A Leading Provider of Microcontroller, Security, Mixed-Signal, Analog & Flash-IP Solutions

Microchip In Automotive

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President and
Chief Operating Officer

Q1FY19 Business Update

- June quarter net sales guidance excluding Microsemi is growth of 1% to 6%, and non-GAAP EPS of $1.39 to $1.49

- We closed the Microsemi acquisition on May 29th; Aggregate borrowing was $8.45B at a blended interest rate of just over 4%

- Expect net leverage of ~4.7X on 6/30/2018 excluding 2037 convertible debt

- Expect Microsemi to add $160M to $180M non-GAAP revenue in FQ1'19, and non GAAP-EPS of $0.02 to $0.06

- Microchip bookings have continued to be very strong and backlog is at record high levels.

- Latest Microcontroller market share data shows consistent market share gains across the 8/16/32-bit markets

- Executing on Microchip 2.0 - Total system solutions - Smart, Connected and Secure

- Combined long-term operating model is **63%** gross margin, **22.5%** operating expenses & **40.5%** operating margins

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

- **~ $6 Billion revenue run rate including Microsemi**
- **~19,000 employees including Microsemi**
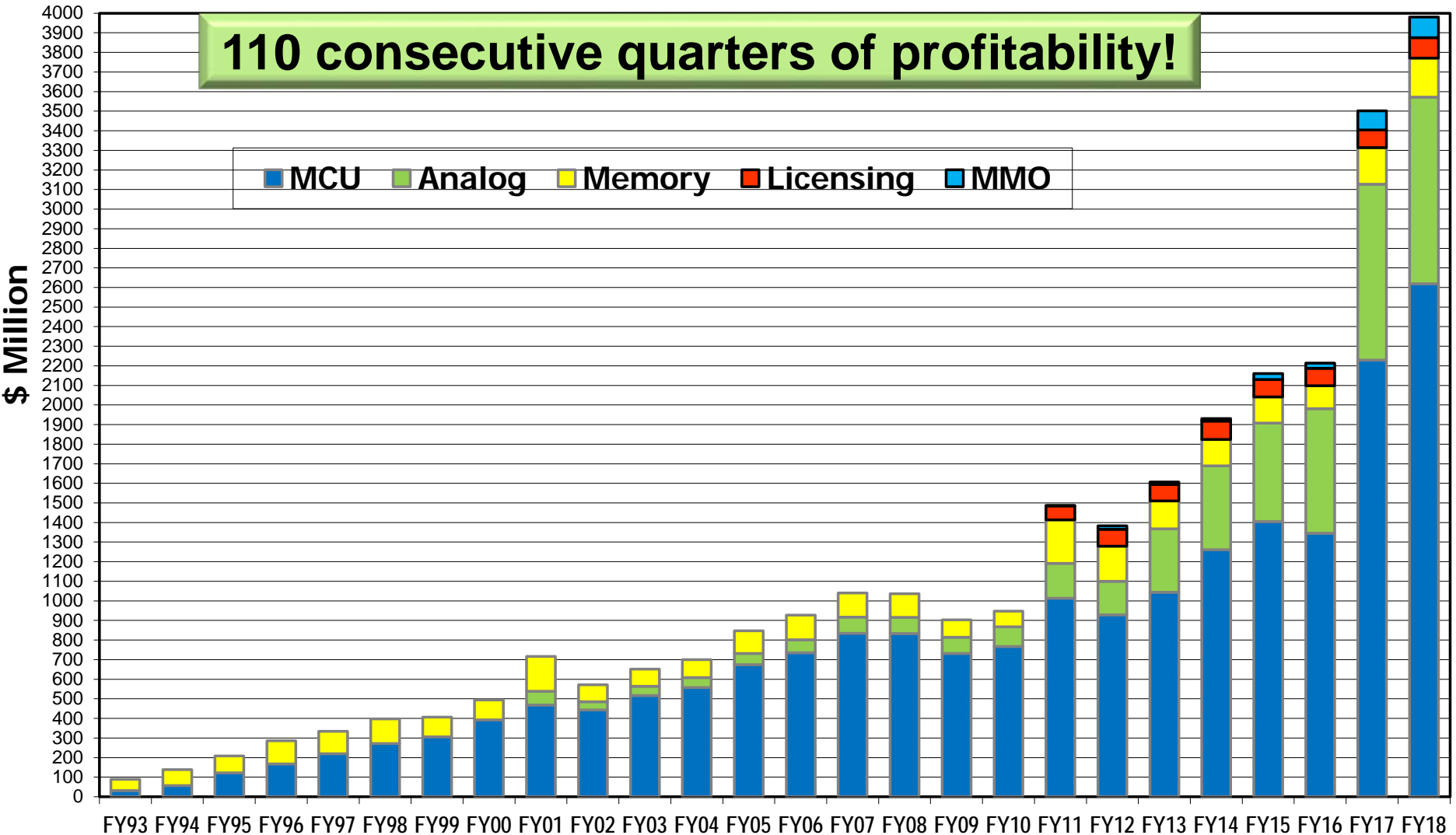- **Headquartered near Phoenix in Chandler, AZ**

