



# TECHNICAL DESCRIPTION

for

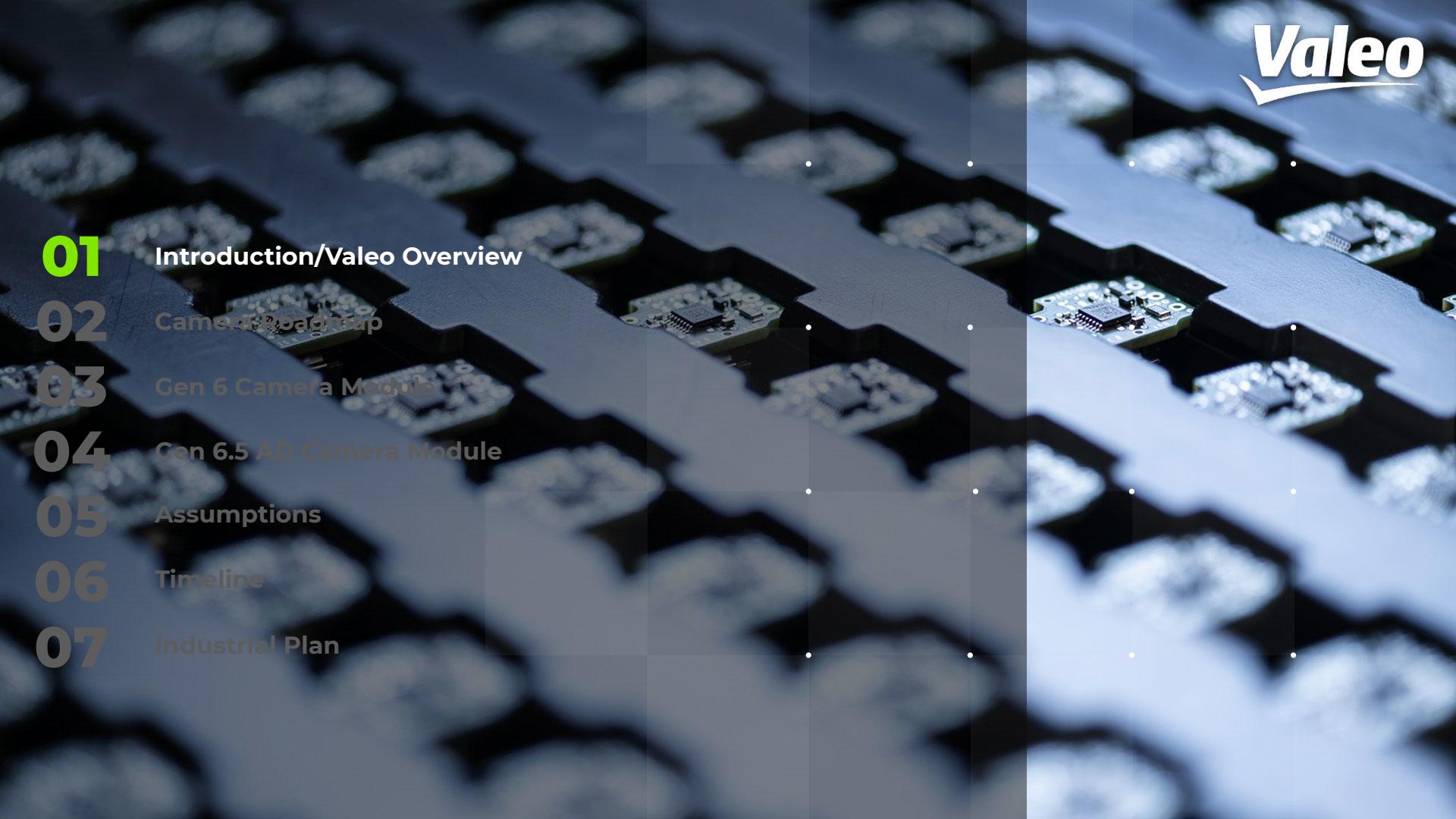
## Camera package RFQ



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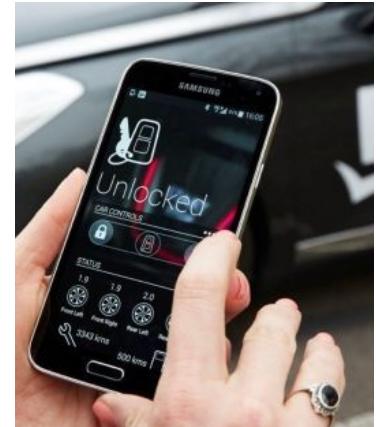


- 01** Introduction/Valeo Overview
- 02** Camera Roadmap
- 03** Gen 6 Camera Module
- 04** Gen 6.5 AD Camera Module
- 05** Assumptions
- 06** Timeline
- 07** Industrial Plan

- 
- The background of the slide features a close-up photograph of a dark green printed circuit board. Several small, rectangular green printed circuit boards are mounted onto it at various angles. Each of these smaller boards has a central integrated circuit and some surface-mount components. The overall texture is grainy and technical.
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4 Balanced and coherent

