SBC-S32V234
QUICK START GUIDE (QSG)

Getting started instructions and a Guide to all Hardware, Software, Tools and Document resources

www.nxp.com/SBC-S32V234

EXTERNAL USE

SECURE CONNECTIONS
FOR A SMARTER WORLD

WHAT IS QUICK START GUIDE?

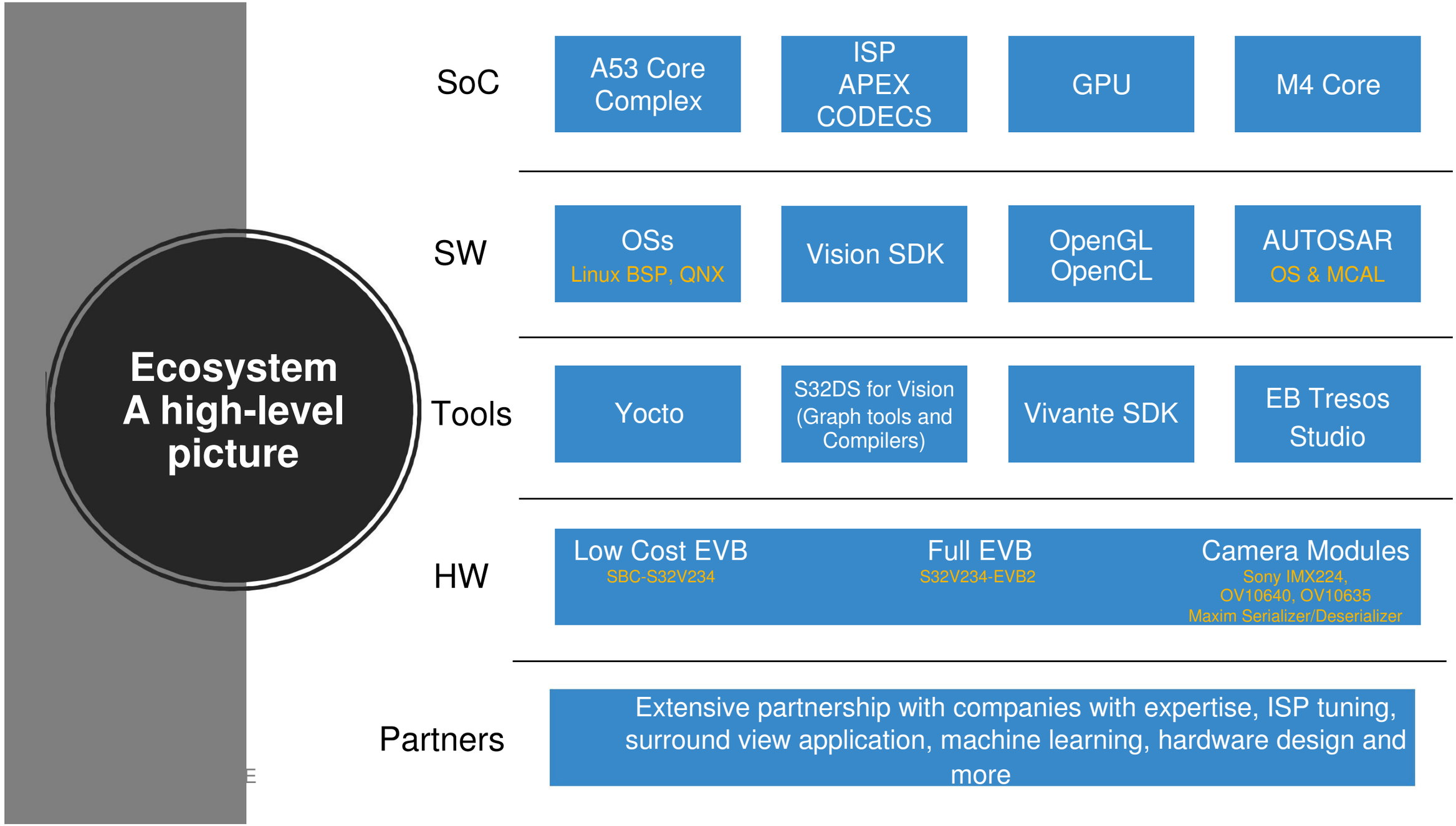
We at NXP continuously strive to provide an easy-to-use enablement package for our devices. This document serves as a launch-pad to navigate all essential resources that we provide to get started with S32V23x SoC and SBC-S32V234 board.