Be The Very Best Embedded Control Solutions Company Ever

SMART | CONNECTED | SECURE

Annual Net Sales Growth

110 consecutive quarters of profitability!

Legend: ■ MCU ■ Analog ■ Memory ■ Licensing ■ MMO

$ Million — chart for FY93 through FY18

Worldwide Microcontroller Market Share

No.	2003 Rank	2008 Rank	2009 Rank	2010 Rank	2012 Rank	2014 Rank	2016 Rank	2017 Rank
1	Renesas	Renesas	Renesas	Renesas	Renesas	Renesas	Renesas	Renesas
2	Motorola	NEC	NEC	Freescale	Freescale	Freescale	NXP	NXP
3	NEC	Freescale	Freescale	Samsung	Infineon	ST-Micro	Microchip	Microchip
4	Matsushita	Infineon	Samsung	Microchip	Microchip	Microchip	ST-Micro	ST-Micro
5	Infineon	Samsung	Microchip	Atmel	ST-Micro	NXP	TI	TI
6	Fujitsu	Microchip	TI	TI	TI	TI	Infineon	Infineon
7	Toshiba	ST-Micro	Infineon	Infineon	Atmel	Infineon	Cypress	Cypress
8	Microchip	TI	ST-Micro	ST-Micro	NXP	Atmel	Samsung	Samsung
9	Samsung	Fujitsu	Fujitsu	Fujitsu	Fujitsu	Spansion	CEC Huada	Toshiba
10	ST-Micro	NXP	NXP	NXP	Samsung	Samsung	Toshiba	Si-Labs

Based on dollar shipment volume 2003-2017, Source: Gartner and Microchip

Worldwide Analog Market Share

Leading Analog IC Suppliers ($M)

2017 Rank	Company	2016	2017	% Change	% Marketshare
1	Texas Instruments	8,536	9,900	16%	18%
2	Analog Devices*	3,790	4,310	14%	8%
3	Skyworks Solutions	3,205	3,710	16%	7%
4	Infineon	3,030	3,355	11%	6%
5	ST	2,519	2,930	16%	5%
6	NXP	2,430	2,415	-1%	4%
7	Maxim	1,900	2,025	7%	4%
8	ON Semi*	1,335	1,800	35%	3%
9	Microchip*	819	940	15%	2%
10	Renesas*	810	915	13%	2%

*Includes sales from acquired companies in 2016 and 2017.