# BUSINESS GROUPS AND AN AFTERMARKET ACTIVITY



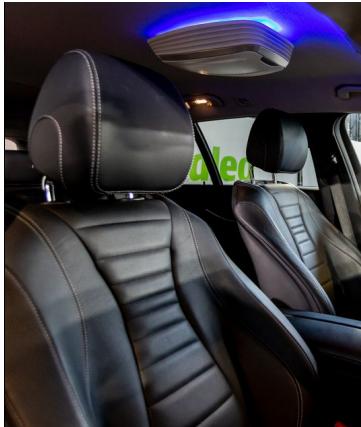
BUSINESS GROUP

**COMFORT &  
DRIVING  
ASSISTANCE  
SYSTEMS**



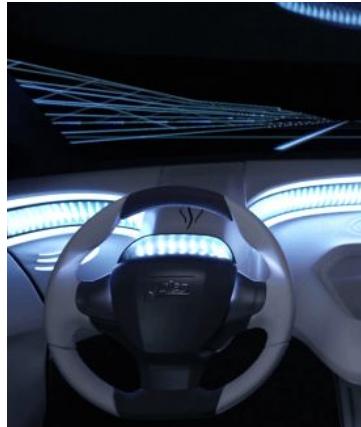
BUSINESS GROUP

**POWERTRAIN  
SYSTEMS**



BUSINESS GROUP

**THERMAL  
SYSTEMS**



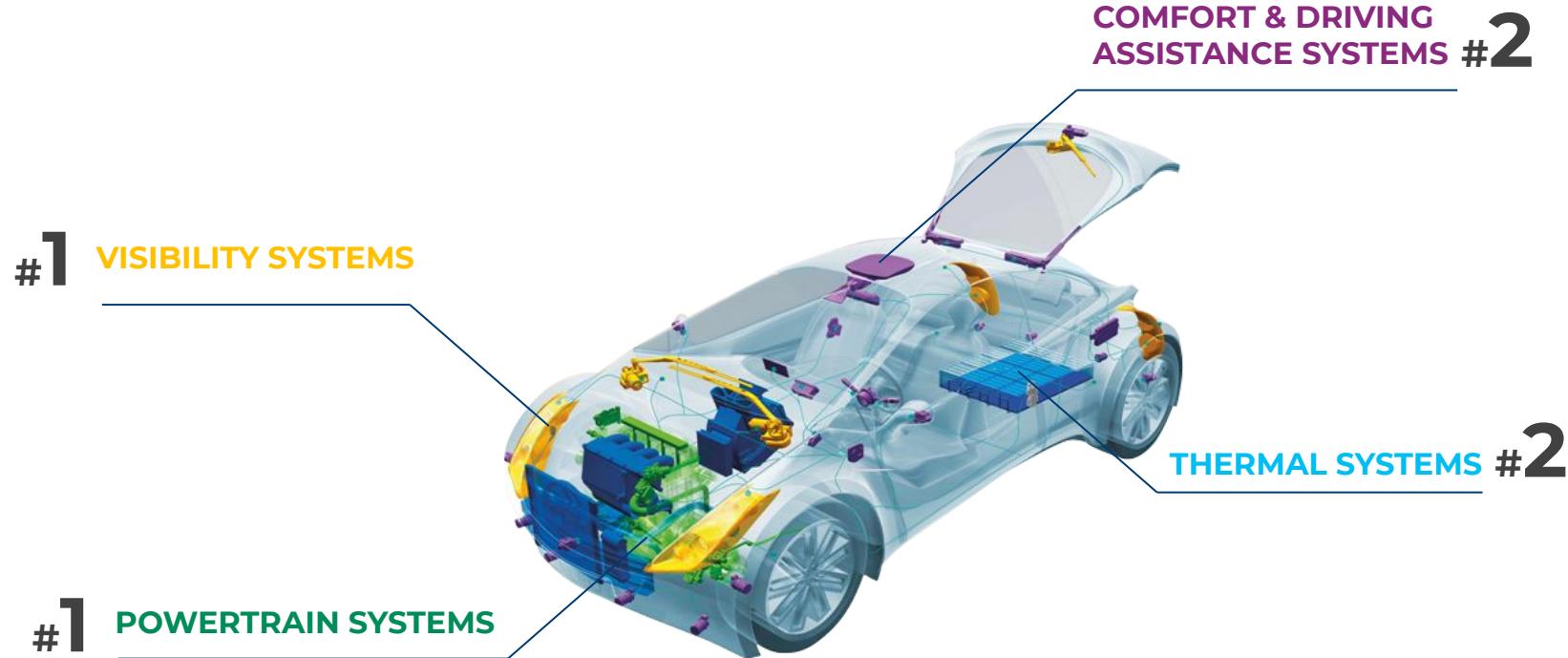
BUSINESS GROUP

**VISIBILITY  
SYSTEMS**



AFTERMARKET ACTIVITY

**VALEO  
SERVICE**



# Valeo Group - Company Overview



**19.3 BN**

TOTAL SALES



**113,600**

EMPLOYEES



**33**

COUNTRIES



**186**

PRODUCTION SITES



**59**

RESEARCH &  
DEVELOPMENT CENTERS



**15**

DISTRIBUTION  
PLATFORMS

# COMFORT & DRIVING ASSISTANCE SYSTEMS

develops a wide range of solutions for autonomous and connected cars, and intuitive mobility.



WHO WE ARE  
**OUR STORY**

## VALEO COMFORT & DRIVING ASSISTANCE SYSTEMS

Valeo is taking part in the revolution of **digital mobility & autonomous car**, giving rise to new forms of mobility.

With its large portfolio of systems and expertise in **detection systems and Artificial Intelligence, advanced Human-Machine Interfaces and connectivity solutions**, Valeo can address the needs of all forms of mobility, by focusing on the end-user.



**Full ADAS technologies and system offers** for automated cars



Wide range of solutions and services for **car access control, car sharing, telematics and acoustics**



**Enhanced interior experience** through intuitive controls, cameras and advanced interactive solutions

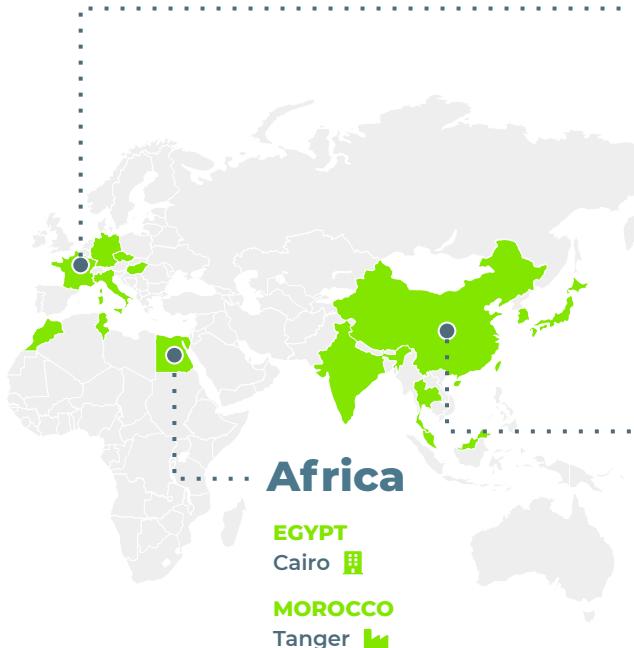


Solutions and services for **new mobility car sharing, telematics and predictive solutions**

# COMFORT & DRIVING ASSISTANCE SYSTEMS

## GLOBAL FOOTPRINT

-  Research center
-  Development center
-  Production plant



## Asia

- CHINA**
  - Guangzhou 
  - Shanghai 
  - Shenzhen 
  - Wuhan 
- KOREA**
  - Kyong Ju 
- MALAYSIA**
  - Penang 
- THAILAND**
  - Chonburi 
- INDIA**
  - Chennai 
- JAPAN**
  - Akita 
  - Tokyo area 

Regional support to our **customers**

# COMFORT & DRIVING ASSISTANCE SYSTEMS

## KEY FIGURES

**NAVISTAR**

€  
**3.6bn\***

Total sales



**19%**

of Valeo  
Group sales



**22,100**

Employees



**18**

Countries



**16**

R&D centers



**31**

Production sites



**457**  
Patent first  
filings



**25**  
Product platforms

**World  
Leader**

in Driving Assistance  
Systems

\* At the end of 2019



**PACE  
AWARDS**

2020

XtraVue® Trailer

2018

Valeo SCALA® Laser Scanner

2017 Finalist

Park4U® Remote

2014

Back-over Protection System

2008

Park4U®

2007

Radar Blind Spot Detection

2005

LaneVue™

# MOBILITY MADE SAFE & ENJOYABLE



## Camera-based ACC + Lane centering

Vision-only ACC + Lane centering complying with EuroNCAP 2020 requirements

## Valeo SCALA®



World's only automotive grade laser scanner on the market

## Park4U®.ai

AI cloud-computing solution to classify parking spaces

## Valeo Drive4U®

Fully-automated driving in urban environment

PLAY VIDEO

# A LEADER IN PARKING, SAFETY & DRIVING AUTOMATION

1 of every 4 new cars worldwide comes with Valeo ADAS technology.