It also contains instructions to get started with SoC, the board and a complete ecosystem.

Contents

- Overview of a complete Ecosystem
- Out-of-box experience: SBC-S32V234
- Getting Started Instructions
- Resource Guide
  - Hardware resources
  - Software resources
  - Operating Systems
  - Drivers and other SWs
  - Tools
  - Documents

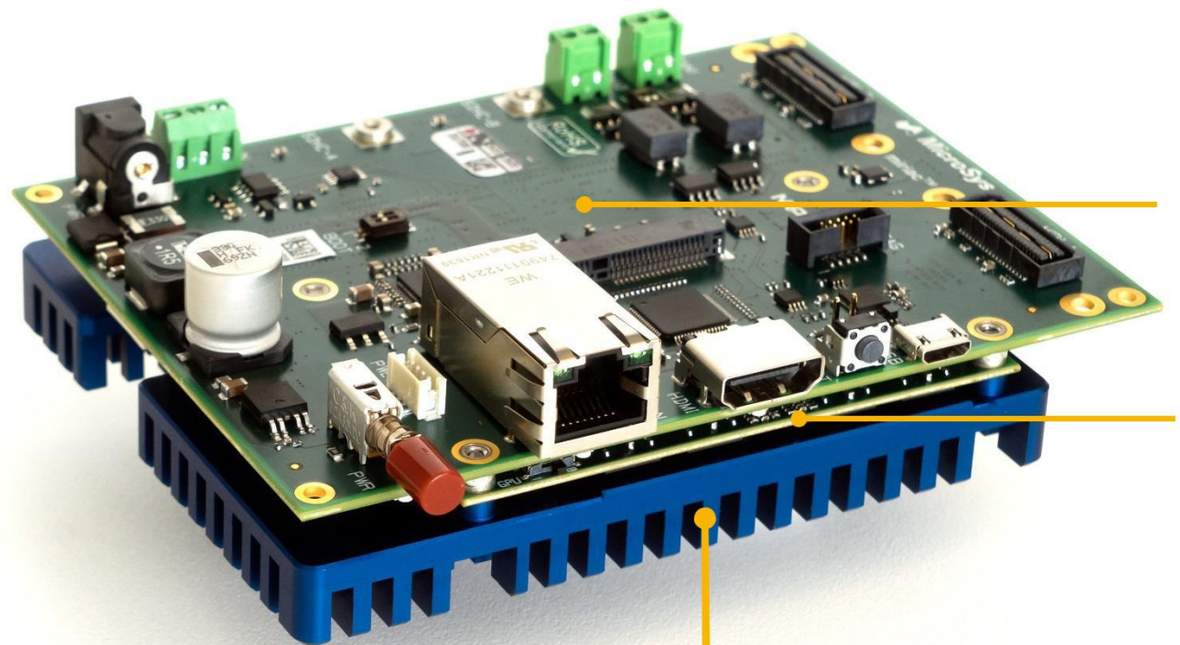
Ecosystem A high-level picture



Out-of-box experience: SBC-S32V234

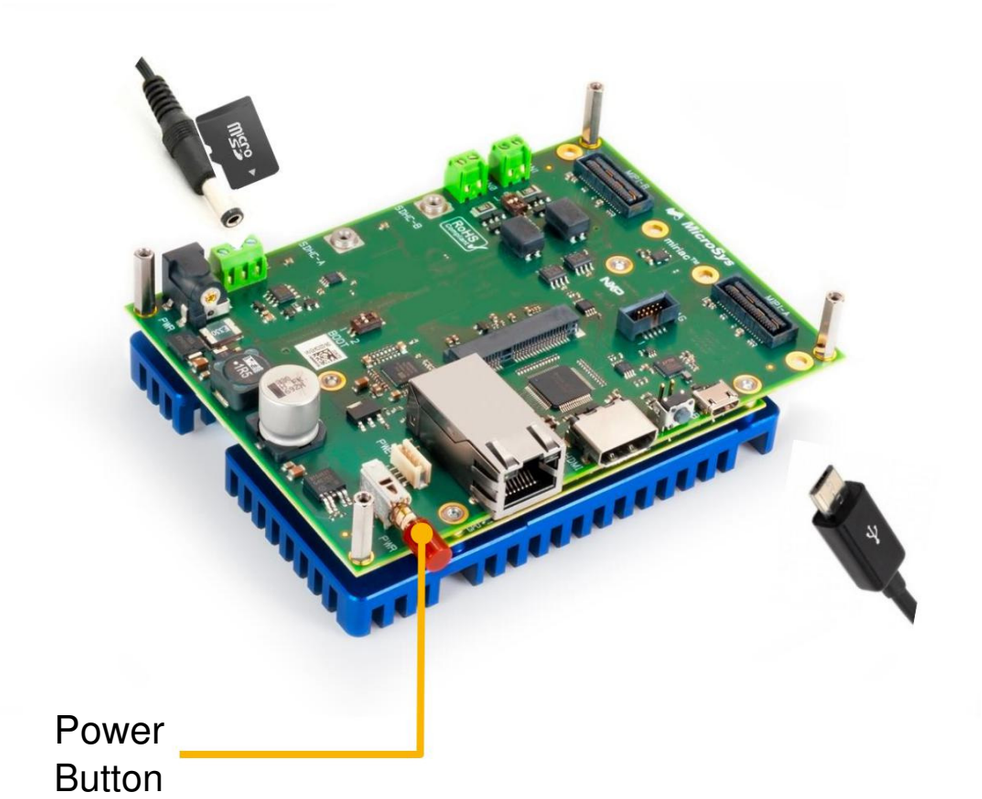
The SBC-S32V234 is a low-cost development platform for S32V234 vision processor.

SBC-S32V234 is a system-on-module concept developed by NXP partner, *MicroSys Electronics GmbH*. It comprises of a Module board mounted on a Carrier board. The module board contains S32V234 processor, external memories and power regulators for module, while the carrier contains all system specific peripherals like Camera Connectors, Ethernet, SD card slot, CANs, LIN etc. This arrangement gives customers flexibility of designing their own carrier board while still reusing the same module board.



MicroSys

Out-of-box experience: SBC-S32V234



1 Connect Power Supply and USB Cable

Connect board with 12V/2A DC power supply. Keep the board power off.
Connect one end of the USB cable to the PC and the other end to the micro-B connector on the SBC-S32V234 board. Allow the PC to automatically configure the USB drivers.

2 Install and Start Serial Terminal

Install and open any serial terminal (e.g. TeraTerm, Putty etc.).
Select the port where board is connected and configure it to 115200 baud rate, 8 data bits, no parity and 1 stop bit.

3 Insert the SD card and Power on the Device

The box contains SD card loaded with Linux BSP. Please make sure it is inserted into SD card slot.
Power on the device by pressing Power Button.
You can now see SBC-S32V234 booting U-boot followed by Linux in the terminal window.