Source: IC Insights, company reports

Revenue by End Market
Excludes Microsemi

MICROCHIP

Communication 5%

Defense & Aerospace 2%

Computing 9%

Industrial 35%

Consumer 24%
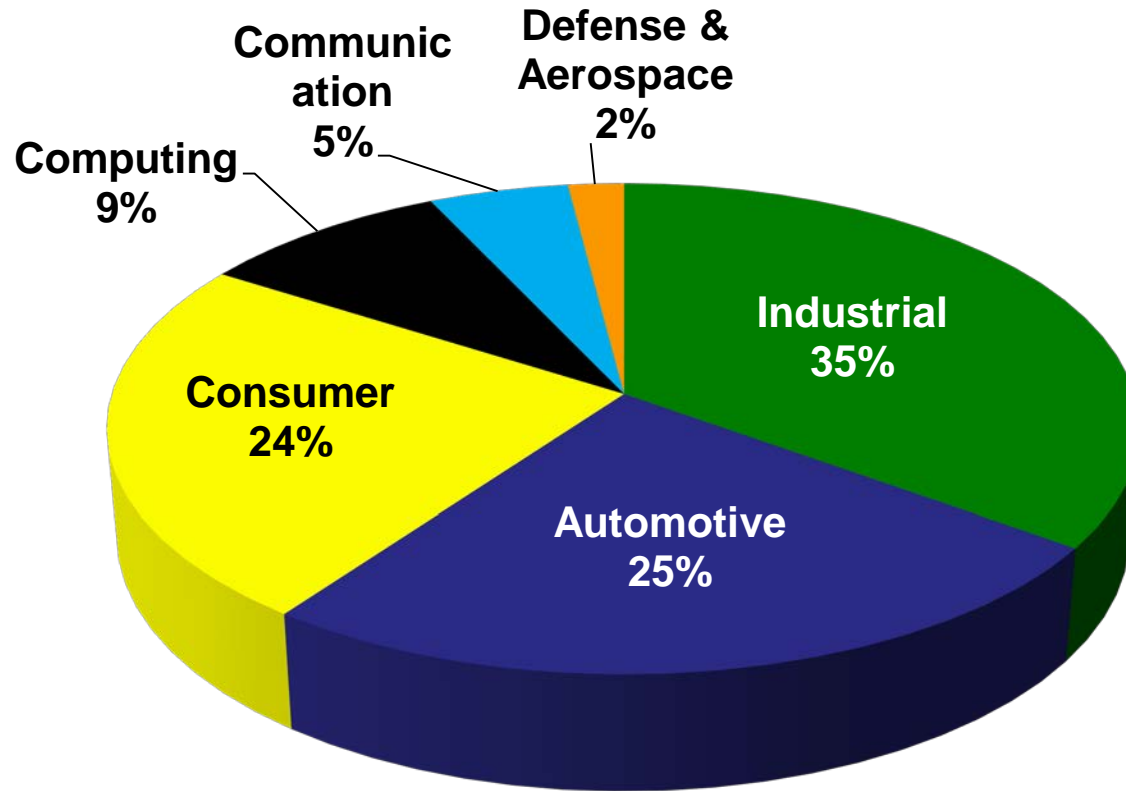
Automotive 25%

Microchip is a top 10 Automotive supplier

Microchip in Automotive

Microchip in Automotive

- Top 10 WW Automotive Semiconductor Supplier in 2017

- 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 In-Vehicle Networking Solutions

- Leading supplier of Embedded Control Solutions

- Leading supplier of Car Access Solutions

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

Automotive Semiconductor Growth Drivers

- **Infotainment Systems & extension of the "consumer world" into automotive**

- **Assisted and Autonomous Driving - while maintaining vehicle & road safety**

- **Electrification of vehicles & related infrastructure**

- **Automotive Cybersecurity**

Market Leadership ... #1 in Capacitive HMI

Multi-Point Touch Screens

Touch Pad Controls

Capacitive Gesture Recognition

Center Console Touch Keys

HMI Market Drivers

Number of Vehicles with Touch are Increasing

- Touch Screen becomes "must have" feature

Size of the Displays are Increasing

- Sweet spot moving from 8″ to 10-12″

Number of Touch Screens & Touch Surfaces are Increasing

- Secondary Screens / Steering Wheel

Microchip Content in HMI

- **Maxtouch controllers for 2-20'' displays**

- **GestIC: gesture recognition**

- **MCUs for capacitive buttons & door handles**

- **MCU for handwriting recognition**

- **LIN, CAN connectivity**

- **Automotive Grade Nonvolatile Memory**

Market Leadership…
in Access Control Systems
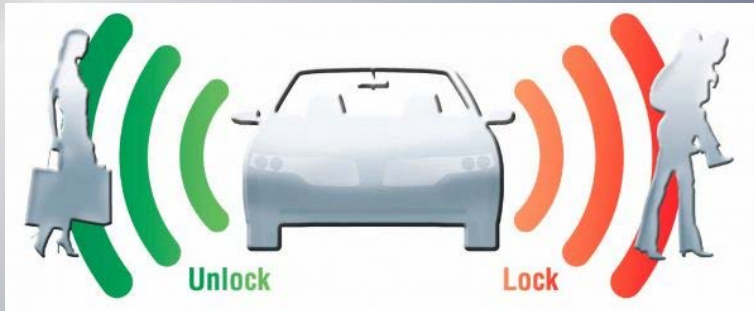
Passive Entry – Walk Away Locking

Highly Secure Keyfobs
RF link + LF immobilizer
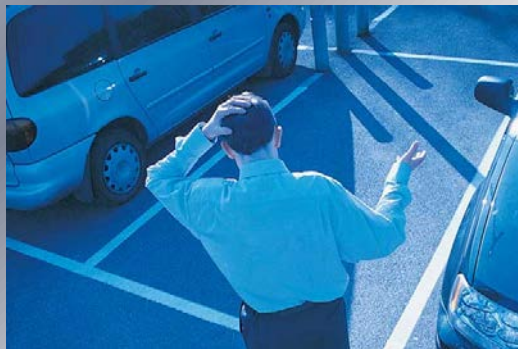
Relay Attack Theft Prevention:
Low Power UWB Radar

