

# Sundance Multiprocessor Technology Limited

## EVP6472 Intech Demo

<b>Unit / Module Description:</b>	Capture Demo For Intech
<b>Unit / Module Number:</b>	EVP6472-SMT909
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# EVP6472 Intech Demo

## Abstract

PAL camera demonstration based on EVP6472 and SMT909

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Certificate Number FM 55022

# 1. Features and Requirements

## To run the application:

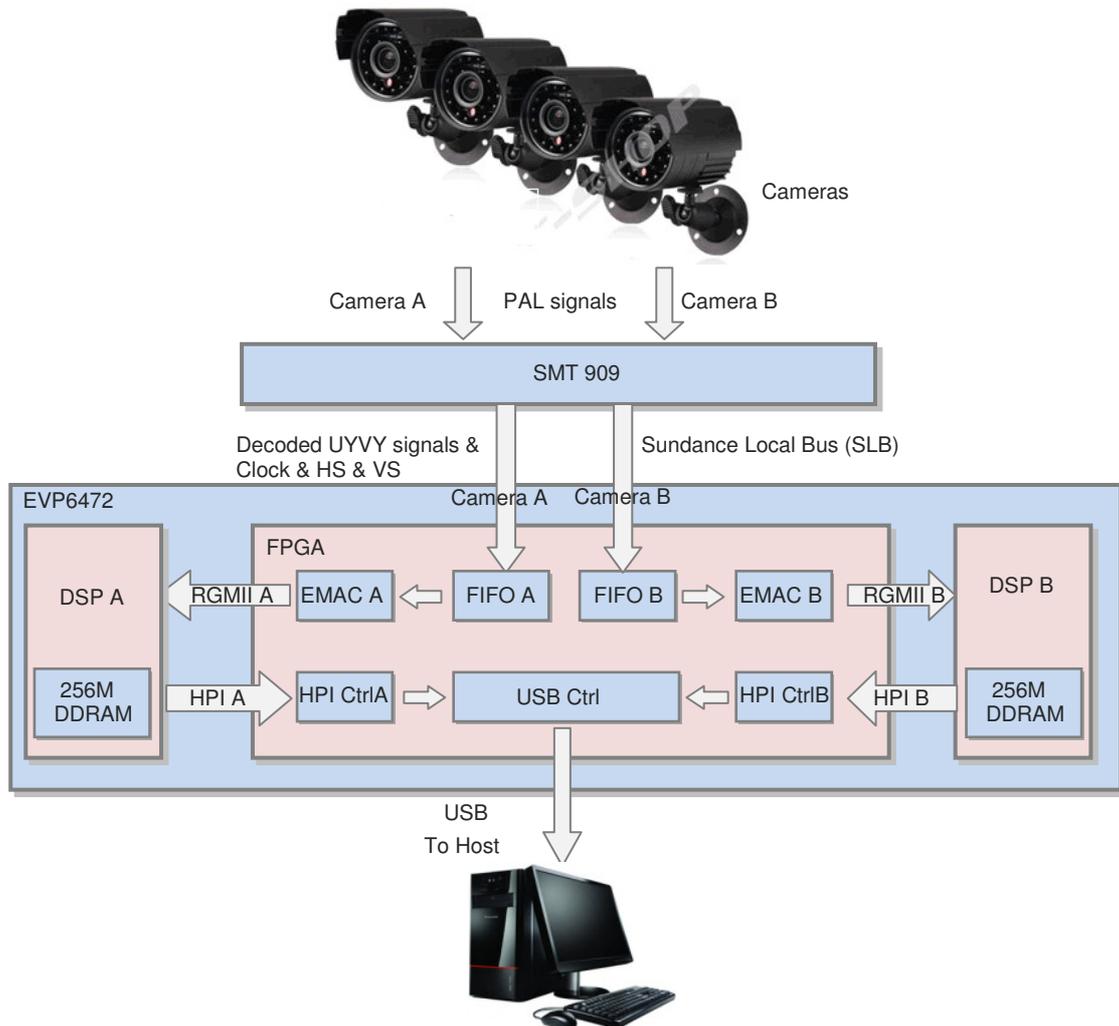
1. PAL: 628(H) x 582(V) Camera x2
2. Sundance hardware:  
SMT372T, SMT111 and SMT909
3. Sundance Software:  
SMT6002 (flash programing) and SMT111 driver
4. Cables:  
SMT507-BNC cable (MMCX –BNC) x2  
USB cable x1  
SMT111 power cable x1  
Xilinx JTAG cable x1