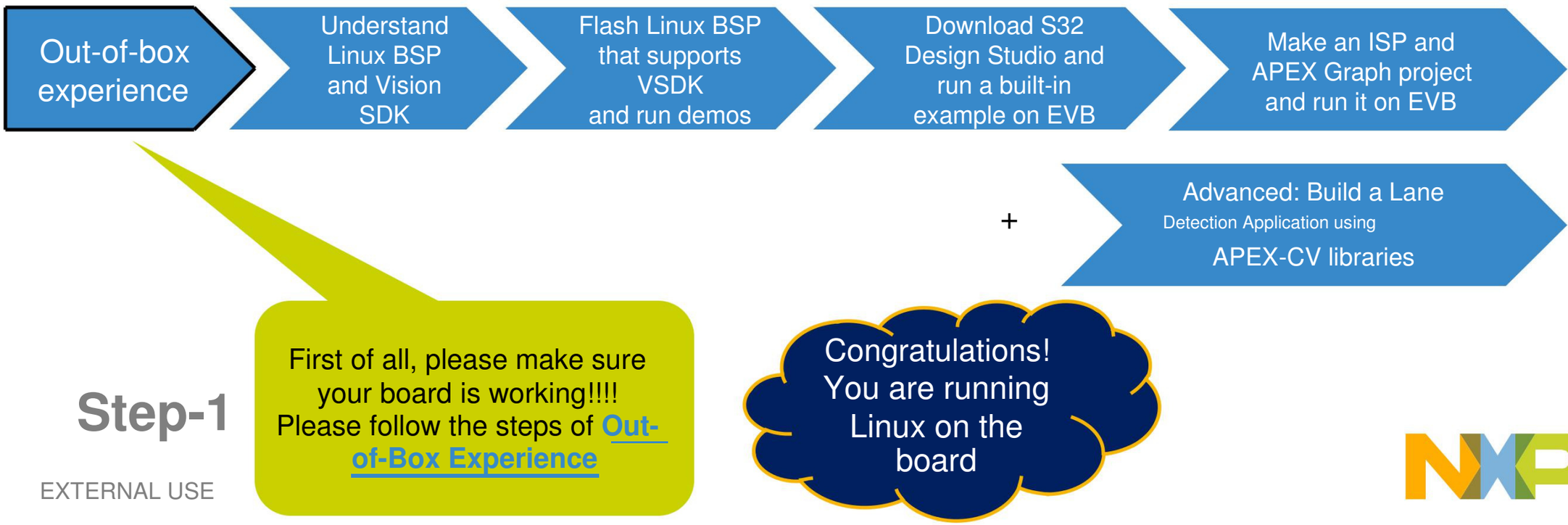
4 Learn More About the SBC-S32V234

Access release notes and documentation at
nxp.com/SBC-S32V234
nxp.com/S32V234

GETTING STARTED INSTRUCTIONS

How To Get Started?

- User often thinks …. **“from where should I start working with this device?”**
- In this section will walk you through the steps of “how to get started?”
  - We will start with the simple out-of-box experience and move forward by understanding different pieces of HW/SW one by one

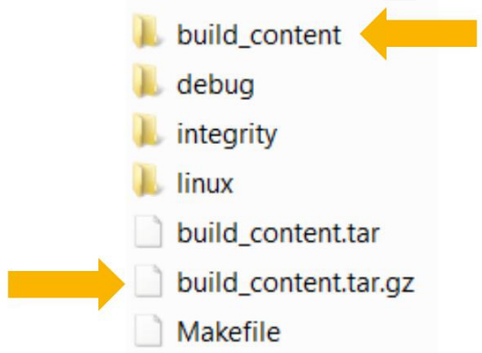


Understand Linux BSP and Vision SDK

- As a part of the complete ecosystem NXP's SW team has developed Linux Board Support Package(BSP) and Vision SDK(VSDK)
- Linux runs on S32V SoC and supports various NXP development boards
  - Using Yocto distribution, it can be customized to suit user application as well
- VSDK helps to develop vision processing applications that can run as a standalone program or on an OS (like Linux, QNX)
- To understand different components of Linux BSP and VSDK please read: **1_Understand_Linux_BSP_and_Vision_SDK.pdf** **(download Quick Start Package to locate this file)**

Run Linux BSP that supports VSDK

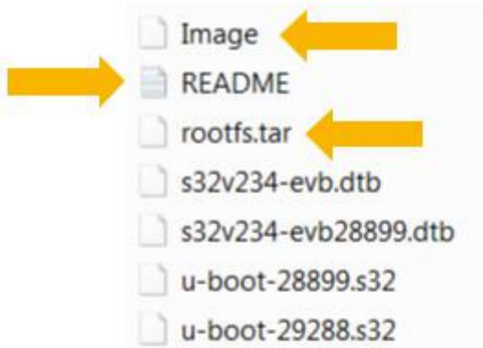
- The Linux BSP that comes with the SBC-S32V234 is Vanilla BSP and need to be changed with the customized Linux BSP that supports VSDK
  - This customized Linux BSP is inherited from the Vanilla BSP itself
- Let us get started with swapping Linux BSP in your SD-card
  - Download VSDK (contact your Marketer/Sales person to get an access)
  - Go to ***vsdk_installation_dir*/s32v234_sdk/os**
  - Unzip **build_content.tar.gz** and retrieve **buid_content** folder