We ensure **safety, assistance and automation** with our best-in-class sensors and perception systems.  
We provide systems and modules for both private and commercial mobility.



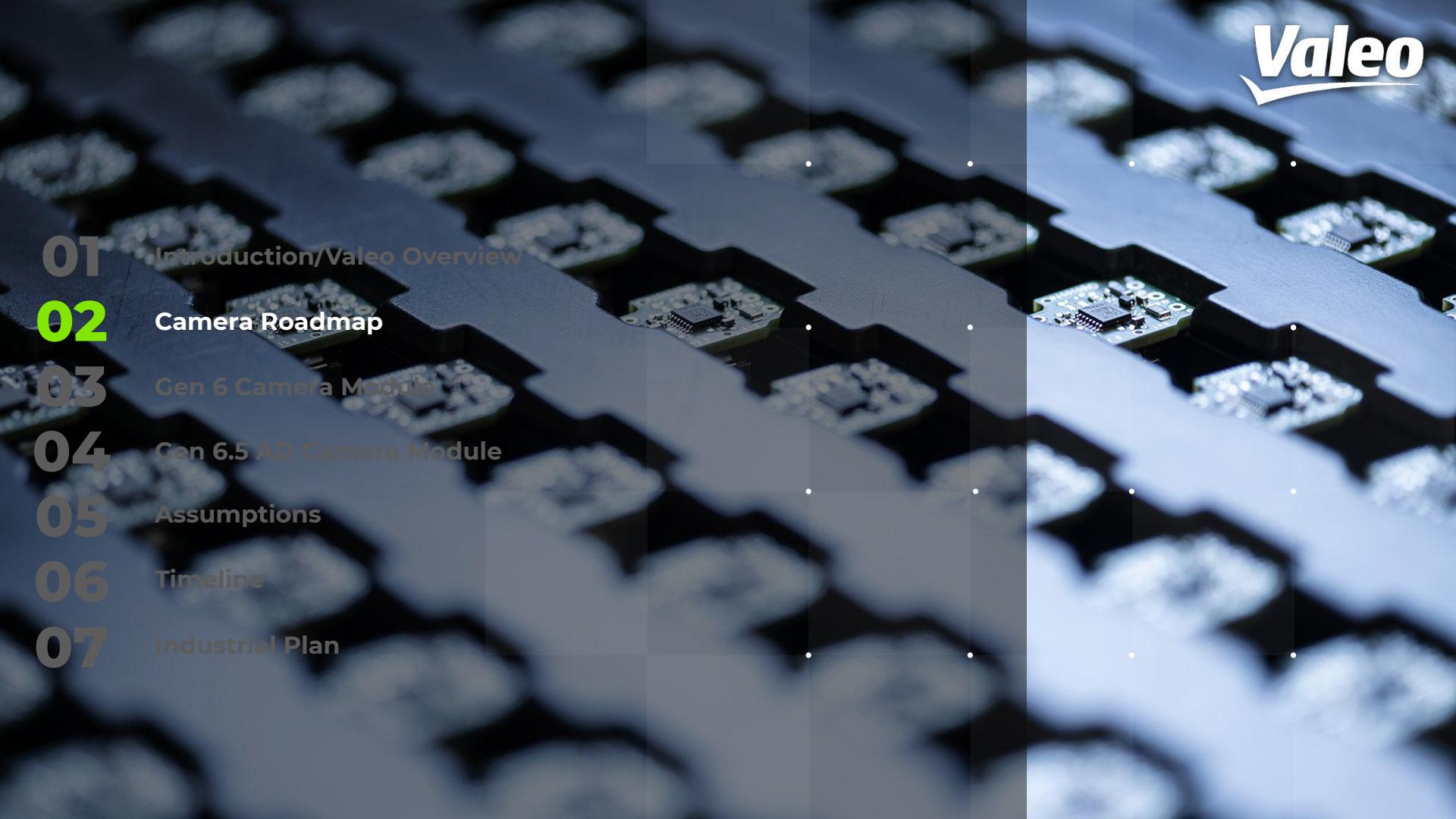
- ✓ Ultrasonic Systems
- ✓ Rear & Surround View systems
- ✓ Automated Parking solutions