## To develop the application

1. Xilinx software tools: Xilinx EDK, SDK (12.3)
2. Taxes Instrument software tools: Code Composer Studio (CCS) (4.24)
3. Visual Studio 2008 (Compiled in WindowsXP OS)

\*Source code is generated with the version in the bracket

## 2. Data Path



1. Two cameras PAL signals are sent to the SMT909 decoder
2. The SMT909 decodes the CVBS signal to YUV 4:2:2 (UYVY) data and sends it to the FPGA via the Sundance Local Bus (SLB)
3. The FPGA separately captures frames from two cameras and then buffer them in two FIFOs. Once the received data size meets the Ethernet package size, the data in FIFO is transmitted to DSP via the RGMII link.
4. The DSPs receive the pixels and stores it in their 256M DDR RAMs.
5. The frames stored in the DDR RAM can be read through Host-Port Interface (HPI) by the FPGA, and sent to the host PC through the USB cable.

### 3. How the system works

After device configured:

1. After boot, the FPGA is automatically configured by the bitstream in the flash memory. The FPGA is configured as an embedded processor (MicroBlaze), and its peripherals used for accessing various interfaces.
2. MicroBlaze reads the DSP code from Flash memory.
3. MicroBlaze writes the DSP code to the DSP program memory through the HPI interface.
4. MicroBlaze sets up the DSP configuration through HPI interface.
5. MicroBlaze resets and starts the DSP.
6. MicroBlaze configures its camera capturer peripheral e.g. EMAC package size and package numbers.
7. MicroBlaze configures the video decoder on SMT909 through I2C bus, and then starts the frame capturing.
8. After one package size of data is sampled, the camera capturer starts one EMAC transmission to transmit the received data to the DSP.
9. After the all required frames are transmitted, DSPs can start to process the data, e.g. video encoding/ compression/ optimization.
10. Once requested by the host, the video stored in the DDR RAMs can be read through the HPI and transmitted to the host PC via USB.
11. The Host PC saves and formats the incoming data (RAW YUV video), which can be viewed YUV player (provided with the demo).

## 4. How to run the demonstration

Every time the EVP6472 boots up, it is self configured by loading the application code (bitstream for the FPGA and binary code for the DSP) from the flash memory. Therefore we need to program the flash for the very first time.

After flash programmed, the EVP6472 automatically starts working every time it boots up.

### 4.1 First time flash programming/recovery

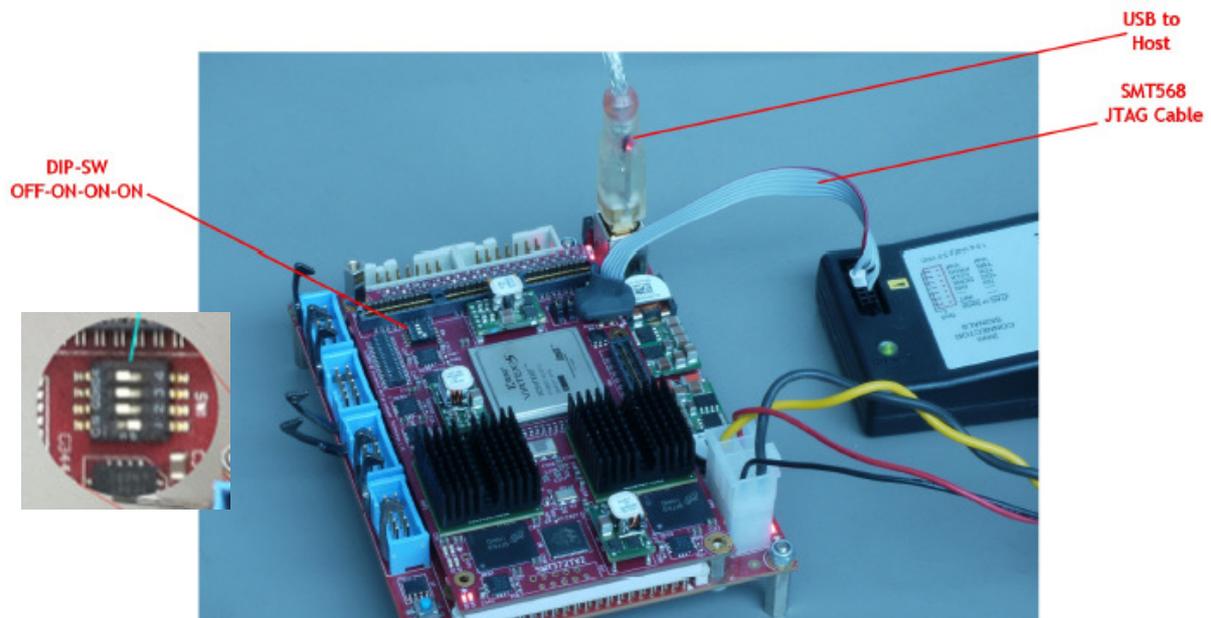
To program the flash, we use JTAG to load the bitstream to the FPGA, which communicates with the host through the USB.