Homelink® – Garage Doors

Car Access Market Drivers

Proliferation of "Passive Entry" / "Passive Start" systems

- Convenient, effortless, secure vehicle entry is important
- Increasing silicon content / car
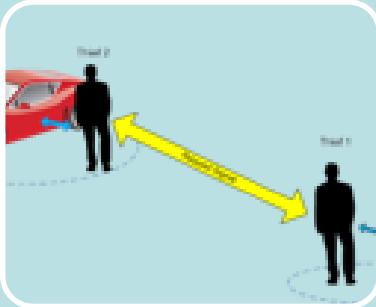
Anti Theft Countermeasures

- Dedicated Silicon solutions required to prevent "Relay Attacks" – Ultrawideband Technology
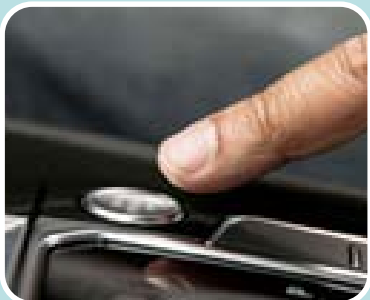
More Vehicles with PEPS

- MCHP estimated installed rates
  - 2017   31% of vehicles
  - 2022   48% of vehicles

Microchip Content in Access Systems

- **Secure 3D LF & RF Keyfob controllers**

- **RF transmitters and receivers**

- **LF coil drivers and immobilizer ICs**

- **Ultrawideband Security ICs**

- **MCU for RF module control for car access and Homelink®**

- **LIN / CAN connectivity ICs**

Market Leadership ... #1 in Infotainment Connectivity
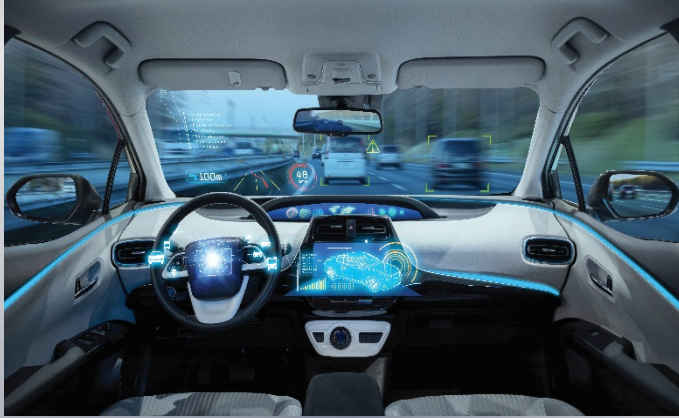
Cockpit Systems

Mobile Device Connectivity

Car Audio & Entertainment

Telematic Solutions

Infotainment Connectivity Market Drivers

Consumer Device Connectivity

- Apple Car Play
- Android Auto
- USB Power Delivery

Government Regulations

- Emergency Call
- Backup Cameras

Car Audio & Voice Assistants

- Entertainment
- Acoustics Management / Noise Cancellation
- In Car Communication

