SOLUTIONS FOR ADAS AND AUTOMATED DRIVING
WHO WE ARE
THE WORLD’S LEADING EMBEDDED SOLUTION PROVIDER

Renesas is a global semiconductor company built on a strong historical foundation of technological innovation originating from Hitachi, Mitsubishi, and NEC. In 2017, Renesas acquired Intersil to become the world’s leading embedded solution provider.

- A global leader in microcontrollers, SoC, analog and power semiconductors
- Focused on a broad range of Automotive, Industrial, Home Electronics, Office Automation and Information Communication Technology
- 780.3 billion yen in net sales in 2017
- Headquartered in Tokyo, Japan
- 20,000+ employees worldwide*1

*1: Consolidated, as of December 31, 2017 / SoC: System-on-a-chip

The European Headquarter in Düsseldorf-Rath
TRUST AND EXPERIENCE REQUIRED FOR VOLUME PRODUCTION

- Renesas is the leading MCU/SoC supplier for Automotive – W/W shipments reached aprox. 1B units in 2016
- Best in quality – Extremely low failure rate at 0.1ppm
- Advanced process – 16nm finFET for SoC, 40nm to 28nm cutting edge process for MCU

Market Share in Automotive MCU/SoC (CY16)*1

- Powertrain: 36%
- HEV/EV: 41%
- Body: 31%
- Chassis & Safety: 20%
- Infotainment (Cockpit*2): 29%
- ADAS: 12%

*1: Renesas’ revenue estimate in each segment is based on the market analyses by Strategy Analytics 2016. / *2: SoC share in all of cockpit related systems. / MCU: Microcontrollers / SoC: System-on-a-chip
FROM ADAS TOWARDS AD

ADAS
- Automatic Cruise Control
- Advanced Emergency Braking
- Lane Assist
- Cross Traffic Alert
- Surround View
- Traffic Jam Assist
- Advanced Emergency Breaking + Steering

Automated Driving
- Highway pilot
- City pilot
- Auto Pilot
- Valet parking
- Remote parking
- Auto parking
- Driver Assistance
- Partial Automation
- Conditional Automation
- High Automation
- Full Automation

Level 0/1
Level 2
Level 3
Level 4
Level 5
END-TO-END PLATFORM FOR ADAS AND AUTOMATED DRIVING

Connecting, Sensing & Analyzing

Multi-Camera
Sensing and Visualization

Radar / Lidar
Sensing

Connectivity
Geo and Traffic Information

Deciding

Sensor Fusion
Collection and Fusion of Sensor Data

Cognitive
Decision Making

Controlling

Automotive Security Gateway

Driving
(Powertrain)

Braking/Chassis
(Safety)

Steering
(EPS)
“SYSTEM-ON-CHIP” SOLUTIONS FOR FRONT CAMERAS

Solutions for Level 2 (“NCAP”) to Level 3+4 Vehicles
NCAP SETTING THE PACE FOR FRONT CAMERAS

- NCAP (New Car Assessment Programme) rates safety level of cars
- Highest safety ratings (★★★★★) require a minimum set of assistance systems:
  - Traffic sign recognition
  - Lane Departure Warning
  - Conditional Emergency Braking
  - Cross Traffic Alert
  - Light Source Detection

Renesas and partners enabling NCAP cameras
AUTOMATED DRIVING PUSHING THE LIMITS

Going from Mono- to Stereo Cameras
Need for high precision
Requires 360 degree detection

Requires new system solutions based on R-Car V3H
### INNOVATION ENGINEERED IN EUROPE

#### 5x increasing computer vision performance

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<td>R-CAR V3H</td>
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<td>4x CA53 IMP-X5+ HWA</td>
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#### Highly efficient accelerator for Artificial Intelligence

- CNN IP providing > 400 GMAC at less than 300mW

#### Highly efficient accelerator for traditional computer vision

- **Dense Optical Flow**
- **Stereo Disparity**
- **Object Classification**
AUTOMATED DRIVING NEEDS MORE THAN A CAMERA
PREPARING THE ROAD FOR AUTOMATED DRIVING

Software Platform

Baidu Apollo

Control Unit

This moment engineers would die for
SUMMARY

Renesas autonomy, “the open, innovative and trusted platform for assisted and automated driving” provides the required answers

We deliver solutions for high volume ADAS today

We are developing solutions for Automated Driving for tomorrow