The bitstream used for programming flash is the same one used for our normal application. It performs one of the actions depending on the first bit of the DIP switch (1 for programming flash and 0 for normal application). To programme the flash, steps are followed.

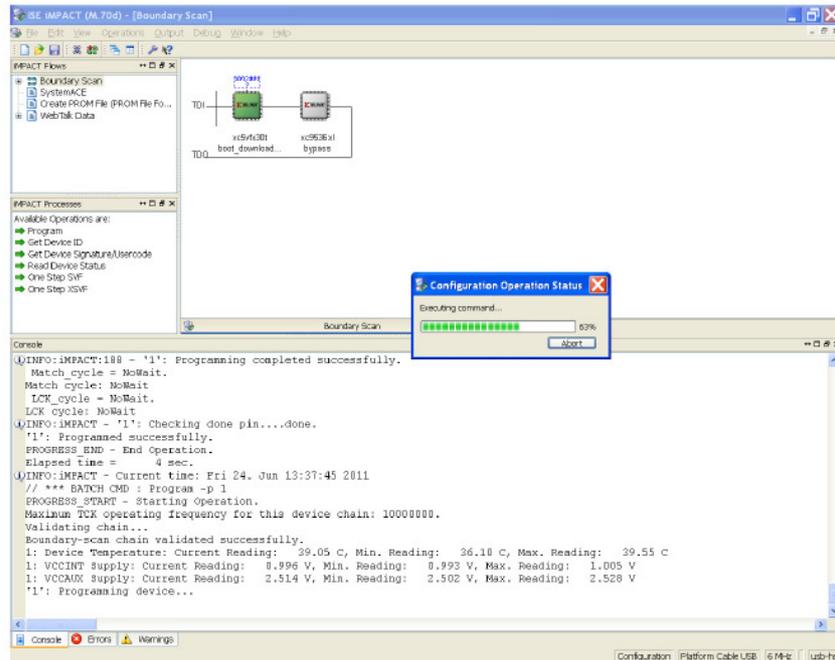
Ensure that the DIP-SW is set as shown above (position 1 OFF, the others ON).

Connect the USB cable from the SMT111 to the Host PC.

Connect the Xilinx programming pod to the SMT372T using an SMT568 JTAG cable.