Microchip Content in Infotainment Connectivity

- **USB Connectivity Solutions**

- **Ethernet Transceivers & Switches**

- **32-Bit Ethernet MCUs**

- **MOST and INICnet Audio and Video Networking Systems**

- **Network Security Products**

Advanced Driver Assist Systems: Examples

Collision Avoidance Systems

Lane Departure Warning

Smart Mirrors

Blind Spot Detection

Microchip in ADAS Systems

- **Microchip in ADAS: Everything but the sensor and the in-vehicle computer:**

Vehicle Computer / Main ADAS controller	In vehicle network	cable	In vehicle network	Sensor Configuration	Sensing Element
Sensor fusion / Data processing	*Data transfer*		*Data transfer*	Sensor Signal Conditioning / Power Management / Functional Safety	*Data collection*
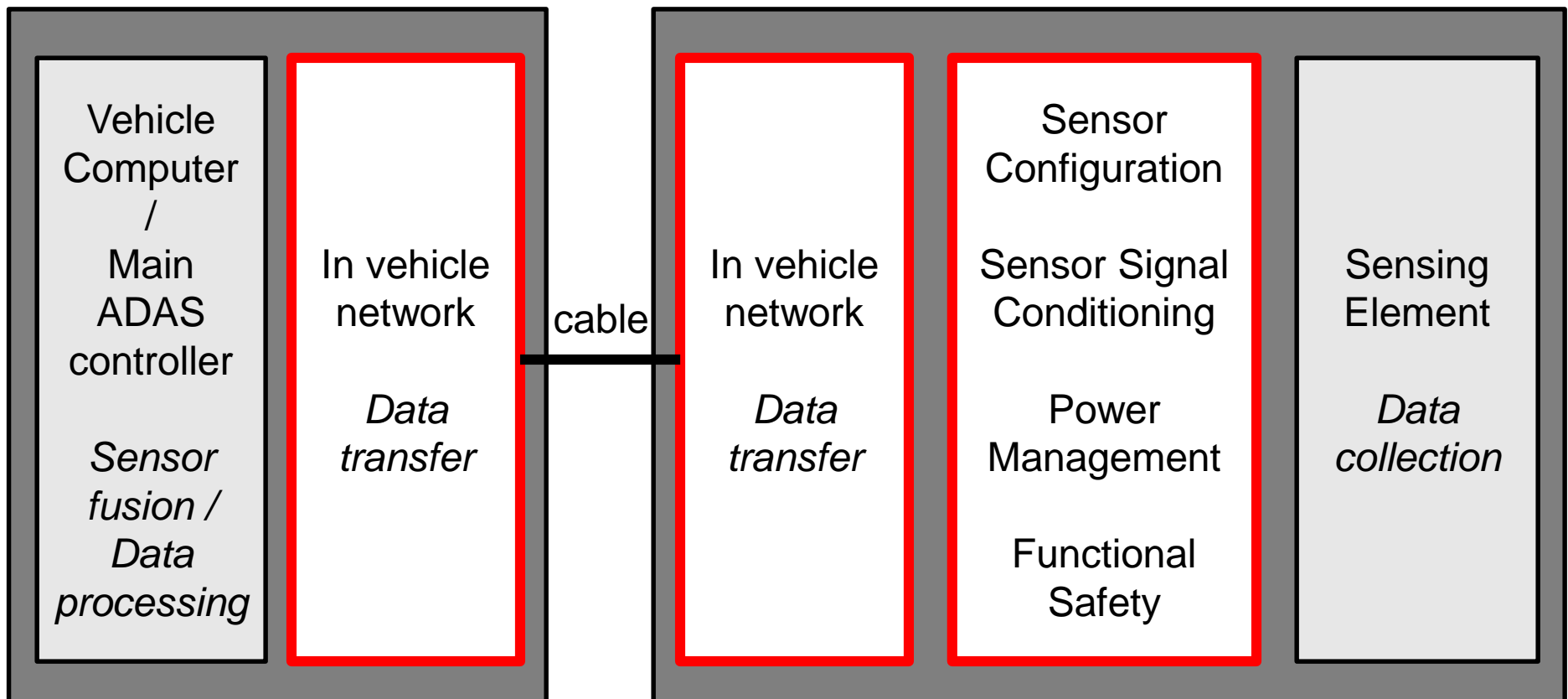
Microchip Content in ADAS Systems

