



S32V Series

# S32V234: 64-bit Multi-core A53 processor for vision and ADAS applications

## Product Summary

The NXP® S32V234 is a high-performance processor with the right set of features to support safe computation-intensive applications around vision and sensor fusion for transportation and industrial markets. It includes quad Arm Cortex®-A53 cores running at up to 1 GHz, dual APEX-2 vision accelerators enabled by OpenCL™ and OpenCV™, 3D GPU (Vivante GC3000), MIPI CSI2 and parallel image sensor interfaces, embedded ISP for HDR, color conversion, tone mapping, etc. and 4 MB on chip system RAM.

The S32V234 processor addresses ISO 26262 ASIL B/C requirements and includes the CSE2, a hardware security encryption module together with Arm TrustZone® technology that provides protection against IP theft and malicious hacking.

## 1 S32V234 Processor Specification Highlights

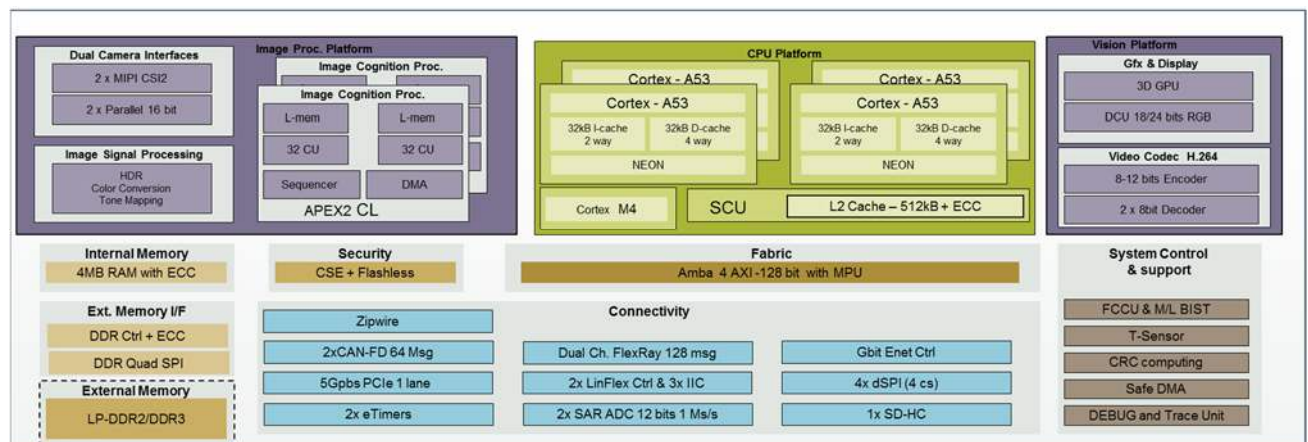
**High Performance Processing** – Up to Quad core Arm A53 600-1GHz Safe Clusters @ ~10000 DMIPS

**Vision Acceleration** – Dual APEX-2 image cognition processor cores enabled by OpenCV








**Automotive Safety** – Developed according to ISO 26262 standard reaching ASIL B and higher

**Security Enabled** – HIS-SHE compliant Crypto Service Engine optimized for flash less devices

## S32V234 Functional Block Diagram



# S32V Value Drivers

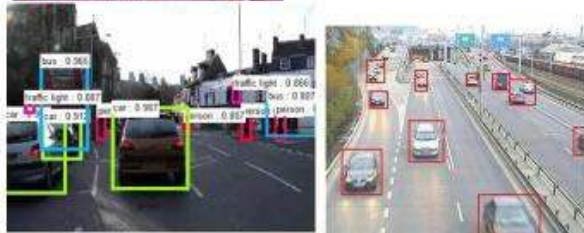
PERFORMANCE		POWER SAVINGS		SAFE & SECURE		
<b>QUAD 1GHz A53 Cores</b>  <ul style="list-style-type: none"> <li>~10k DMIPS</li> <li>800MHz option</li> <li>Dual core option</li> </ul>	<b>DUAL APEX Vision Accelerators</b>  <ul style="list-style-type: none"> <li>APEXCV support</li> <li>CNN Deep learning</li> <li>ID and Class.</li> <li>APEX graph tool</li> </ul>	<b>M4 Core for Functional Safety</b>  <ul style="list-style-type: none"> <li>ASIL-B Safety</li> <li>ISO26262 and IEC61508</li> <li>AutoSAR MCAL</li> <li>AutoSAR OS</li> <li>Sensor Fusion</li> </ul>	<b>Graphic Processing Unit (GPU)</b>  <ul style="list-style-type: none"> <li>GC3000 3D GPU</li> <li>4 shader</li> <li>Supports OpenCL, OpenVG, OpenGL</li> <li>Offload MPUs for graphic/HMI support</li> <li>Machine learning</li> </ul>	<b>Low Power Envelope 2-10W</b>  <ul style="list-style-type: none"> <li>Low power option</li> <li>&lt;7W non GPU with passive heatsink</li> <li>GPU enabled option &lt;10W</li> </ul>	<b>Encryption Security (CSE)</b>  <ul style="list-style-type: none"> <li>128bit encryption</li> <li>SHE compliant</li> <li>Secure Boot</li> <li>Trust zone</li> </ul>	<b>On-chip Image Signal Processor (ISP)</b>  <ul style="list-style-type: none"> <li>Reduce camera BOM for SVM</li> <li>ISP graph tool</li> </ul>