- ✓ 3-5 stars NCAP solutions
- ✓ ACC and Lane Centering
- ✓ Rear AEB

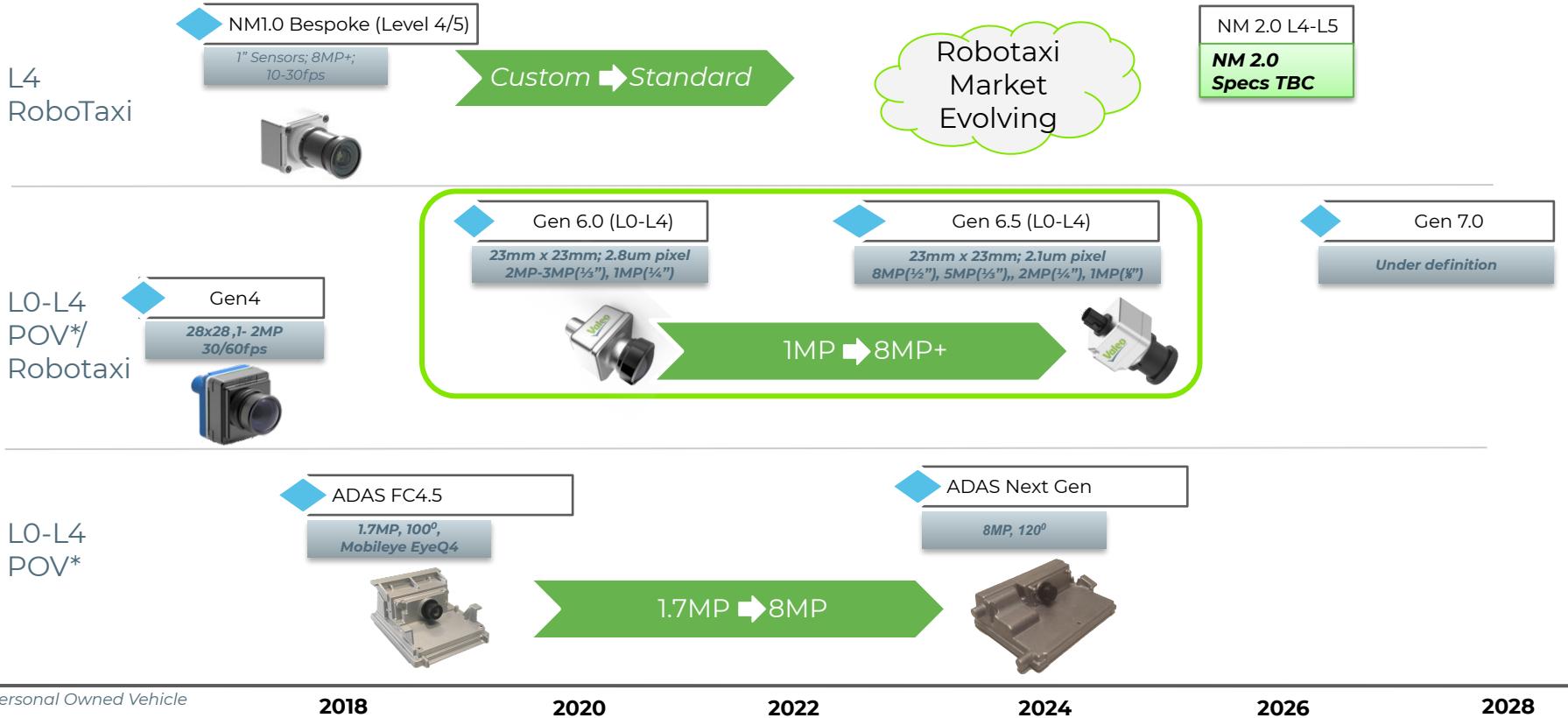


- ✓ 360° perception systems
- ✓ Localization & mapping
- ✓ High Definition Sensor (LiDAR, camera, radar)

- 
- A dark, close-up photograph of a printed circuit board (PCB) featuring several camera modules. The modules are green printed circuit boards with various electronic components and connectors. They are arranged in a grid-like pattern across the board. The background is dark, making the green boards stand out.
- 01** Introduction/Valeo Overview
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# Valeo Autonomous Driving Camera Roadmap

**NAVISTAR**



\*Personal Owned Vehicle

2018

2020

2022

2024

2026

2028

# Gen 6 and Gen 6.5 AD Technology



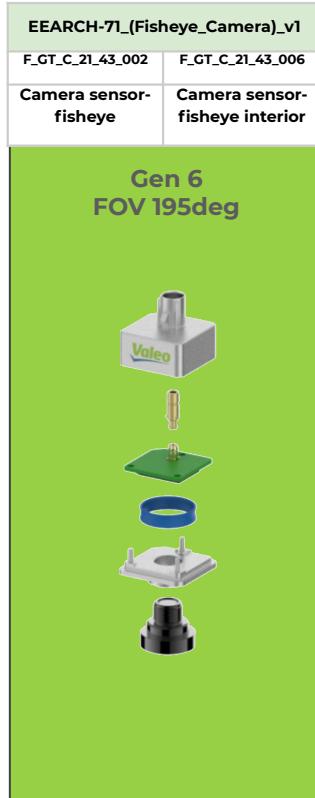
- Valeo state of the art Automotive Camera
- Fully tested product according Valeo standard specifications (EMC, ENV)
- Automated Assembly Line
- Proprietary Alignment Process that internalizes tolerances
- Innovative Laser Soldering & Laser Welding Process
  - Impact Extruded Aluminium Housing
  - Improved EMC Shielding
  - No Screws - No Seals
  - No Glue - No Anodisation
  - Ultra-compact
  - Optimised form factor for vehicle installation
  - Better Heat Dissipation
  - 1 PCB