Out-of-box experience | Understand Linux BSP and Vision SDK | **Flash Linux BSP that supports VSDK and run demos** | Download S32 Design Studio and run a built-in example on EVB | Make an ISP and APEX Graph project and run it on EVB

Run Linux BSP that supports VSDK

- Go to **build_content/v234_linux_build** folder
  - Here, you can find the different components of Linux BSP customized to support VSDK
    - Follow the instructions in **README.txt** file to flash SD-card
    - **Note:** U-boot and dtb files available in this folder are for the other NXP EVBs. For SBC-S32V234 EVB use the u-boot dtb files provided by your marketer/sales person/application engineer.
    - **Note:** Use the Image and rootfs from this folder.



Run Linux BSP that supports VSDK

- Once you followed the steps, SD-card is ready. You can insert it into the board and boot the linux!
- You can go to **home/root/vsdk** directory and can run precompiled demo applications
  - Do not forget to connect cameras and screen according to application function!

```
root@s32v234evb:~/vsdk# ls
apex_add.elf                        apex_integral_image_cv.elf      apexcv_pro_affine.elf           apexcv_pro_hough.elf            apexcv_pro_remap.elf            isp_ov10635_viu_dcu.elf         multi_thread.elf
apex_downsample_upsample_cv.elf     apex_isp_face_detection_cv.elf  apexcv_pro_aggcf.elf            apexcv_pro_image_pyramid.elf    apexcv_pro_tmo.elf              isp_ov10640_quad.elf            neon_eigen_add.elf
apex_emulation_test.elf             apex_isp_fast9.elf              apexcv_pro_blockmatching.elf    apexcv_pro_image_pyramid_multi.elf  data                        isp_sonyimx224_csi_dcu.elf      neon_fftw_cv.elf
apex_face_detection_cv.elf          apex_isp_ldw_cv.elf             apexcv_pro_brief.elf            apexcv_pro_laplacian_pyramid.elf  encoded_stream.h264           isp_sonyimx224_default.elf      neon_gauss3x3_cv.elf
apex_fast9_cv.elf                   apex_isp_segmentation.elf       apexcv_pro_canny.elf            apexcv_pro_lbp.elf              gdc_cppunitapp.elf              isp_sonyimx224_h264enc.elf      web_server.elf
apex_gauss5x5_cv.elf                apex_orb_cv.elf                 apexcv_pro_fast.elf             apexcv_pro_lkpyramid.elf        hello.elf                       isp_sonyimx224_rgb_yuv_gs8.elf
apex_histogram_cv.elf               apex_roi_cv.elf                 apexcv_pro_gftt_corners.elf     apexcv_pro_lktracker.elf        isp_h264dec_single_stream.elf   isp_stereo_apexbm.elf
apex_indirect_input_cv.elf          apexcv.elf                      apexcv_pro_hog.elf              apexcv_pro_orb.elf              isp_jpeg_4stream.elf            isp_stereo_calib.elf
```

Download S32 Design Studio and run a built-in example on EVB 1 of 2

- Now that we have our device up and running, the next step is to start the application development.
- To aid the developer, NXP provides a free IDE called ***S32 Design Studio for Vision (S32DS for Vision)***
  - It includes:
    1. Support for Standalone & Linux Application Development
    2. Integrated Vision SDK
    3. Integrated APEX and ISP graph tools
    4. Built-in Compilers (e.g. GCC, NXP's APEX compiler)
    5. 3rd party SW support (e.g. OpenCV)
    6. Built-in demos