## 2 Target Application



**Surround View**  
**Front Cameras**  
**Rear Cameras**  
**Sensor Fusion**  
**Lane Departure**  
**360° Surround View**  
**Facial Recognition**  
**Optical Flow**  
**Traffic Count**  
**Autonomous Farming**

**Machine Vision**  
**Autonomous Drive**  
**Object Classification**  
**Pedestrian Detection**  
**Stereo Disparity**  
**CNN/DNN Neural Networks**  
**Drone / UAV Safety**



## 3 Part Attributes

### General Purpose Processing

- Two 2 x Arm A53 Safe Clusters
  - 64 bit, 1.0 GHz
  - 2 x 256 KB L2 cache per cluster
  - Neon SIMD
  - ~10,000 DMIPS
- 2 x 32b DDR3/LPDDR2 at 533 MHz

### Accelerated Processing

- Image Signal Processing

- 2 x APEX2 – Image cognition Processing  
Open CL
- h.264 Codec and MJPEG decoder
- 3D GPU GC3000 (4 Shader)

#### **Functional SAFETY**

- Classic ASIL B/C capable SoC
- LBIST, MBIST
- Voltage and temperature monitoring
- Full memory ECC, E2E ECC
- Software Core Self Tests
  - Software independent fault monitoring and reporting
- Safe DMA, CRC processing and MCAL

#### **High Speed Serial Interfaces**

- 1 PCIe controllers
- 1 dual channel FlexRay®
- 1 Zipwire
- 2 x MIPI CSI2 - 4 lanes 6 Gb/s

#### **Low Speed Serial Interfaces**

- 2 CAN –FD
- 4 SPI, 2 LinFLEX
- 4 x Timer
- FlexRay

#### **Security**

- 1 CSE3 – Flashless

## 4 Development tools and Ecosystem

### **Evaluation Boards / Hardware**

#### **SBC-S32V234**

- The SBC-S32V234 is a EVB consisting of
  - MPX-S32V234 is a SOM based adapter with the S32V234 MPU
  - CRX-S32V234 is the carrier board adapter that MPX-S32V234 plugs into

#### **OV10640CSP-S32V**

The OV10640CSP-S32V is a MIPI camera that features the OV10640 image sensor. This camera allows users to make full use of the ISP integrated in the S23V234 MPU.

#### **S32V234-EVB2**

The NXP S32V234-EVB2 is an evaluation system and development platform.

Features:

- Video input (VIU connectors, 2 x MIPI)
- Video Output (RGM to LVDS converter, RGB to HDMI converter)
- Ethernet and FlexRay
- Memory plus SD card slot

- Various Communication and General IO connectors
- Accelerometer and magnetometer plus gyroscope
- Expansion card options

### **MXOV10635-S32V**

The Maxim MXOV10635-S32V is a LVDS Camera that features the OV10635 image sensor which integrates an image signaling processor.

### **MAX9286S32V234**

The Maxim MAX9286S32V234 is a deserializer adapter for expanding 1x MIPI port to up to 4 LVDS cameras for surround view.

## **S32V Part Numbering FS32V234CON1VUB (Superset w/CSE security) FS32V234CMN1VUB (Superset w/no CSE)**

**Ordering Partnumber (always 16char)**

- F/P** Product status
- S32** Product Type/Brand = Automotive
- V** Product Line
- 2** Series/Family (incl. generation)
- 3** Core platform/ Performance indicator
- 4** Product (eg no of cores)
- C** Option #1: Speed
- M** Option #2: Config
- N1** Fab and Mask rev must be 2 max
- V** Temperature Suffix
- UB** Package Suffix
- R** Tape and Reel Indicator

**Product Status for ordering and marking**  
PS32 for prototype and FS32 for qualified ordering pn

**Examples**  
S32V234 (The S32V200 series)

**Options -**  
Option1: Speed (Number): B = 800MHz; C = 1GHz;  
Option 2: Config (Letter)  
Use a decoder to allow flexibility, example:

Config	ISP	3D GPU	CSE	LP
A	Yes	No	No	No
B		reserved		
C		reserved		
D		reserved		
E		reserved		
F		reserved		
G		reserved		
H		reserved		
I		reserved		
J	Yes	No	No	Yes
K	Yes	No	Yes	No
L	Yes	No	Yes	Yes
M	Yes	Yes	No	No
N	Yes	Yes	No	Yes
O	Yes	Yes	Yes	No
P		reserved		

**Series**  
S32V234 would be 2<sup>nd</sup> generation (after Monitor), hence V200.

**Core / Platform**  
Cortex A53 based

**Product**  
Quad core version = V234  
Dual core version = V232

**Temperature**  
C = -40C to 105C Tj  
V = -40C to 125C Tj

**Package Suffix**  
UB = 621 FC-BGA

**Tape & Reel**  
R = Tape & Reel  
T = Trays/Tubes in order to fill the 16 char

**Most Likely NCAP Front Camera (Low Power)**

Config	ISP	3D GPU	CSE	LP
J	Yes	No	No	Yes
L	Yes	No	Yes	Yes
N	Yes	Yes	No	Yes

**Most Likely Data Fusion (High Power)**

Config	ISP	3D GPU	CSE	LP
K	Yes	No	Yes	No
G	Yes	Yes	Yes	No

**Most Likely Surround View**

Config	ISP	3D GPU	CSE	LP
M	Yes	Yes	No	No
O	Yes	Yes	Yes	No

**Active Part numbers**

PS32V234CMN1AVUB
FS32V234CMN1VUB
FS32V234CON1VUB
FS32V234CKN1VUB
FS32V234BMN1VUB
FS32V234BJN1VUB
FS32V234BLN1VUB
FS32V232BMN1VUB