MICROCHIP

In vehicle computer / ADAS controller	CAN/LIN ↔ CAN/LIN	MCU & Memory	Image Sensor
	Ethernet ↔ Ethernet	Security	Ultrasonic Sensor
	CoaX-Press ↔ CoaX-Press	MEMS Oscillators	Radar
	INICnet ↔ INICnet	Power Management	Lidar
		Analog	
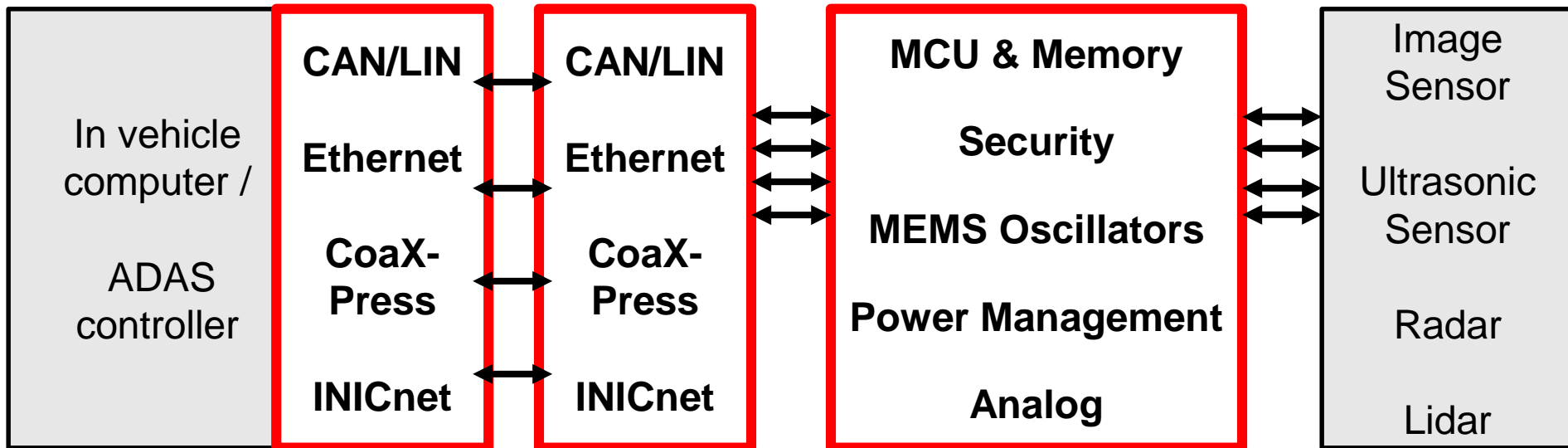
1-3 SOCs / vehicle   >>100 IC / vehicle   5-30 sensing elements / vehicle

Microchip in ADAS Applications
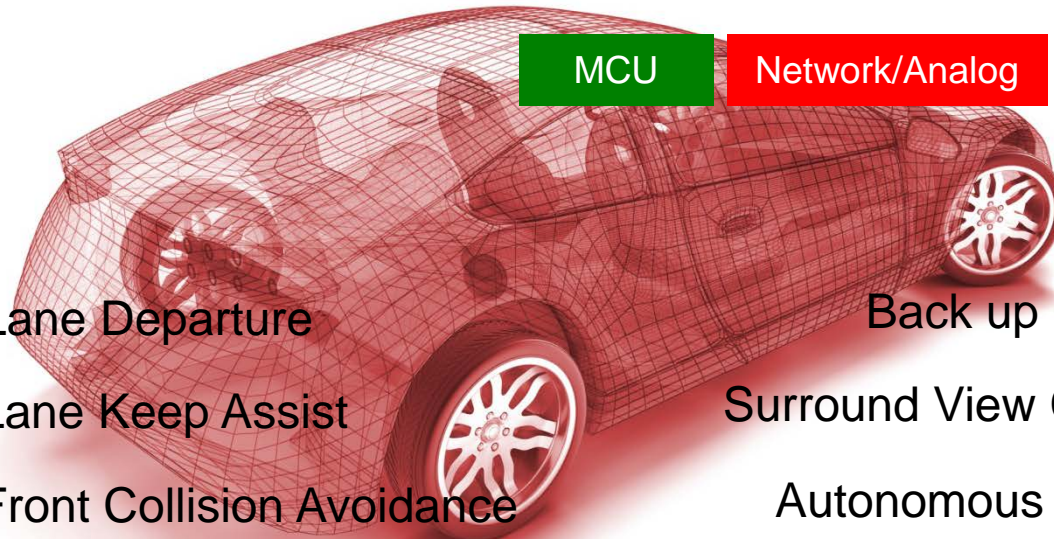
| MCU | Network/Analog | Memory | Security Emerging Need |

