ENDOSCOPE CAMERA ASSEMBLY

Semiconductor Fabrication & Assembly for Medical Device Designers

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Product Architecture Demands For In-Body & Implantable Devices

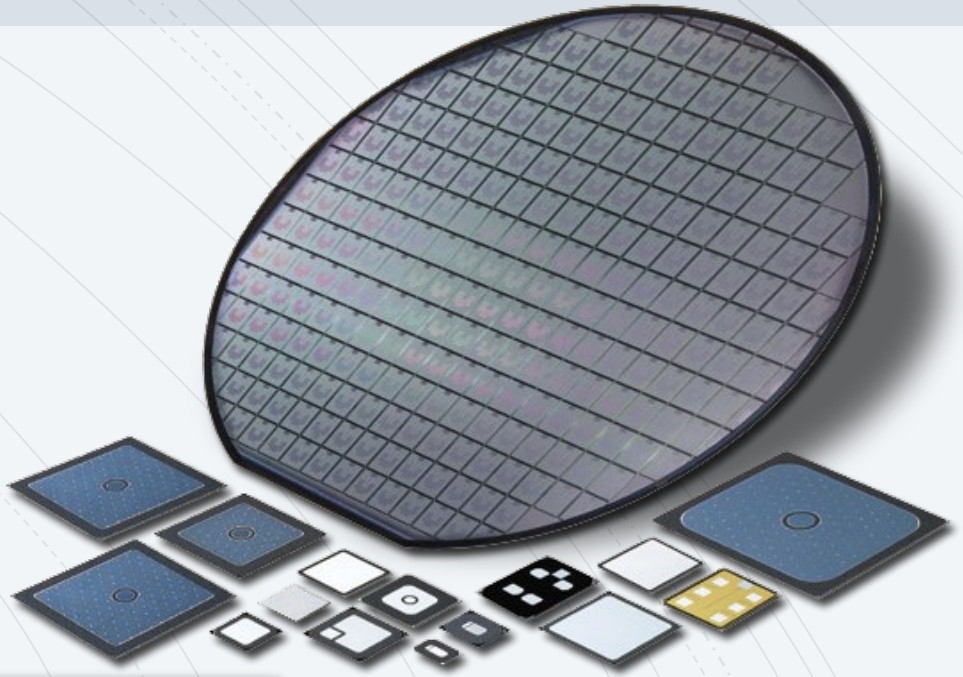
Small Footprint – Nonintrusive

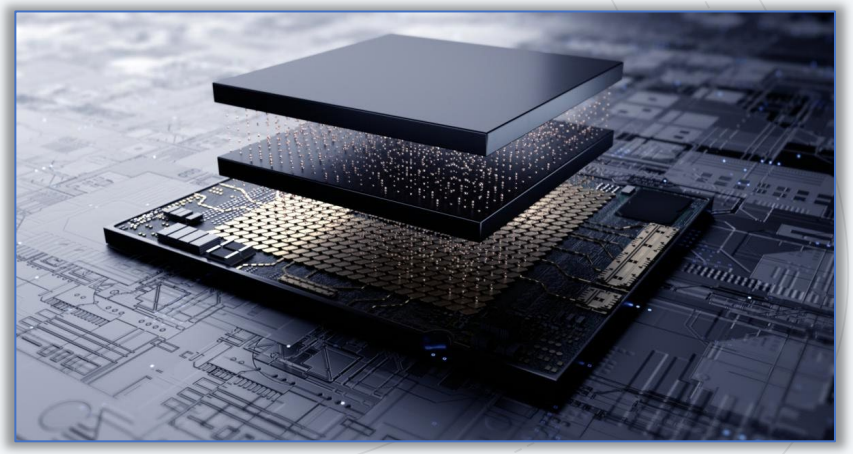
- ✓ Chip-On-Board
- ✓ Rigid – Flex Substrates
- ✓ 3D Stacked Components

Integrated Optical Components

- ✓ Precision Placement (± 5µm) in 3 Axis
- ✓ Particle Control

Sterilizable & Hermetic





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Endoscopes – Instructive Example

