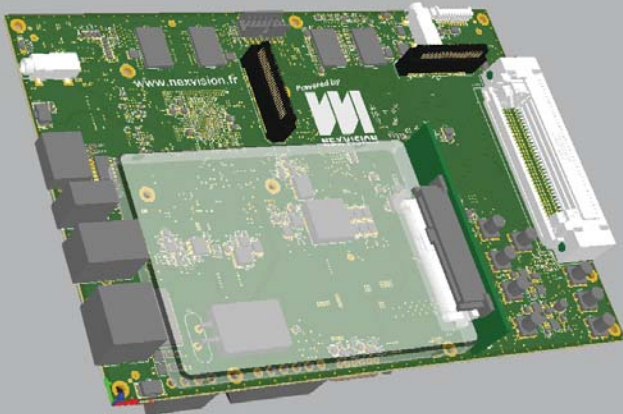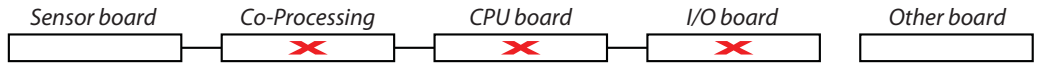# NEXVISION
## eyetronic

**1**

**Video camera processing and capture**
**World highest embedded video processing power**
**(TI's best DSP + best Xilinx FPGA based pre-processor)**

| Sensor board | Co-Processing | CPU board | I/O board | Other board |
|---|---|---|---|---|
| | **X** | **X** | **X** | |

**H264** *AVC*™
*Full HD* | *X-HD*™

**TEXAS INSTRUMENTS** DaVinci

**XILINX**®

# CAM MASTER

## Camera Processor

**DaVinci™ DM8148 + XILINX KINTEX 7**

## Reference Design

DSP TEXAS INSTRUMENTS TECHNOLOGY   ARM POWERED

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IMAGE SENSOR BOARDS

CPU BOARD

**FPGA**
video processing

TI Davinci
**DM8148**
HD H264 encoding & analytics

I/O BOARD

PCIe, SATA Disc
2 x SD Card
I2C, SPI, RS 232 + GPIO
HDMI 1.3 Full HD
6G-SDI, Coax Press
USB3.0, USB2.0
Audio
Giga Ethernet

**6G-SDI**

**PCI EXPRESS**™

HI-SPEED CERTIFIED **USB3.0**

**CoaXPress**

**HDMI**™
HIGH DEFINITION MULTIMEDIA INTERFACE

## OVERVIEW

- Nexvision's CAMMASTER smart camera is a complete video camera reference design
- Designed for 3.6 GigaPixel/s processing capability
- On-board video analytics (TI's DaVinci™ DM8148)
- Embedded Linux dedicated distribution

## HIGHLIGHTS

- Multiple extra high resolution independent video inputs from 2 (Full-HD) to 20 (X-HD™) megapixels
- H264-MP codec : HD1080P@60fps
- On-board dedicated video enhancement image pipe (HDR, FPN, Noise reduction, EDoF), Nexvision's IP: «PIXIP»
- GigaEthernet, USB2.0, USB3.0, SATA, Coax Press, 6G-SDI, Audio, HDMI video output, PCIe, SPI, I2C, RS232
- Video analysis framework (third party accessible)
- Onboard video recording and meta data storage (SSD or SD)
- Onboard streaming server based on our NexStream
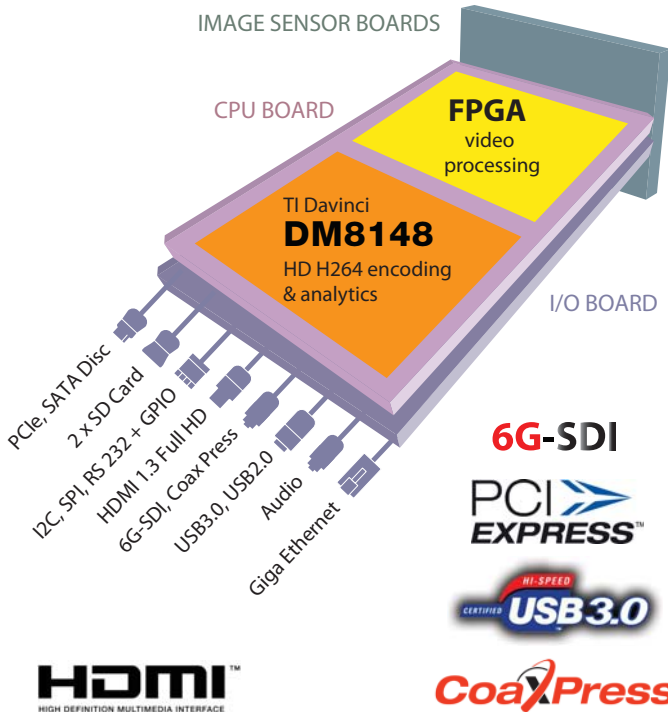
## REFERENCE DESIGN PROCESS