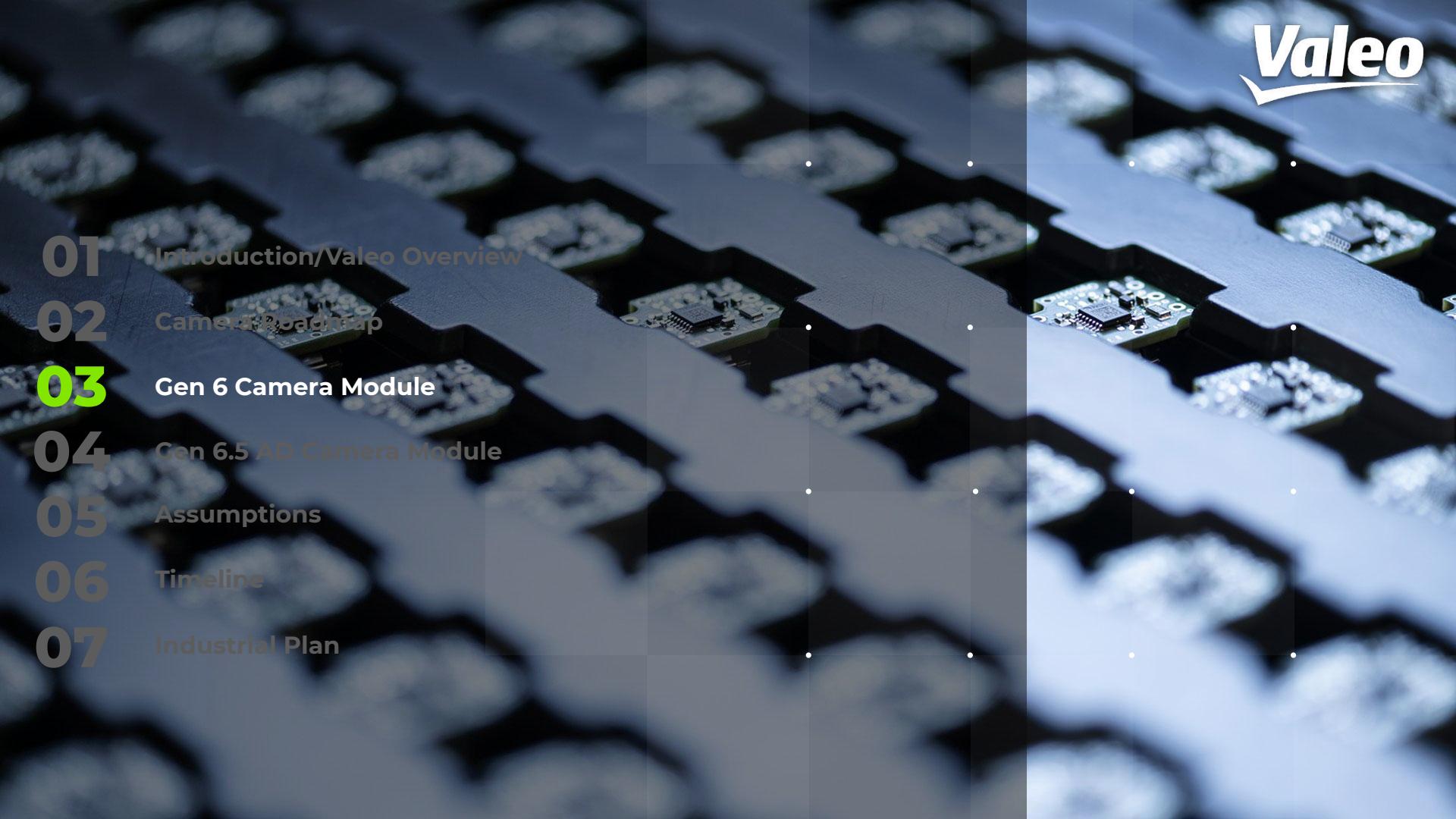


>15 years experience in automotive imaging and strong history of innovation  
including proprietary, best in class, active alignment.

# Product Selection

**NAVISTAR**



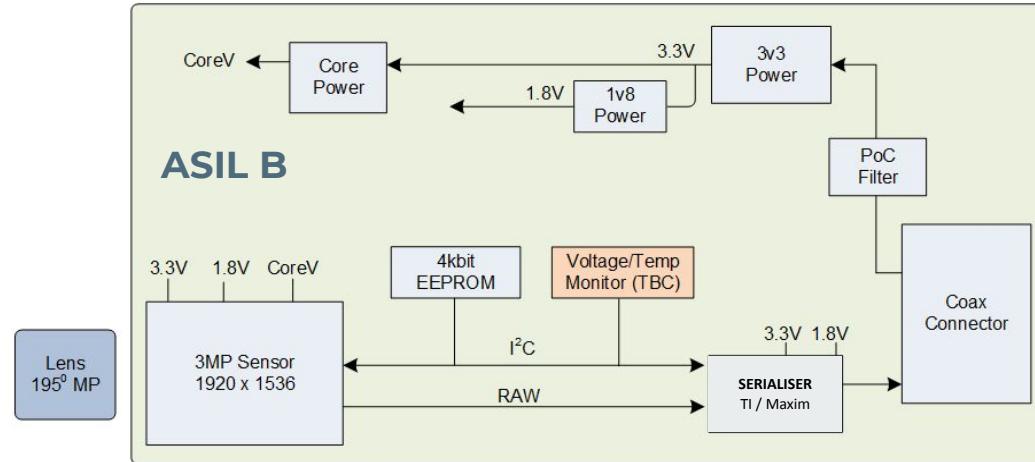
- 
- The background of the slide features a close-up photograph of a dark blue printed circuit board. Several small, rectangular green printed circuit boards are mounted onto the main board at various points. Each of these smaller boards has a central black square component, likely a sensor or microchip, surrounded by smaller electronic components and wires. The overall pattern creates a sense of repetition and technology.
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# Product Definition - Fisheye Camera

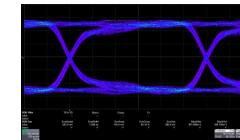
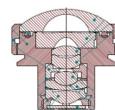
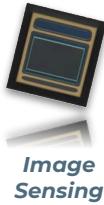
	<b>Surround View Camera</b>
Camera Platform	Gen6 SVS (3um)
Form Factor	23mm x 23mm Sealed Package - IP69k/IP67
Aluminum Welded Housing	IQ focus over Temperature Thermal benefits Fully Shielded, optimized for EMC
Lens FoV	<b>196° x 158° F# = 2.0</b>
Image Sensor	3MP - Sony <b>IM623</b> (1/2.42), 1920 x 1536 RGGB - LFM - HDR (~120dB) AEC-Q100 Grade 2 qualified
Optical Path Seal	Yes
Video Interface	Fakra, Power Over Coax; Maxim MAX96717F
PCB	Single PCB aligned to housing (internally) to minimize mounting tolerance
Power Supply	1.2W nominal @ 12V
Operating Temperature	-40C to +85C (depending on vehicle installation) (Components rated -40C to 105C)
Functional Safety	ASIL B Camera Design Features
Cybersecurity	Valeo Cyber Security Platform supporting secure production environment; Sensor Authentication Mechanisms (Camera, Image, Communication, Software)
Sample Availability	Q4, 2021



# System Architecture

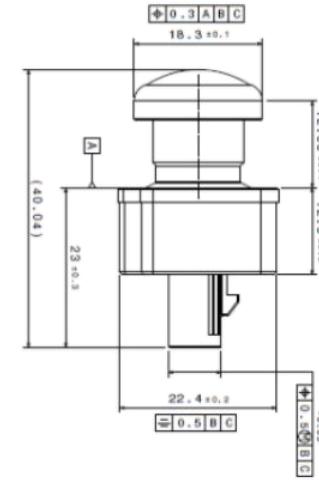
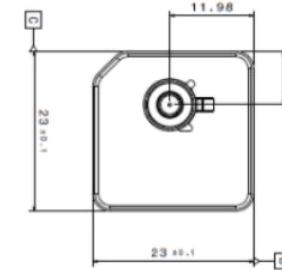
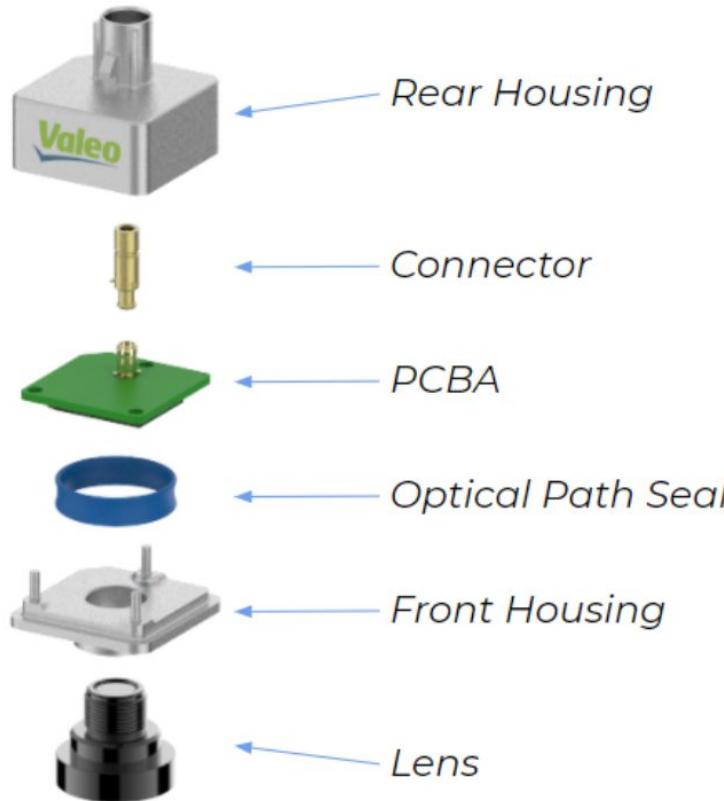
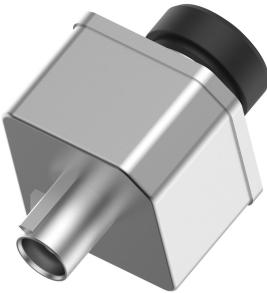