An Instrument Used To Examine
The Interior Of The Human Body

Many types, each named according to the area they are used to examine

- Arthroscope – Joint examination
- Bronchoscope – Lungs and airways
- Cystoscope – Bladder
- Laparoscope – Abdominal organs

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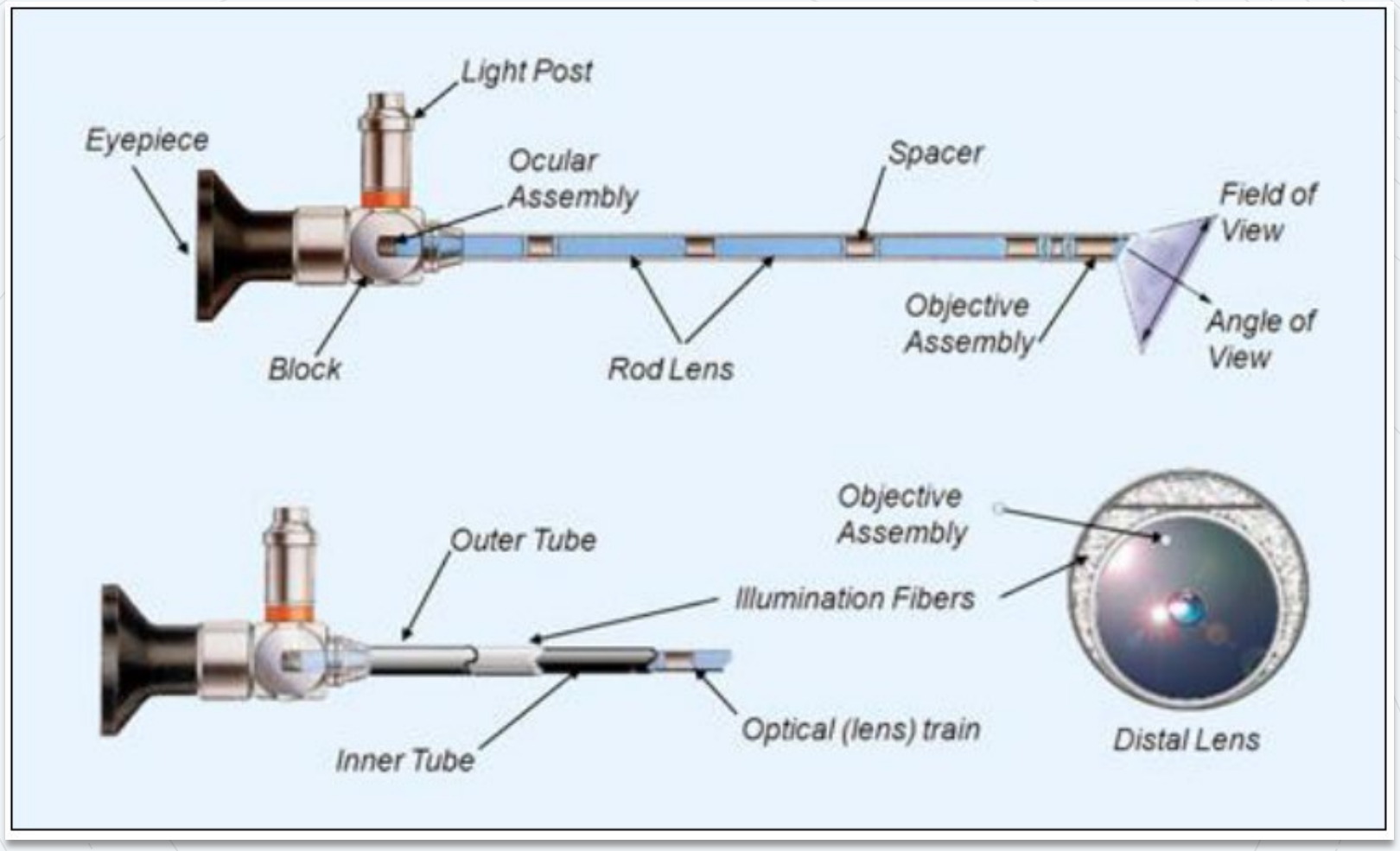
Typical Endoscope Design