Lane Departure — Security, MCU, Network/Analog, Memory

Lane Keep Assist — Security, MCU, Network/Analog, Memory

Front Collision Avoidance — Security, MCU, Network/Analog, Memory

Automatic Emergency Braking — Security, Network/Analog, Memory

Adaptive Cruise Control — Security, Network/Analog

Blind Spot Detection — Security, MCU, Network/Analog

Traffic Sign Recognition — Security, Network/Analog, Memory

Parking Sensors — Security, MCU, Network/Analog

Back up Camera — Security, MCU, Network/Analog, Memory

Surround View Camera — Security, MCU, Network/Analog, Memory

Autonomous Parking — Security, Network/Analog

LED Matrix Lighting — Security, MCU, Network/Analog

Pedestrian Detection — Security, MCU

TPMS — Security, Network/Analog

Rain Sensor — Security, MCU, Network/Analog

Adaptive Lighting — Security, MCU, Network/Analog

V2X — Security, Network/Analog

Automotive Networking

Leadership in Automotive Networking

Track Record & Experience

- #1 in deployed USB ports, Ethernet Ports in the Car & Infotainment Networking
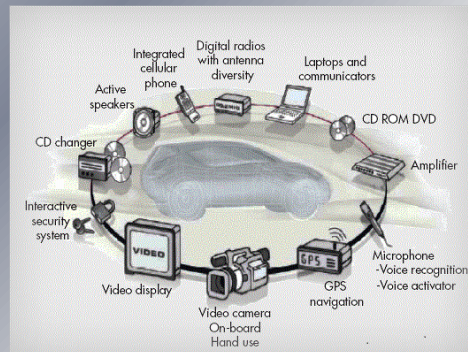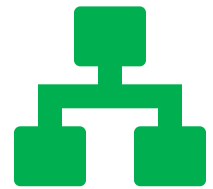- > 1 Billion CAN & LIN nodes shipped
- Domain Based -, Service Oriented Architecture, Phy, EMC & Software

Contribution to Standardization

- …in ISO, IEEE, AVNU, MIPI, OPENAlliance, CoaXPress, MOST Co, USB-IF
- Working with Apple (CarPlay), Google (Android Auto), Linux Foundation (AGL)
- Working with OEMs

Innovation & Technology Leadership

- First to Market with Automotive Qualified Products for Ethernet and USB
- First in Production with Service Oriented Architecture (MOST)
- Leader in low power and robustness (EMC performance)

Total System Solution

- Broadest Networking Product Portfolio & Related Products
- Software Stacks, Drivers, Reference Designs & Development Tools
- Wide, complementary 3rd Party Network

Automotive Cybersecurity

Scalable Security solutions for Automotive to keep today's and future cars secure:

- Securing Boot Operation (ensure only authorized SW is used)
- Message Authentication (only authorized ECUs can talk)
- Message Encryption (secure content on bus systems)

Automotive Security Market Drivers

Wireless "Highway for hackers"…

- Proliferation of wireless interfaces that are the entry door: Cellular, WiFi, Bluetooth => numerous examples

Safety Systems depend on Software

- Virtually all safety systems (brake, acceleration, etc. are controlled by MCU + SW => angle of attack
- Possibility of OTA (over the air updates)

Need to Secure Today's Car

- Cars and car networks (e.g. CAN) historically have not been designed with security in mind
- Solutions needed that do not require complete redesign

Microchip Automotive Security Solutions

- **Certified "Element of Trust" ICs**

- **Stand alone "Border Security Devices" to secure existing ECU designs**

- **32-Bit MCUs with Automotive Security features**

Microsemi in Automotive

- **Microsemi's automotive products complement Microchip's automotive portfolio in the following areas:**
  - **High Voltage SiC diodes and MOSFETS => Hybrid and full electric vehicles, vehicle chargers => highest efficiency**
  - **Automotive grade FPGAs => ADAS, electrification**
  - **PCIe products => serving the need for high speed connections in ADAS / in-vehicle computing applications**
  - **Inductive sensors => robust positioning solution for harsh environment: motor, valve, pedal, wheel positioning**

MCHP Applications in Luxury Car

36 MCU / 10 Analog / 6 USB / 6 Memory / 6 Most® / 4 Kleer®

Surround View Camera

COMPASS

Roof Controller

Cluster

Garage Door Opener

Head Unit

HVAC Blower

Amplifier

Navigation

Telephone Touch Dialer

HVAC HMI Control

Approach Sensors

Mirror

Tuner

Airbag

PTC Heater

Wiper

Rear View Camera

Engine Control Timer

Rear Seat Entertainment

Media Box

Adaptive Light

LED DRL

Parking Assist

Throttle Control

DewPoint Controller

Natural Vaccuum Leak Detection

Light Switch

Glow Plug Control

Air Quality Controller

Touch Display Control

Hazard Switch Control

Door Switch Module

Touch Key Control

Steering Wheel Buttons

Car Access Control

Tire Pressure Control

Immobilizer

Hyundai Genesis Applications
33 MCU/ 23 Analog / 2 USB / 7 Memory / 3 MOST®

Automatic Defogger Sensor

Sunroof

Overhead Console Lamp

CO^2 Monitor

I-Box

Headunit

Cabin Lamp

Airbag

Active Seatbelt

DRL

Breakout Box (Rear)

EPB

AVN

Audio

Personal Lamp

Emblem Touch

RKE/PKE

ISG(LDC)

EAM (Turbo GDi)