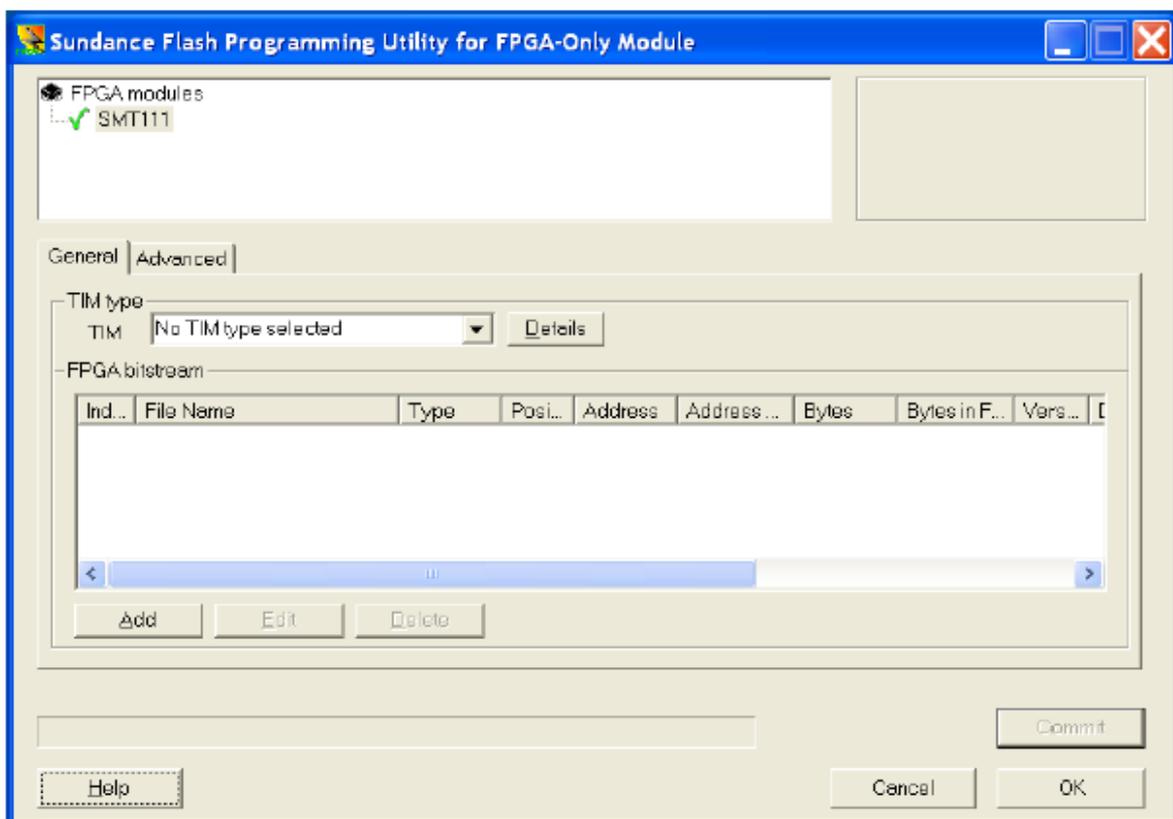


Run Xilinx impact programming tool and select boot\_download.bit as the configuration file for the XC5VFX30T of the SMT372T.

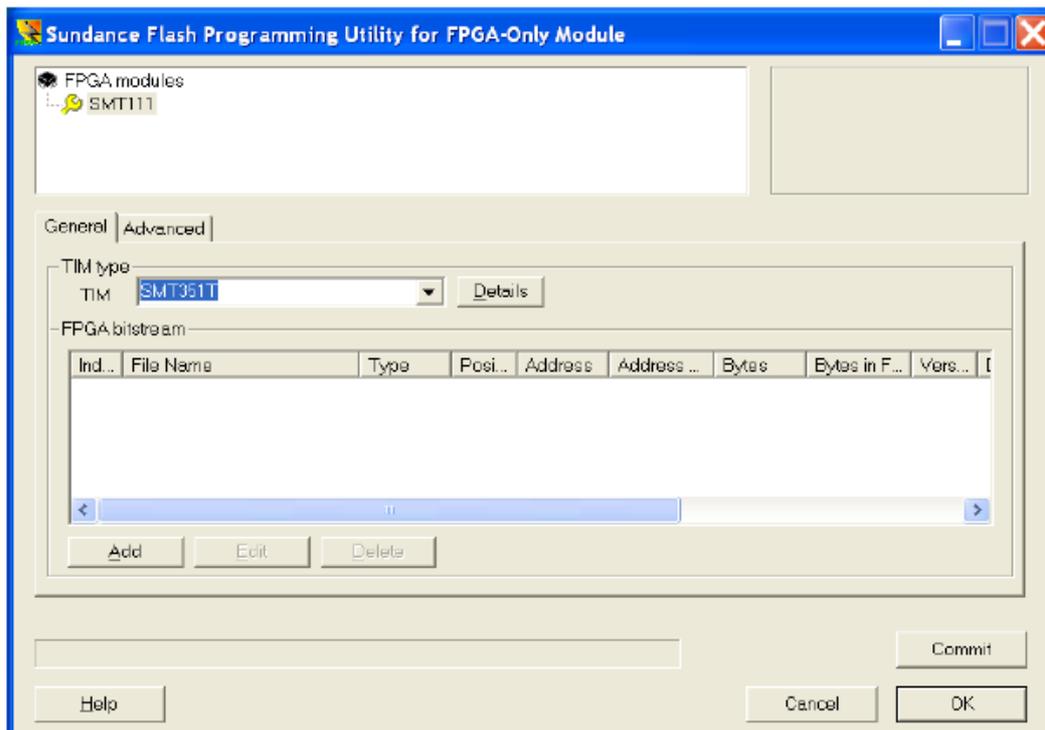


Configure the FPGA. When configuration is complete press the reset button on the SMT111. Do NOT power off the EVP system.

Run the SMT6002 application.



Select the TIM type as SMT351T.