    and many more…
- Let us get started with S32DS for Vision

Download S32 Design Studio and run a built-in example on EVB 2 of 2

- In this part we will download the S32DS for Vision, import a build-in example and run it on SBC-S32V234 board
- Please follow the steps below…
  1. Download S32DS for Vision from here. (you can find download instruction under the DOCUMENTATION tab)
  2. Open S32 Design Studio and make a new workspace
  3. You can see a "**Getting Started**" page
     - Please Navigate to **Documents** tab and follow instructions of "**HOW TO**" documents listed below, one-by-one
       1. ISP: Create An ISP Project From Example in S32DS for Vision.pdf
       2. EVB: Setup S32V234 EVB for debugging with S32DS for Vision and Linux BSP.pdf
       3. EVB: S32V234 EVB Linux setup static IP address.pdf
       4. DEBUGGING: Setup A Remote Linux Connection in S32DS for Vision.pdf
  4. Congratulation! You have just compiled, debugged and ran you first program using S32DS for Vision

- Explore Documents, Videos and Tutorials in S32DS to learn more about S32DS for Vision

Out-of-box experience | Understand Linux BSP and Vision SDK | Flash Linux BSP that supports VSDK and run demos | **Download S32 Design Studio and run a built-in example on EVB** | Make an ISP and APEX Graph project and run it on EVB

Make an ISP and APEX graph project & Run it on EVB

- After becoming an Expert with S32DS for Vision, let us move forward with Visual Graph Tools integrated into S32DS for Vision
  - APEX and ISP visual graph tools provide easy to use graphical interface to develop vision pipeline for this dedicated vision accelerators on S32V
  - Code generated from APEX and ISP graph tool can be used in any application developed with and without IDE
- Please follow the Tutorials below to learn *"how to use visual graph tools?"* (both tutorials can be found in quick start package and S32DS for Vision)

  2_ISP_graph_tool_in-depth_tutorial.pdf

  3_APEX_graph_tool_in-depth_tutorial.pdf

Build a Lane Detection Application using APEX-CV libraries

- Let us create a “**Lane Detection Application**” using APEX-CV libraries
- Please follow instructions in the tutorial below

  4_APEX_CV_Lane_Detection_Application.pdf

RESOURCE GUIDE

Hardware: SBC-S32V234

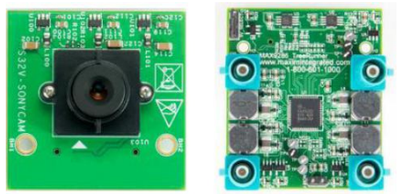
- *List of necessary documents and files for SBC-S32V234*

Document Type	Document Name	Description
Hardware User Manual	User_Manual_SBC_S32V234.pdf	This document describes all components and connections on EVB
Hardware MCU flow diagram	MCU_FlowDiag_SBC_S32V234.pdf	Walks through the flow of MCU execution that brings up & watches the power supplies, detect & handles reset and provides RCON configurations
Schematics	Schematic-Module-S32V-R2.pdf	Schematic for module board that mounts S32V234 processor, memories, control MCU etc.
	Schematic-Carrier-S32V-R2.pdf	Schematic for carrier board that incorporates all peripherals like Ethernet, MIPI connectors, CANs, LINs etc

Download: **www.nxp.com/SBC-S32V234 >> DOCUMENTS**

Hardware: Camera Modules

- *Description of supported camera modules*



Camera Module	Documents	Description
S32V-SONYCAM	Sensor: Contact Sensor manufacturer Schematics: Contact Module manufacturer	MIPI based camera with Sony IMX224 sensor
MXOV10635-S32V		OmniVision 10635 camera with serializer
OV10640CSP-S32V		OmniVision 10640 camera with serializer
MAX9286S32V234		Maxim 9286 deserializer board for above 2 cameras

Software

- *List of supported Operating Systems*

OS	Description
Linux BSP	Linux Board Support Package with fully configurable Yocto Distribution
AUTOSAR	AUTOSAR OS 4.2.1 is available only for Cortex-M4 core and MCAL 4.2 is available for both Cortex-M4 & Cortex-A53 cores
QNX	Visit BlackBerry QNX for more information