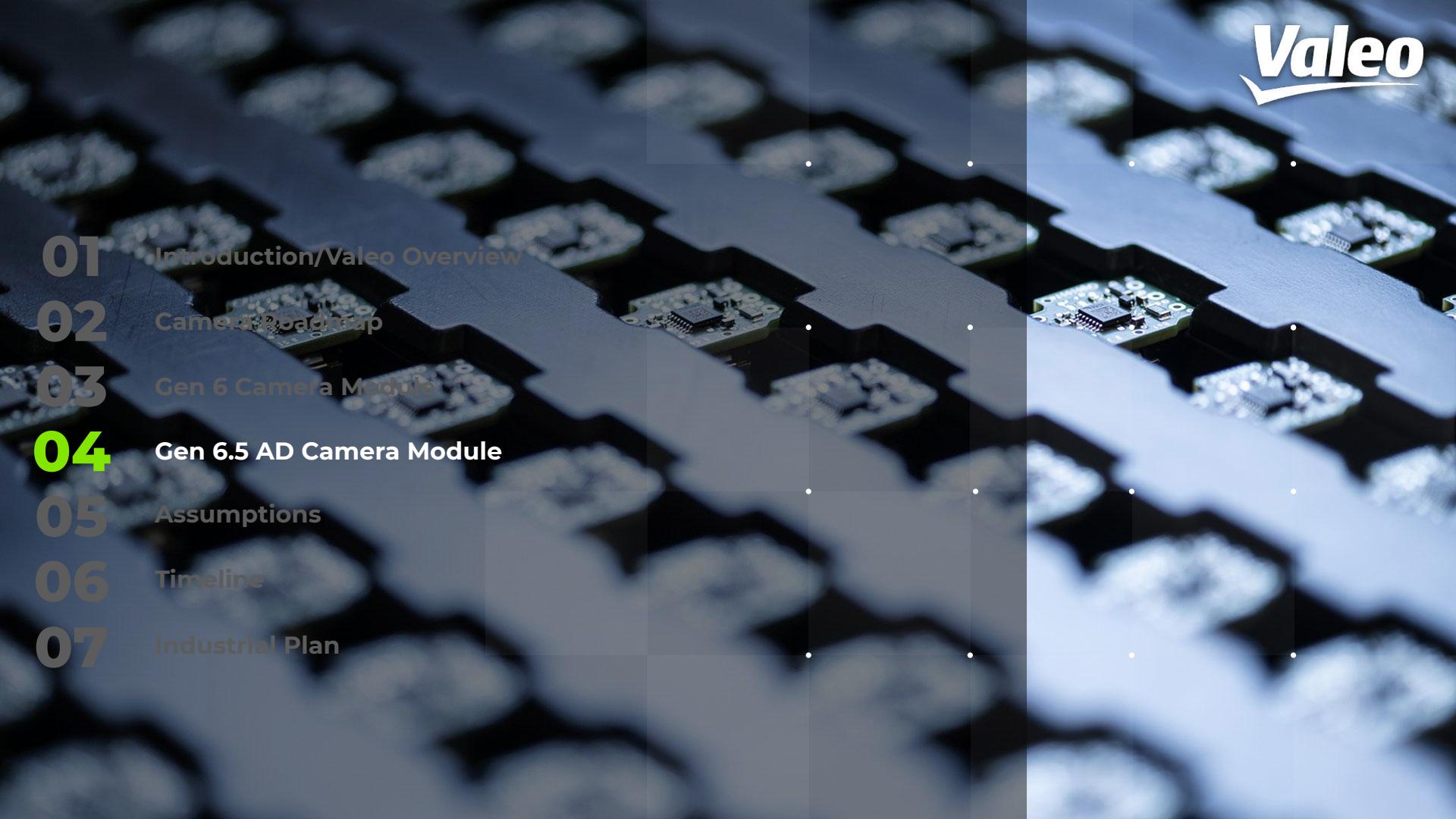
\* Nvidia 200° lens specification terminology is aligned with Valeo's 195° specification terminology



*Video Transmission & Comms*

# Mechanical Overview



- 
- A dark, close-up photograph of a printed circuit board (PCB) featuring several camera modules. The modules are green printed circuit boards with various electronic components and connectors. They are mounted onto a larger, black, multi-layer PCB. The background is dark, making the green modules stand out.
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# Product Definition - Camera Module

	<b>AD Cameras</b>
Camera Platform	Gen6 AD
Form Factor	25mm x 25mm IP69k/IP67
Lens FoV	<b>70° &amp; 30°</b> , F# = 1.6
Image Sensor	8MP - Sony <b>IMX728</b> (1/1.72), 3840 x 2160 RGGB - LFM - HDR (~130dB) AEC-Q100 Grade 2 qualified
Heating Element	Yes
Optical Path Seal	Yes
Video Interface	Fakra, Power Over Coax; Maxim MAX96717
Power Supply	1.6W nominal @ 12V
Operating Temperature	-40C to +85C (Components rated -40C to 105C)
Functional Safety	ASIL B Camera Design Features
Cybersecurity	Valeo Cyber Security Platform supporting secure production environment; Sensor Authentication Mechanisms (Camera, Image, Communication, Software)
Sample Availability	Q4, 2021