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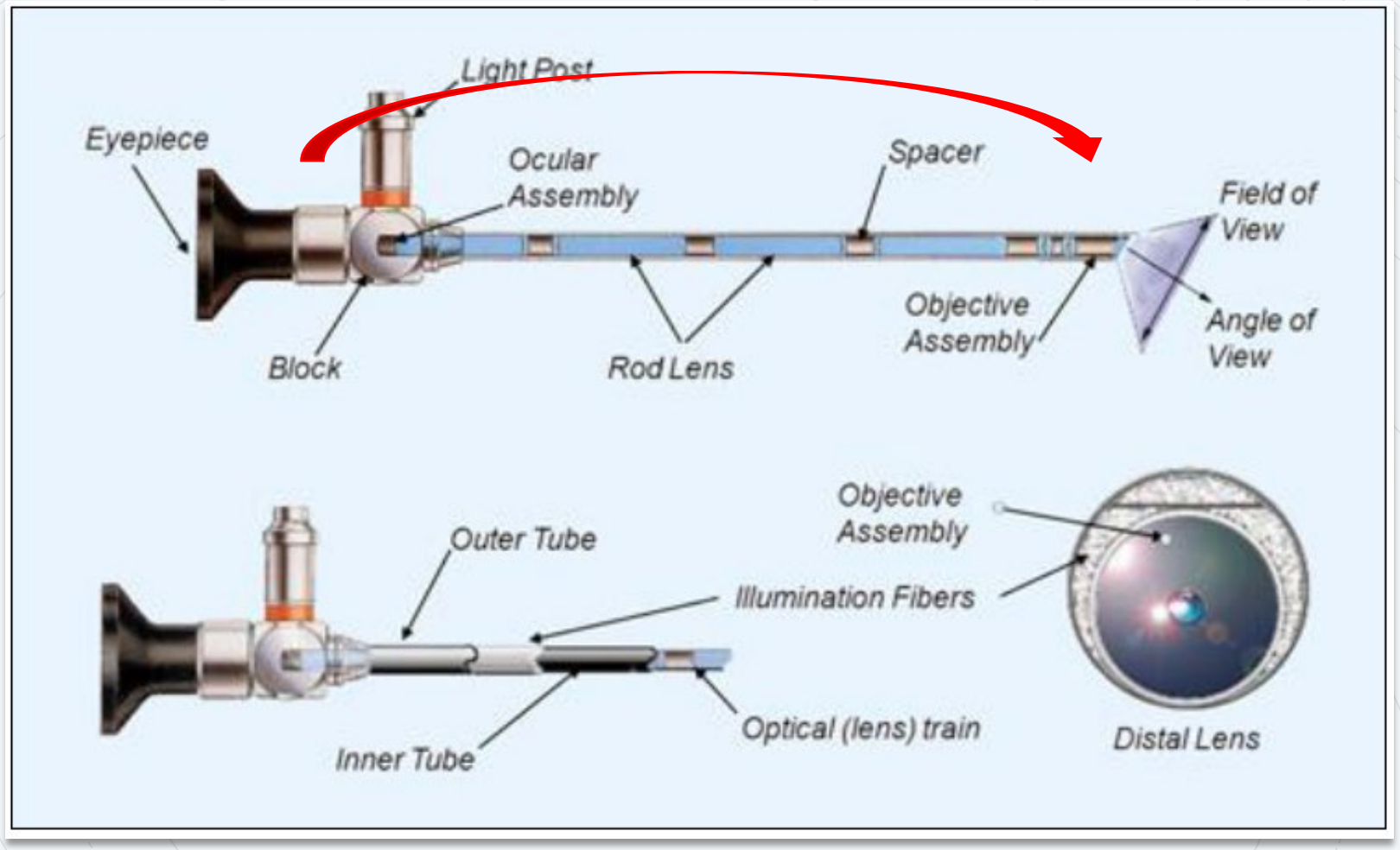
Next Generation Endoscope Design