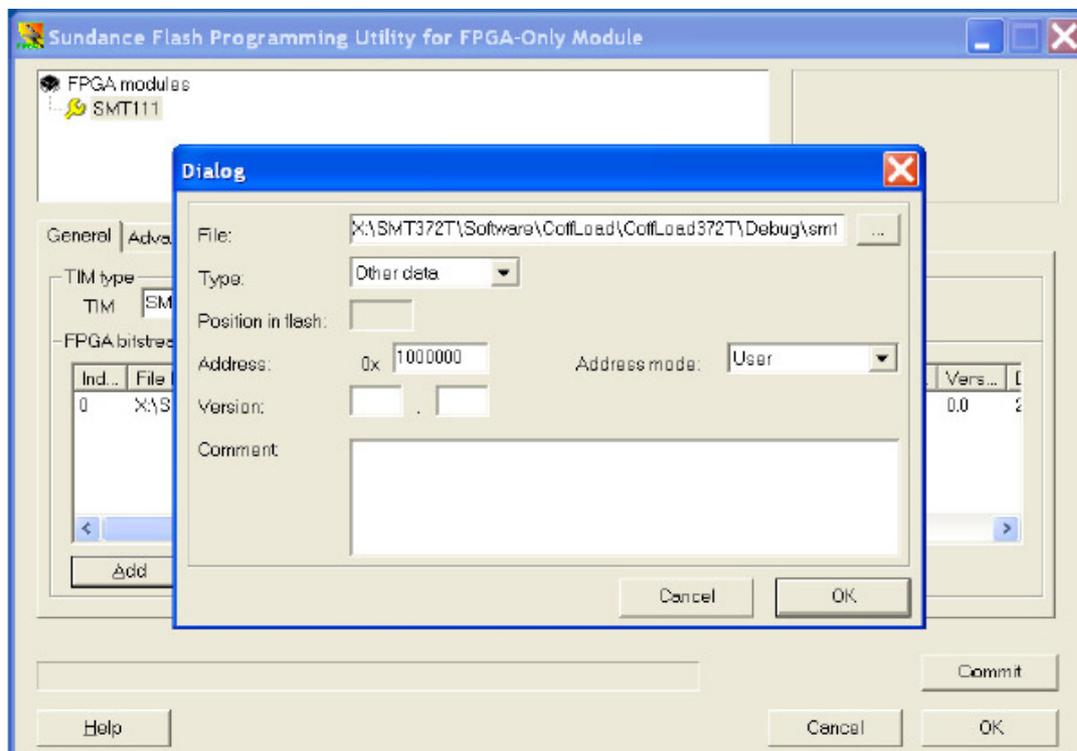


Add the “FPGA.bit” bitstream:

Type: Bitstream; address 0x0; address mode: basic.

Then add the “DSP.bin” DSP application:

Type: other data; address 0x1000000; address mode: user.



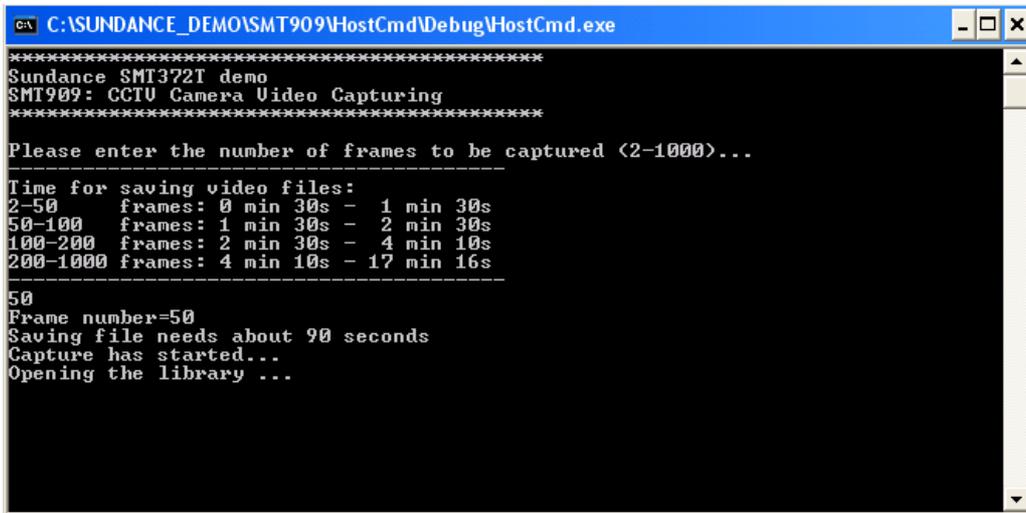
Click OK, then Commit. When programming has finished close SMT6002.

## 4.2 Run the application

1. Set the DIP-SW as “1111” for normal application.
2. Power off the board, plug in SMT909, and connect with the camera cables, as shown in the picture.
3. Power on the board, press the reset button to reset the DSP (if success, ALL of the 4 LEDs should flash for 1 second).



- Run the host program (HostCmd.exe), select the video size, after the command window close, two video files (clip\_a.yuv and clip\_b.yuv) should be generated.



- Install the provided YUV player (or other player).
- Open the video file, set the video size to: 768 x 576, UYVY pixel format, 0 byte header size, and choose your preferred FPS (frame per second) to play the video