# System Architecture

## Sensor Tradeoffs

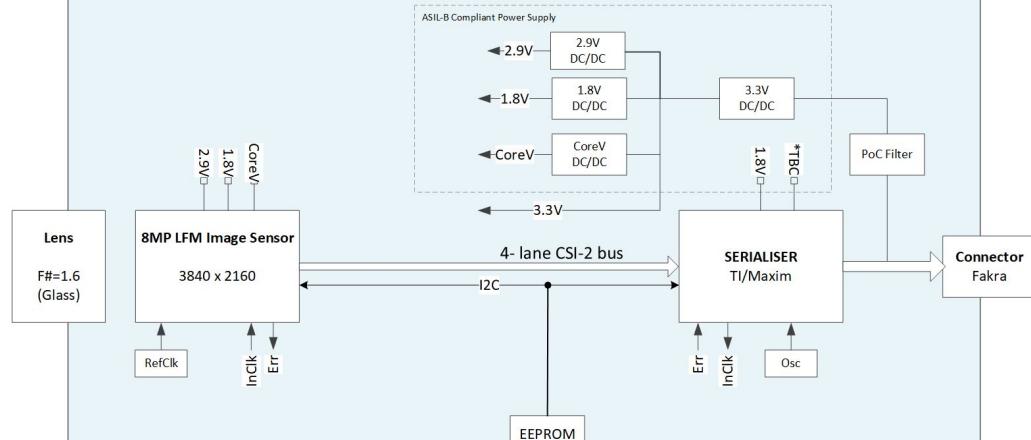
- Viewing vs. CV Application
- Resolution, Low Light, LFM, HDR



## Lens Design for L4 Use Case

- FOV 30°, F#=1.6
- HFOV 70°, F#=1.6
- Optimal design vs. robustness vs. cost vs. system

## Gen6.5 PCB & Housing Assembly



## Safety for L4

ASIL B Power Supply with safety features in serialiser and sensor

## EEPROM

Support for additional L4 production calibration data

## PCB

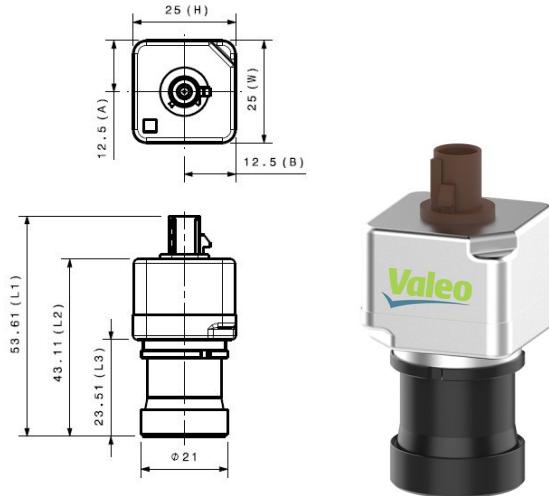
Decoupled PCBs to optimize optical path performance

## Serialiser

TI/Maxim high speed SerDes interface

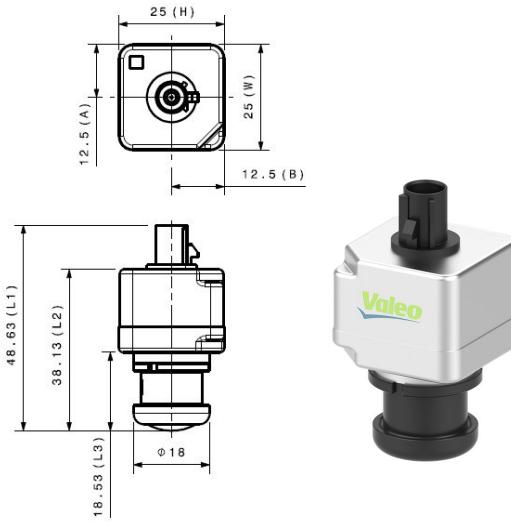
## Mechanical Construction

### Gen 6.5AD Camera 30°

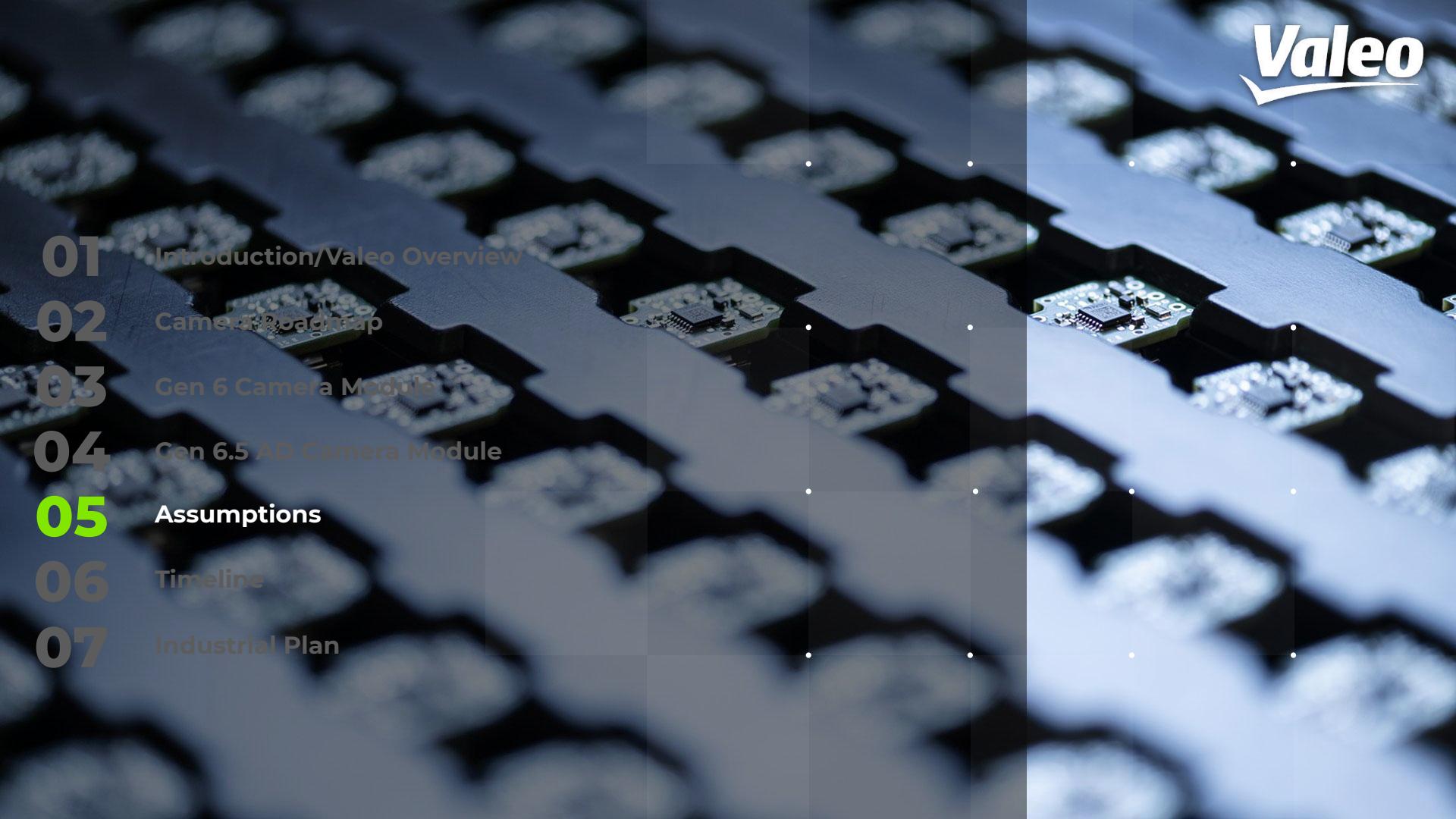


Camera sensor medium and long range

### Gen 6.5AD Camera 70°



Camera sensor short range

- 
- A close-up photograph of a dark grey or black printed circuit board (PCB). Several small, rectangular green printed circuit boards (camera modules) are mounted onto the larger board at various points. The camera modules have a central chip and some smaller components. The background is slightly blurred, creating a sense of depth.
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# Assumptions