Get Linux BSP & AUTOSAR: **www.nxp.com/softwarecenter >> Automotive Software**
Getting trouble: **Contact your NXP Marketer/Sales Person**

Software

- *List of NXP developed important software*

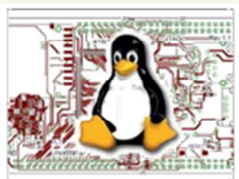
Software	Description
Vision SDK	Vision SDK contains necessary libraries and tools essential to the vision processing. It enables programming of on-chip vision accelerator IPs. Works with Linux BSP and QNX
AVB Video Listener	Driver to receive AVB streams from cameras connected through Ethernet
Structural Core Self Test Library	Structural Core Self Test libraries for M4 & A53 cores and Neon
MBIST Manager	Driver to for dedicated Memory Built-in Self Test IP in SoC
sBoot	sBoot is a software checking whether the device booted to a safe configuration
Security Firmware	Security Firmware for SoC integrated hardware security module - CSE3

Get all: **www.nxp.com/softwarecenter >> Automotive Software**
Getting trouble: **Contact your NXP Marketer/Sales Person**

Tools

- List of supported *NXP* or *3rd party* tools

Tool	Description
Yocto Project	An open source collaboration project that provides templates, tools and methods to help you create custom Linux-based systems for embedded products regardless of the hardware architecture
IDEs	NXP S32 Design Studio for Vision(S32DS for Vision) Elektrobit Tresos Studio, Green Hills MULTI
Compilers	GCC or other ARM compilers for ARM cores NXP compiler for APEX2 accelerator (integrated in S32DS for Vision and Vision SDK) Synopsys compiler for APEX2 accelerator
Debuggers	P&E Multilink/Cyclone Lauterbach TRACE32
Vivante SDK	Vivante SDK can be integrated with Linux for GPU programming