**1** Order a Nexvision Reference Design

**2** Update your Specifications

**3** Get your camera Ready to sell

## Features

* Extra high resolution from 2 megapixels (Full-HD) to 20 megapixels (X-HD™)
* Full framerate, high quality video encoding
* On-board high-end FPGA with two DDR3 SDRAM banks, dedicated to video enhancement and advanced video processing (NexVision's IP : «PIXIP»)
* 2x165 megapixels/s MSOC's video processing pipeline, two dedicated DDR3-SDRAM bank
**Codec (DM8148)**
* H264-Main Profil for minimal storage size and bandwidth :
120M pixel/s - Full HD 1080P (2 M pixels @ 60fps)
* Optional video codec : Motion-JPEG, MPEG4-part2, RGB444 , YUV422, RAW
**Image pre-processing (FPGA)**
* Media processor image processing pipe
* Advanced 12-bit based color processing for high fidelity color reproduction (3D LUT)
* Temporal noise filtering and contrast enhancement
* Multiple exposure blending provides realtime HDR for high details retention in low and over exposed area
* Super resolution
**Multisensor capable**
* Multispectral band image sensor fusion (Visible, Short Wave IR, Thermal IR)
* Multisensor panoramic or 360° immersive video realtime on board unwarp
**Audio/Video Streaming**
Live video streaming
Full Duplex Audio
**Open onboard video analysis,** for exemple :
Video analysis framework, third party accessible, with 100% dedicated DSP (C674)

## Software Development

Embedded Linux own distribution based on Linux 2.6.37, U-boot bootloader
Nexvision's multimedia framework
Multiple path video processing pipeline for simultaneous :
* multiple resolution
* multiple compression codec
* third party accessible video analysis and painting
Embedded NVR (Network Video Recorder) concurrent recording & streaming :
* RTP/RTSP/RTCP Video Streaming onboard server is standard compliant
* It also support real time bandwidth adjustment (from 40K up to 25Mbit/s),
* Video stream encryption (128 bits AES) when used with NexStream™ technologies
* HTTP server (only for Motion JPEG streaming)
DSP Integration with TI codec engine framework

## System

MSOC : Texas Instrument DaVinci DM8148 media processor
High multimedia computing power (4GOPS integer/float DSP +
1080P60 H264 Video Codec IP + ARM CortexA8@1Ghz)
NAND FLASH : 512MBytes
DM8148 DDR3-SDRAM : 512MB (up to 1GB)
FPGA : NexVision's IP video pre-processor front-end with 2 x 256MB dedicated DDR3-SDRAM banks
Integrated hardware watchdog
Backed up Real Time Clock

## Remote Management

Compatible with any H264 RTP/RTSP compliant client like VLC, NexRMC*,
Compatible with any MJPEG HTTP compliant client like VLC, NexRMC*,
NexRMC is our Remote Media Center software, from our video management system NexVMS
NexRMC is our top edge software supporting CAMMASTER's advanced features like X-HD™ resolution, sensors monitoring, firewall pass-through,
Innovative search in recorded video content, intuitive and user configurable interface
Web-based management, configuration and viewer

## Network

Gigabit Ethernet 10BaseT/100Base/1000base TX - RJ-45 connector
Wireless : WIFI (802.11ac/n/g) optional via USB2.0 ports + Zigbee™ for remote control

