HSM

Telematics Unit

- CAGR 2017 25: 22%, Semi SAM: \$15 / unit
- 25 years experience in security, certificates provisioning, ecosystem

Automotive Summary

- Emerging supplier for EV high power electronics: SiC
- Essential component supplier for autonomous cars: PCIe
- Leading position in: Automotive Networking, Embedded Control and Car Access
- #1 in USB and Infotainment Connectivity
- #1 for Capacitive Touch Solutions
- 25+ years trusted supplier for the global automotive industry
- Constantly increasing the automotive footprint in high growth segments through R&D investment and acquisitions

Thank You!