Elektrobit

PE micro

Green Hills SOFTWARE

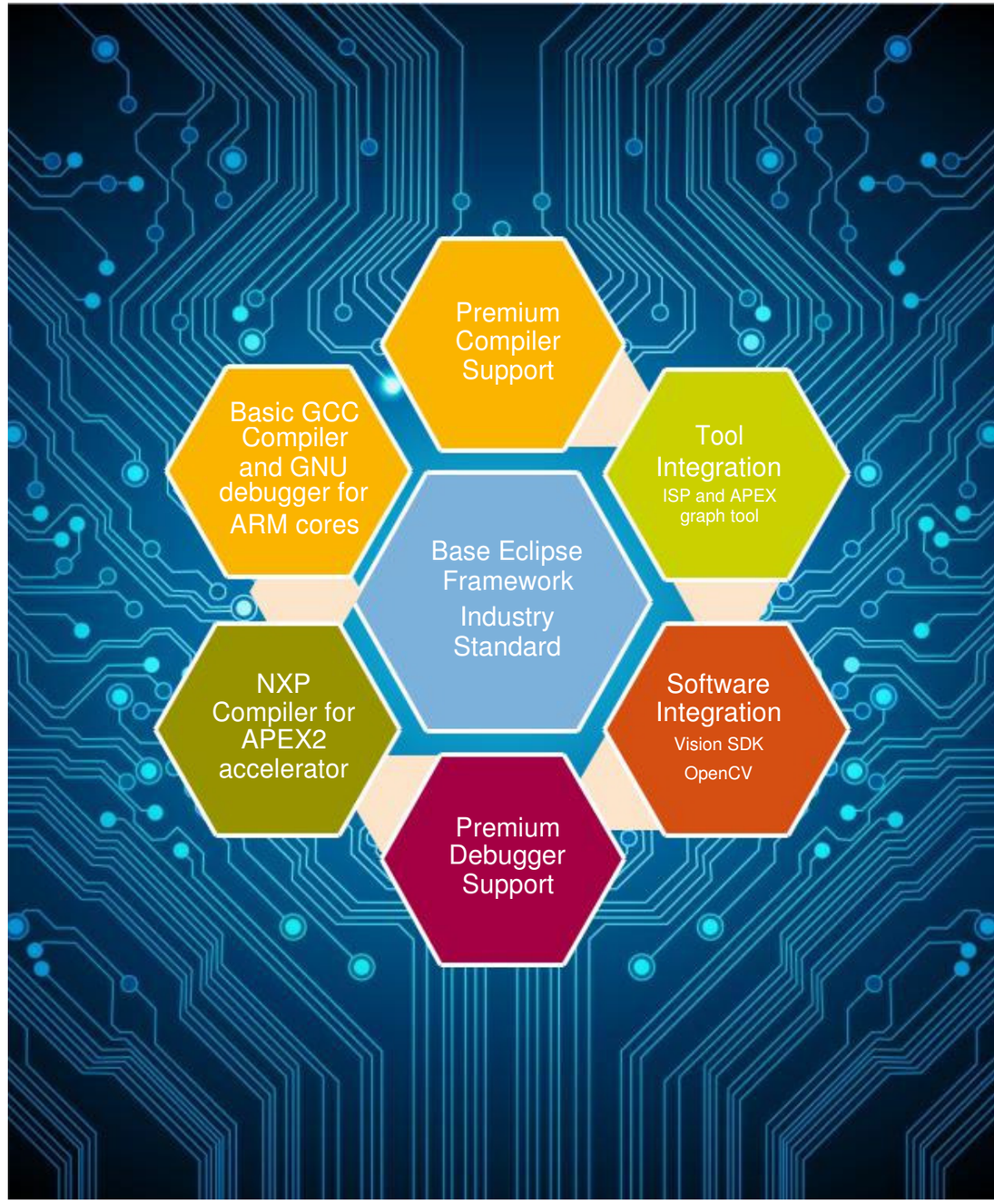
LAUTERBACH DEVELOPMENT TOOLS

VIVANTE

Get S32DS for Vision: **www.nxp.com/s32ds >> DOWNLOADS**

Tools: S32 Design Studio for Vision

- **An eclipse based IDE for S32V234**
  - Eclipse Neon 4.6 Framework
- **Tool-Chain:**
  - GNU Tool-chain for ARM® Embedded Processors (Launchpad) build (4.9.3 20150529)
  - ARM64 Compiler: GCC Compiler 4.9
  - APEX2 Compiler: NXP APU compiler
- **Debuggers:**
  - P&E Multilink/Cyclone (with P&E GDB Server)
  - Lauterbach TRACE32 support by New Project Wizard
- **Software Integration**
  - Fully integrated Vision SDK
  - OpenCV
- **Tool Integration**
  - Visual Graph tools for ISP and APEX2 program development
  - DDR configuration and validation tools



Documents: SoC

- *List of SoC specific documents*

Document	Description
Fact Sheet	High level information of SoC
Data Sheet	SoC datasheet for Electrical and Physical characteristics
Reference Manual	Detailed manual for SoC IPs
Safety Manual	A guide for safety system developers to build safety-related systems using the safety mechanisms of the S32V234
Errata	List of errata for SoC with bug fixing solution

Get all: **www.nxp.com/s32v >> DOCUMENTATION**

Documents: Tutorials and others

- There are many tutorials available to get started with S32V234, easily and smoothly
- Here is the list of available resources…..

Document	Description
Understand Linux BSP and Vision SDK	
APEX VGT Tutorial	Get: www.nxp.com/SBC-S32V234 >> Documents >> *Quick Start Package*
ISP VGT Tutorial	
APEX-CV Tutorial	
HOW TO Docs/Videos	Get: open S32 Design Studio for Vision >> Getting Started (page) >> DOCUMENTATION/VIDEO
Application Notes	Get: www.nxp.com/SBC-S32V234 >> Documents

Looking for Support? : nxp.com/support

NXP has dedicated teams of experts to handle support questions

- Technical Communities:
  - We highly recommend to reach NXP community first for technical support, so that all users can benefit from questions you ask
  - This way is faster too.
  - Useful community links:
    - S32V234
    - S32 Design Studio

- Support Requests:
  - If you do not want to discuss particular question on community, you can raise a support ticket

- Chat:
  - All non-technical questions can be answered by a live Chat

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