SmartCamera+ with AR1335 and AP1302
SmartCamera+ Demonstration Platform

ON Semiconductor AP1302
MIPI Image Signal Processor
13MP@30, 1080p@120
Bayer, JPEG, YUV, Gamma, Face Detection

ON Semiconductor AR1335
13MP Image Sensor
1/3” Progressive Scan
4208x3120, 30fps

eMMC 8GB
H.264/H.265/MJPEG
microSD 2.0

Mini DP 1.2a Output
Ethernet
HTTP, RTSP, TCP/IP, UDP
USB 2.0
Audio Codec

Xilinx ZU4EV SoC
DDR4, 2400MT/s, 64bit, 4GB
AR1335 Image Sensor
AR1335 : 13MP 1/3.2” CMOS Imaging Sensor

**Features**
- 1/3.2” optical format
- 4208 (H) x 3120 (V) [4:3]
- 1.1µm BSI pixel
- RGB Bayer and Mono Options
- Electronic Rolling Shutter and GRR support
- 4-Lane D-Phy MIPI CSI-2 interface
- 270mW 13mp30 mode
- Onboard temperature sensor
- -30°C to 70°C operation
- 11 degree and 32 degree CRA options
- Bare Die and CSP Packages

**Key Applications**
- 4K Video recording and streaming
- Body Cameras
- IoT Cameras
- Drones
- Sports Action Cameras
- High Resolution Imaging

**Key System Capabilities and Benefits**
- 4-lane MIPI CSI 2 interface for high bandwidth transfers
- High Responsivity for excellent low light performance (82% Peak QE)
- High Linear Full Well (5300e-) for great dynamic range
- Support major professional video formats (4K 30fps, 1080P 60fps, 720P 120fps)
- 3D synchronization controls to enable stereo video capture

**Orderable Part Numbers**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Product Description</th>
<th>Orderable Product Attribute Description</th>
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<tbody>
<tr>
<td>AR1335CSSC325MD20</td>
<td>13MP, 1/3.2&quot;, RGB Color, 32° CRA</td>
<td>Bare Die</td>
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<tr>
<td>AR1335CSSC11SMD20</td>
<td>13MP, 1/3.2&quot;, RGB Color, 11° CRA</td>
<td>Bare Die</td>
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<tr>
<td>AR1335CSSM32SM20</td>
<td>13MP, 1/3.2&quot;, Mono, 32° CRA</td>
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<td>AR1335CSSM11SM20</td>
<td>13MP, 1/3.2&quot;, Mono, 11° CRA</td>
<td>Bare Die</td>
</tr>
<tr>
<td>AR1335CSSC11SMKA0-CP</td>
<td>13MP, 1/3.2&quot;, RGB Color, 11° CRA</td>
<td>CSP with Protective Film</td>
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<tr>
<td>AR1335CSSC11SMKA0-CR</td>
<td>13MP, 1/3.2&quot;, RGB Color, 11° CRA</td>
<td>CSP without protective film</td>
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<td>AR1335CSSC32SMAH3-GEVB</td>
<td>13MP, 1/3.2&quot;, RGB Color, 32° CRA</td>
<td>Evaluation Headboard</td>
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<tr>
<td>AR1335CSSC11SMKAH3-GEVB</td>
<td>13MP, 1/3.2&quot;, RGB Color, 11° CRA, CSP</td>
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AR1302 Image Coprocessor
Features

- Supports Up To 13MP (4224 x 3156)
- Primary Camera I/F – 4-Lane MIPI (up to 1.2Gbps/lane)
- Secondary Camera I/F – 3-Lane MIPI (up to 1.2Gbps/lane)
- Control Plane – 2-wire I2C, supports up to 3.4Mbps; 4-wire Serial I/F (SPI Slave) for Register Access (up to 25Mbps)
- Output I/F – 4-Lane MIPI (up to 1.2Gbps/lane)
- Input Formats – RAW6/RAW8/RAW10/RAW12
- Output Formats – YUV422, YUV420, 888RGB, 565RGB, 555RGB, JPEG, MPEG, RAW8, RAW10, RAW12
- Max Frame Rate – 30fps @ 13MP, 120fps @ 1080p
- Onboard Temperature Sensor
- -40°C to +85°C (Tj) Operating Temp

Key System Capabilities & Benefits

- Scalability
  - Single Device Supports a Wide Variety of ON Semiconductor’s Sensors
- Clear Buffer between Sensor & Further Image Processing (if needed)
  - Takes Away the Complexities of Sensor Tuning, Enables Focus on the Application Value-Add
- Dual Sensor Mode with Concurrent Streaming
  - Enables Depth, Stereoscopic Vision
- Auto Focus, Auto Exposure, Auto White Balance, Flicker Detection & Mitigation, Local & Adaptive Tone Mapping
  - Control & adaptation to dynamic lighting conditions
- Corrections – Len Shading, Bad Pixel, Gamma; Demosaicing, Denoising, Sharpening
  - Pre-processed High Quality Image Outputs
- Supported by ON Semiconductor’s DevSuite
  - Easy development of imaging system; Short TTM
SmartCamera+ Demonstration Platform
“We are entering an era where Artificial Intelligence (AI) is becoming an integral part of vision-based systems. ON Semiconductor, with its industry-leading range of Global Shutter and Rolling Shutter image sensors, is working hand-in-hand with Xilinx to provide our common customers solutions to support this new kind of intelligence.”

Gianluca Colli, Vice President and General Manager, Industrial and Consumer Solutions Division, Intelligent Sensor Group

ON Semiconductor
Ultra-Low Latency Face Detection Demo

RTSP over Ethernet
Notebook Decode & Display

Smart Camera

Laptop

APU - PS
Ethernet

Sensor + ISP
1080P 1080P@30fps

MIPI CSI2-RX
1080P
Resize 640x360
Frame Buffer DMA
DPU
Coordinates

VPSS
Frame Buffer DMA
Encoder

DPU - PL

~18ms per frame
~100ms per frame

Image courtesy: Xilinx Inc.
SmartCamera+ Use Cases
Smart Building

• People counting
  • Office space rentals based on occupancy
  • Crowd / flow control

• Social Distancing monitoring
  • Assist in COVID distancing

• Surveillance
  • Intruder detection
  • Restricted area access control
Retail

- Theft Detection
- Precision Marketing
- Face Payment
- Inventory Management
Machine Vision

Ultra-Low Latency AI

Image courtesy: Xilinx Inc.