## Storage

SATA3 or 4 x line PCIe gen3 (FPGA) : SSD (NVMe) - Expansion connector
SATA link (DM8148) : hard drive or SSD for low speed (<400 Mbits/s) on board storage
SD card x 2 (1 x microSD (on Main board) +1 x standard SD (on IO board))
USB compliant Storage : Flash Disk on USB Key (USB2.0)
EEPROM 128Kbits (FPGA)
EEPROM 128Kbits (DM8148)

## Video Input /Output

- RAW video interface on FPGA - 100 x LVDS Pairs - 320pins connector
- GENLOCK IN or OUT + Composite video output - MCX connector
- 1 x 3G-SDI IN or OUT by software - MCX connector
- 2 x CoaxPress CXP6  IN or OUT by hardware assembly - MCX connector
  (Power over Coax output with 12W@24V)
- Linear Time Code (LTC) IN and OUT - Lemo5 connector
- 1 x 148.5Mhz – 16/24/30 bits for LCD display (with OPENGL co-processor on DM8148)
- HDMI 1.3 (with audio) - HDMI 19pins connector
- D1 PAL/NTSC composite analog output from FPGA - MCX connector
- 4 x 6G-SDI OUT (can be used as SD, HD, or 3G-SDI) - MCX connector

## Image Sensor board compatibility

Video interface is compatible with any sensor ;
Progressive scan, color with 2, 5, 8, 11, 12, 17 or20 megapixels (X-HD™)
High sensitivity up to 12V/Lux-sec, low read noise <2e-
Selectable video resolution and frame rate by image sensor daughter boards choise
Up to 16 sensor boards, any combinations of Nexvision's board :
"ISB17M" board : 17Mpixel, 5µm pixels
"CAM12M" board : 12Mpixel, 5.5µm pixels (22.5x16.9mm), 4.64V/lux.s,
12Mpixel 4096 x 3072 pixels 300fps shoot & preprocess frame rate, H264@60fps
"CAM2M" boards : FullHD 1080P(1920x1080) 340fps shoot & preprocess frame rate
"CAMPANO" boards : 4096 x 500 multisensor board, very high sensitivity 12V/lux.s
"SWIRCAM" : Short Wave Infra Red, 320x256, 100fps, with TEC cooling controller

## Power Supply

Input : 10-33VDC,15W-30W - 3.96mm terminal block connector
Power voltage level and reset supervision
Super Cap or Battery charger (LiPo or Li-Ion - 6 cell) - Terminal block connector
Transient voltage suppressor and EMI common mode filters with resettable fuse
Output : 2 x 12v@5A buck mode - Lemo2 connector
         2 x 24v@5A buck/boost mode + remote start (RS) - Fisher3 connector

## General Purpose Input/Output

VGA LCD display + Backlight controler on IO board
General purpose IO : Buttons + LED indicators + scroll wheel (I2C extender on IO board)
8 x general purpose button - 6 x display menu selection button - 1 x power ON/OFF button

## USB & PCIe

1 x USB3.0 Device (5Gb/s) for high speed video output - Type B connector
1 x USB2.0 Host or Device high speed (up to 480Mb/s) - Type A USB connector
5V@0.5A protected power outputs
1 x PCIe 4 x lines - Connector
1 x USB2.0 Host or Device - Type A USB connector on IO board typicaly for WIFI link

## Audio

Digital I/O : I2S link on DM8148 & FPGA - Expansion connector
Digital Output : HDMI connector
Analog Output : Stereo headphone amplified - Jack 3.5mm IO board
Analog Inputs : Stereo balanced + switchable phantom 48V - Lemo5 connector IO board

## Environment Sensors & Actuator

Inertial sensors (3D accelerometer, 3D Gyroscope, 3D Magnetometer) on IO board
Pressure sensor on IO board
Temperature sensors on Main & IO board
GPS with integrated antenna
2 x piezo actuators (+100V) - Board to Cable connection

## Serial Links

* UART (RX/TX) + I2C + SPI or GPIO - Board to Cable connection
* UART (RX/TX/CTS/RTS) or I2C or 4 x GPIO - Expansion connector
* RS232/JTAG for system debug on board connector (Jack 3.5mm for FTDI cable /20pins)

## Physical Dimension

Main board : 180mm (L) x 125mm (l) x 40 (h)
Temperature : 0 to +50 °C (–40°C to +85°C optional)
Humidity : 10~90% non condensing