Move the Camera to the Tip of the Endoscope

- Sharper Picture
- Simpler Optical Train
- Easier to Integrate
- Smaller, Easier to Handle

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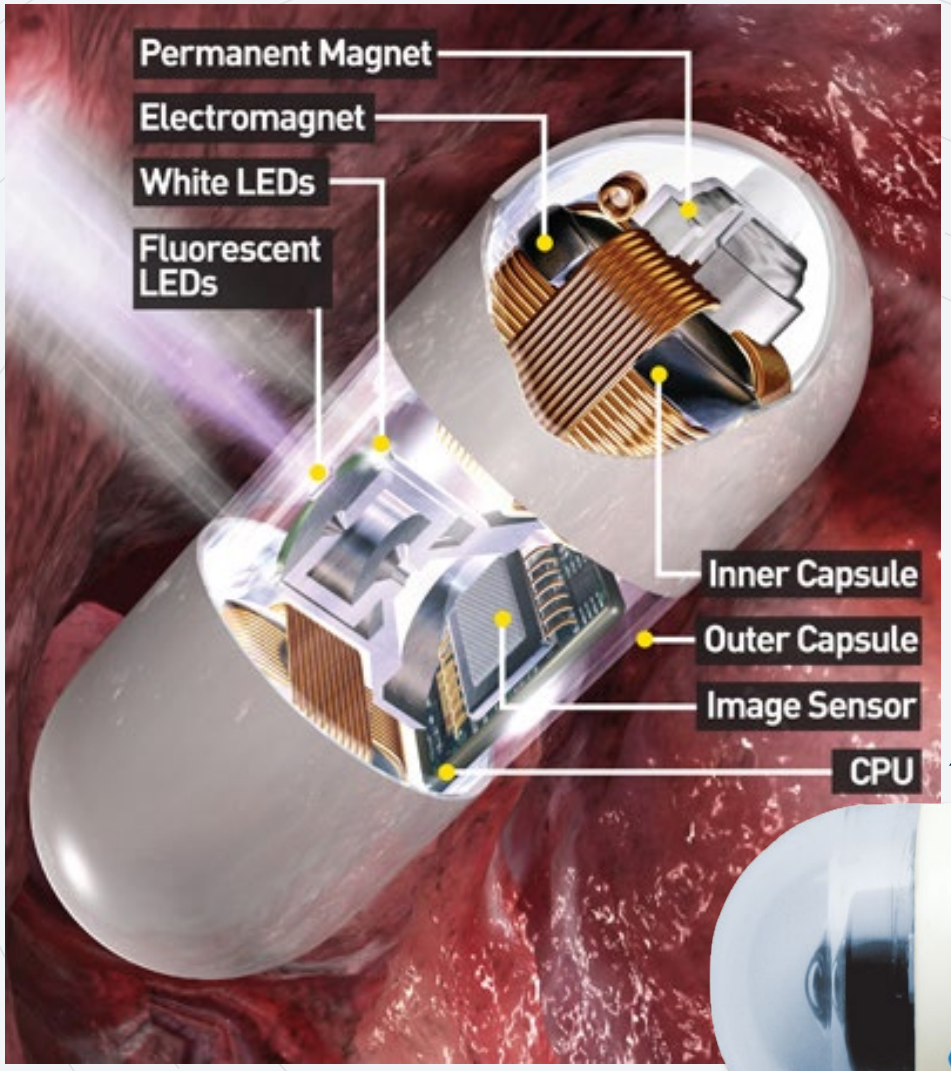
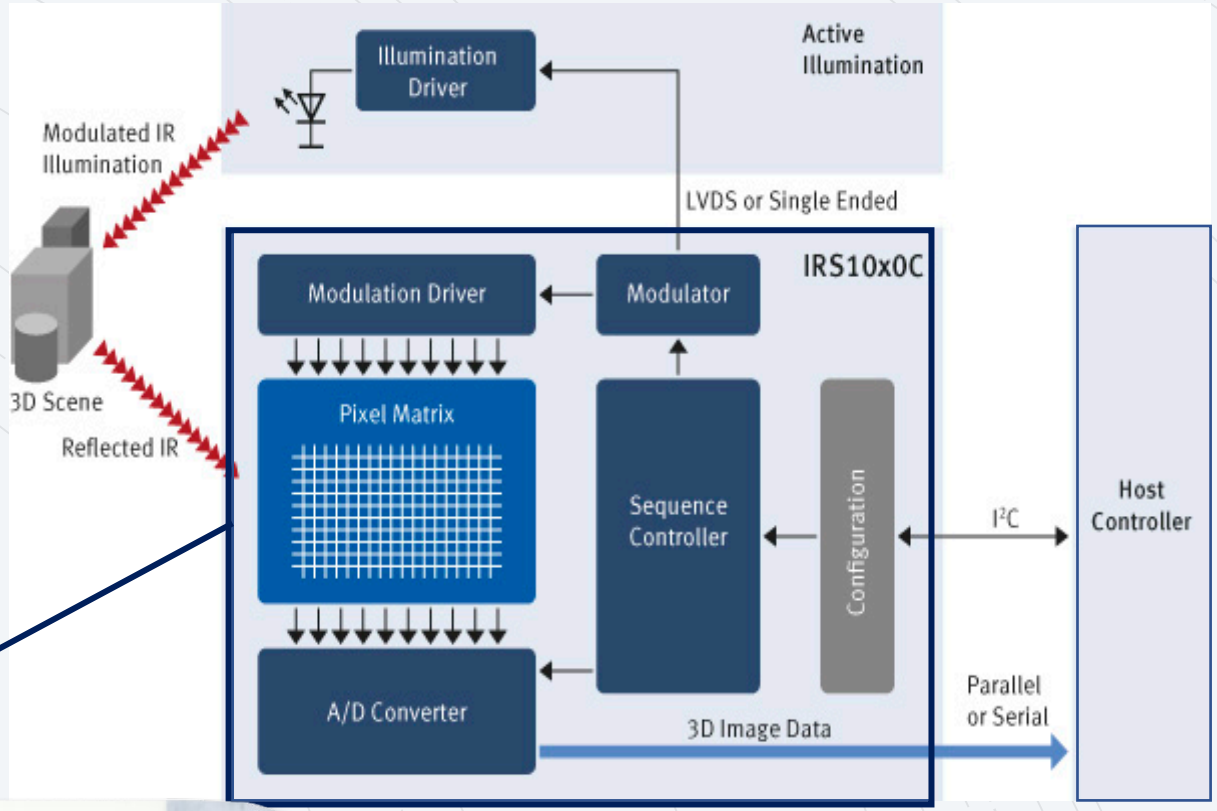
The Capsule Endoscope