- Camera builds with Valeo standard mobility camera process
- Technical support on product specification is included
- Safety Goals: **ASIL B** (frozen / delayed frames) as per existing design
- Prior Design Validation (DV) test data results will be provided
- Personal Owned Vehicle use Mission Profile
- Valeo industrial department can provide standard end of line (EOL) test results
- Process Validation (PV) surrogate data will be provided. No additional PV considered

**01**

Introduction/Valeo Overview

**02**

Camera Roadmap

**03**

Gen 6 Camera Module

**04**

Gen 6.5 AD Camera Module

**05**

Assumptions

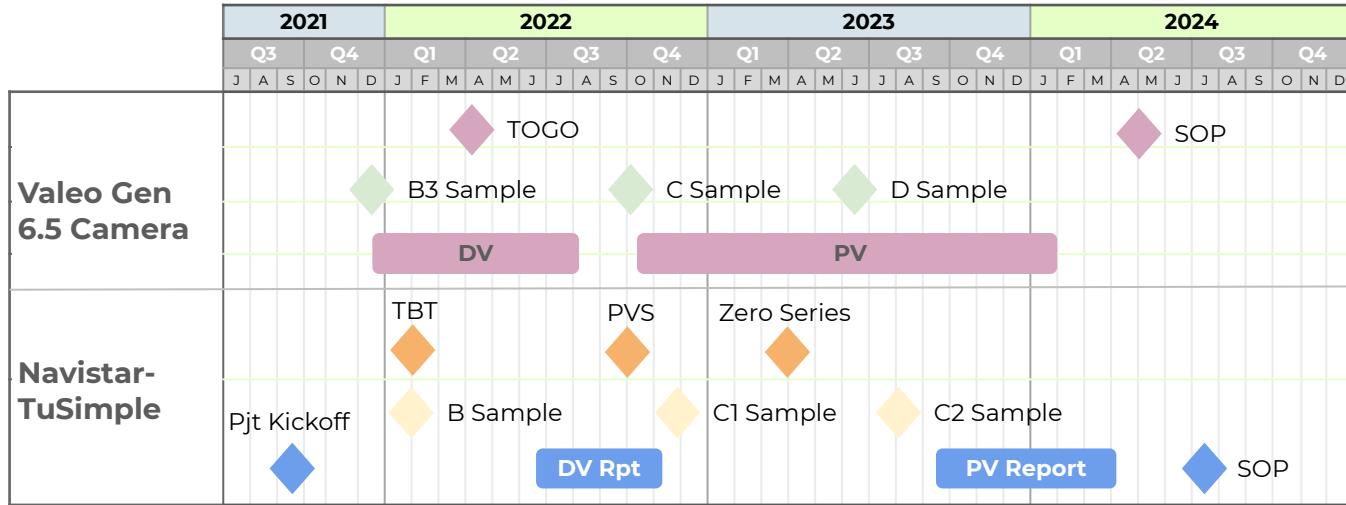
**06**

Timeline

**07**

Industrial Plan

# Timeline



**01**

Introduction/Valeo Overview

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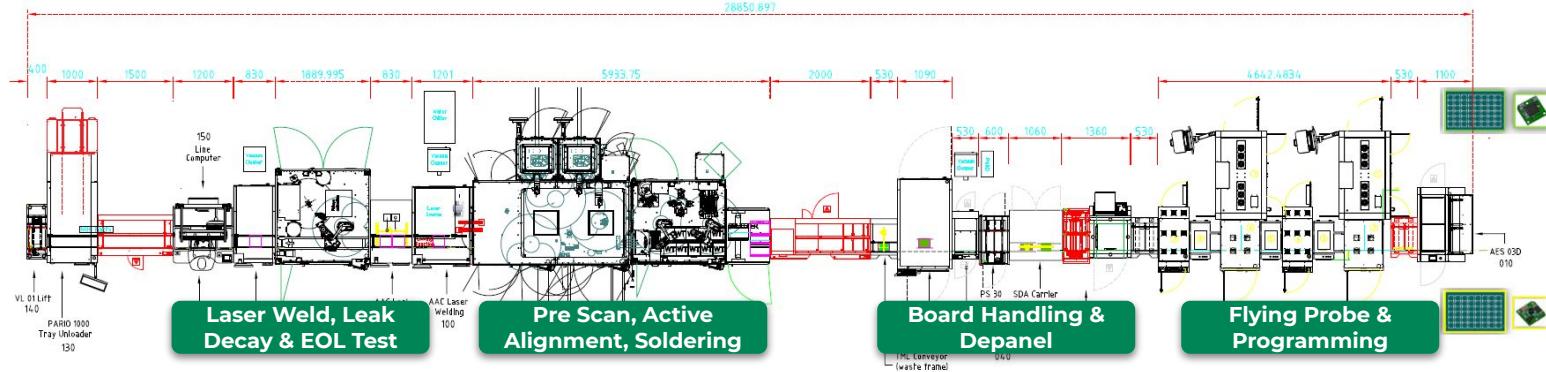
Industrial Plan

## Tuam, Ireland Site

- ➔ Established **1982**
- ➔ Site footprint **12,745 m<sup>2</sup> (Total Site Area)**
- ➔ Production Size  
**2,820 m<sup>2</sup> Production Area**  
**750 m<sup>2</sup> Warehouse**  
**590 m<sup>2</sup> Cafeteria**  
**8,585 m<sup>2</sup> Other**
- ➔ Annual Sales  
**A 2019      FO 2020**  
**€261M      €181M**
- ➔ OEM Customers  
**Daimler, Jaguar, GM, VW, VOLVO,  
BMW, PSA, Hyundai, Renault**
- ➔ Main products  
**Camera, SVS - RVC - Front Camera -  
Autonomous Driving.**
- ➔ Yearly Production Volumes  
**> 6.8 million Assemblies 2019**



# Valeo Camera Gen 6/6.5 Production Line



# Industrial Assumptions





SMART TECHNOLOGY  
FOR SMARTER MOBILITY