LED Driver Module

Adaptive Front Leveling

Rear Camera

Hands-free Module

Steering - Vibration

R-MDPS

Seat Heater

Door Latch

Steering - Heater
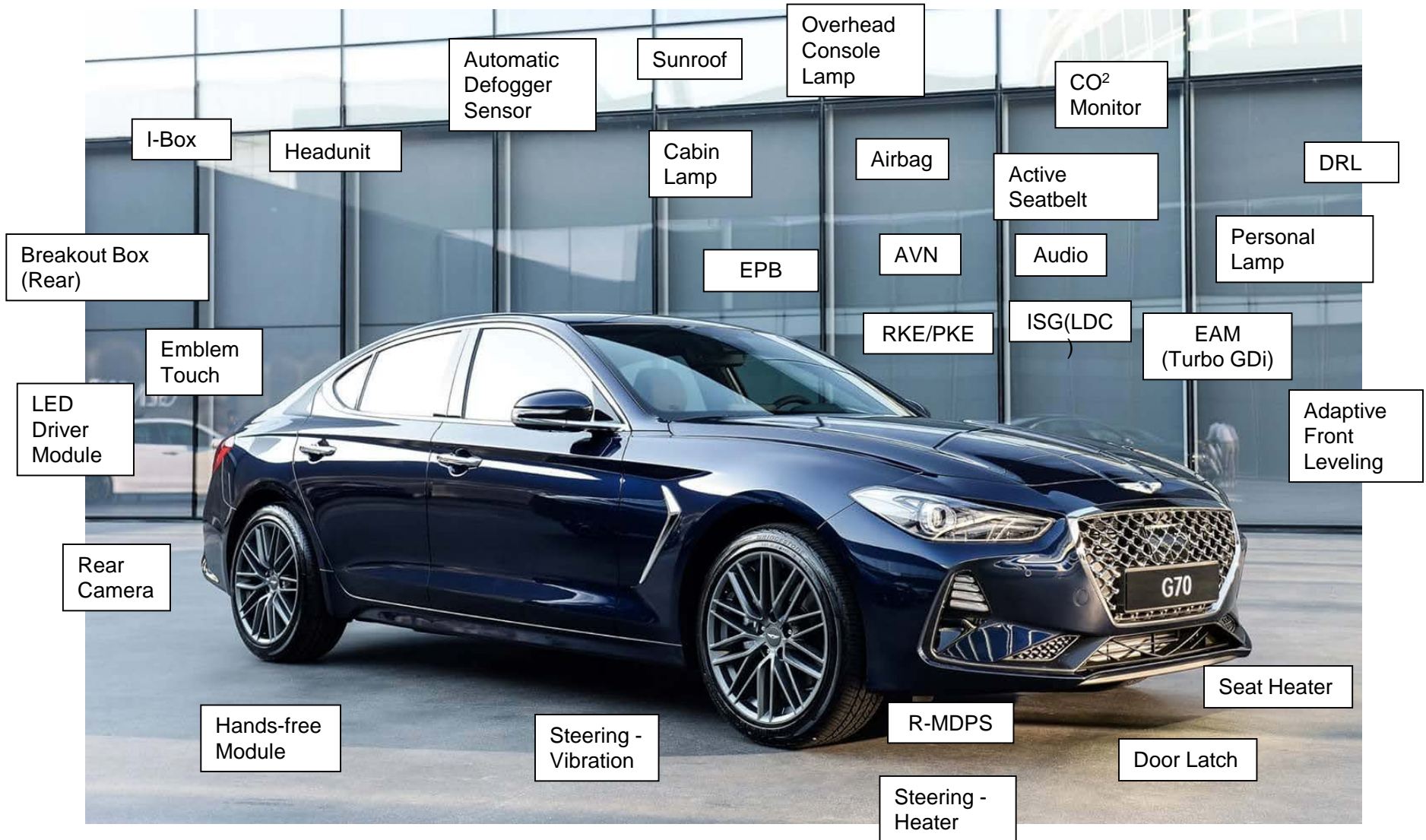
Summary

- Microchip is a TOP 10 Automotive semiconductor supplier with 25+ years experience serving the market

- Microchip is a market leader in multiple application areas such as touch Screens, automotive networking, car access, infotainment connectivity

- Microchip's portfolio of leadership products is rapidly expanding in high growth applications

- Microchip is well positioned for growth in the explosive ADAS and emerging automotive cybersecurity markets

- Total System Solution offering through broad product portfolio

Leadership and Flexibility that Enable Success!

Thank You!