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Endoscope Cameras Require 3D Assembly

3D Assembly = Assembly of semiconductor components in a stacked configuration to pack more function in less space

This can be achieved by using mostly conventional processes

- Flip Chip, Waterfall bonding, or Combinations
- Flip Chip and On-Chip Thru Silicon Vias (TSVs)

Conventional substrates may be used

- Rigid-Flex Assemblies
- Flex-Only Assemblies
- Ceramic – used frequently for power dissipation & hermeticity

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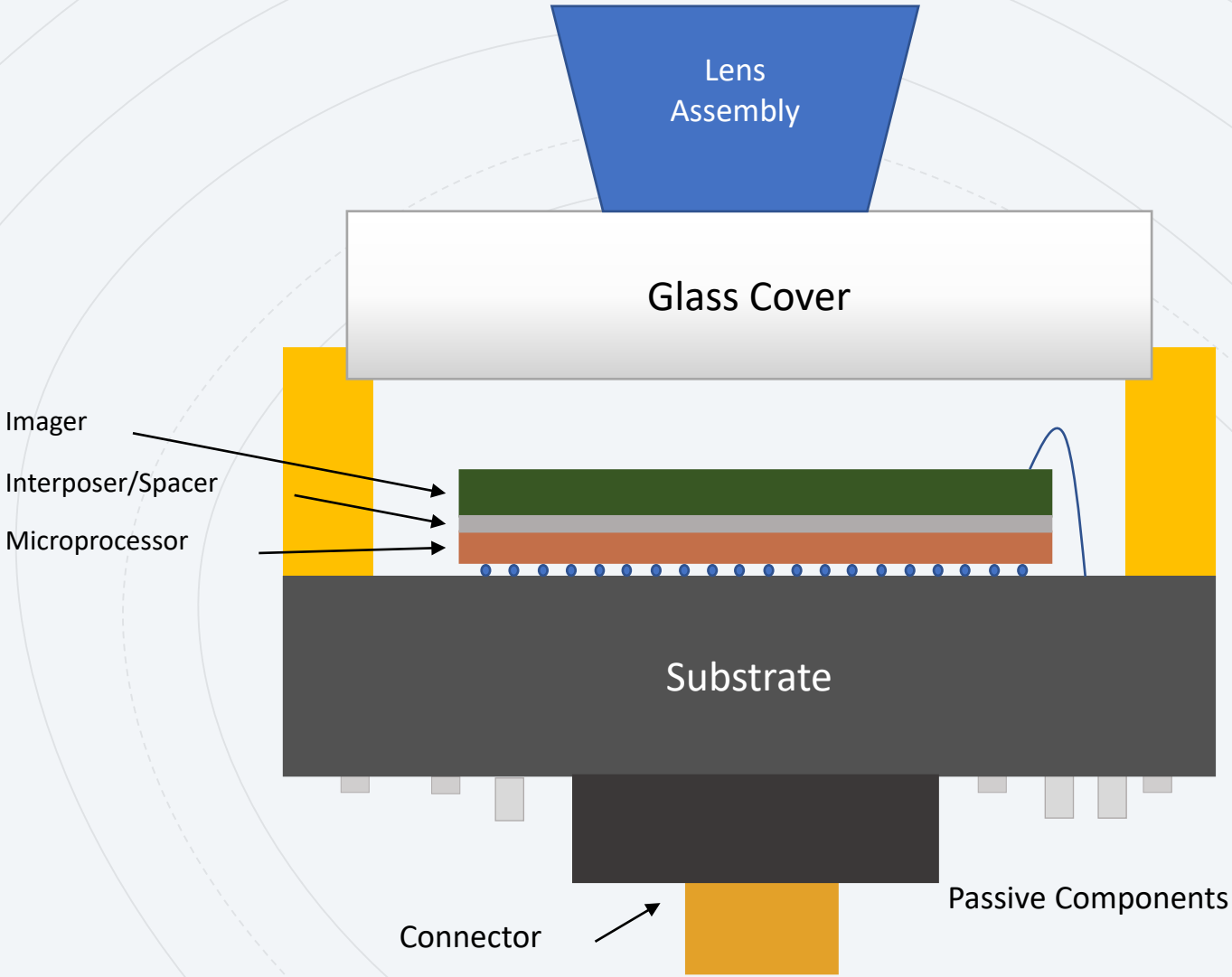
3D Stacked Camera Assembly



- Passive Alignment of Lens Assembly to the Package
- Alignment of the Imager Die to the Package: +/- 10 µ
- Z Axis Control for Optical Plane Alignment: +/- 15 µ
- Ceramic Substrate – Hermetic for Autoclave Sterilization
- Tight Dimensional Specs on All Package Components
- Microprocessor Flip Chip Attached, Imager Wire Bonded

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Issues for Medical Device Designers

Medical Device manufacturing is characterized by:

- Tight regulatory oversight
- Lifetime BoM and Process documentation
- Demanding layout size control
- Mixed assembly processes (SMT, Die Processing, Optical Assembly)
- Development of stable, automated processes

Once a process has been fully developed and properly documented, it remains unchanged for the life of the product due to the costs associated with making any modifications.

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"We Build What You Design"

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