



Elphel Inc.

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Elphel NC353L

highly customizable and high performance network camera

Overview

Elphel has been creating the worlds first open camera systems based on free (GNU/GPL) software and open hardware. Elphel is an Utah based company which went into business in 2001 and was founded by the digital imaging guru Andrey Filippov (PhD) who before worked for the General Physics Institute (Moscow, Russia) in the area of high-speed high-resolution, mixed signal design, application of PLDs and FPGAs, and microprocessor-based embedded system hardware and software design, with a special focus on image acquisition methods for laser physics studies and computer automation of scientific experiments.

Technical Specifications

Image sensor	1/2.5" bayer-pattern CMOS
Effective number of pixels	2592x1936 (5,018,112 pixels)
Aspect Ratio	Chip 4:3, Region of Interest freely adjustable in 16 pixel steps
Sensor Output	12Bit ADC
Sensor Features	Region of Interest, on-chip Binning and on-chip Decimation
Dynamic Range	70db (76db when using 2x2 binning)
Electronic Shutter	1µs to "very-long" (~3h) in 1µs steps
White Balance	Auto, Manual
Gain	Analog & Digital (0 dB to 12 db continuous)
Exposure Control	Auto / Manual
Lens Mount	C/CS
Sync	System Internal / External (with support for multiple sensor frontends - Stereo / 3D Setups available)
Interfaces	RS-232, 100Mbit Ethernet, SATA, USB, ZIF IDE, GPIO (for ext. sync)
Power Consumption	2.4 -5.8 W (depending on operation and load)
Weight	215 g (without lens or accessories)

Key Features

- Free Software and Open Hardware - specially designed to allow creation of new products
- Color and B/W Sensor Frontends available: Aptina 5MPix CMOS with /without IR Cutoff Filter
- High speed hardware accelerated image/video compression: 80 MPix/s
- Recording formats: Quicktime, OGM, JPEG Image Sequence, JP4 RAW Image Sequence, RAW sensor data, HDR (experimental)
- Available Mediums: Stream over 100Mbit Ethernet (unicast or multicast), 2 Compact Flash Card slots, ZIF IDE Connector for camera internal 1.8" HDD, SATA Connector for external HDD, SSD or RAID
- USB Applications: Audio recording, GPS module & compass allow recording geotagged video, etc.
- GPIO for external synchronization
- User/Developer friendly and open scripting: PHP (API, examples), CGI, C, C++, etc.
- Software Development Kit (SDK) and full hardware documentation freely available
- Firmware Upgrade (both GNU/Linux and FPGA) over the network
- Power supply: 48V DC, 12V-36V DC (mobile applications) or regulated 3.3V



Elphel NC353L-369-GEO with lens, CF card and compass module (internally installed)



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Applications

- Scientific Imagery and Video Applications
- High Speed Video
- Machine Vision
- R&D
- Microscopy
- Observation of Nature/Wildlife
- Underwater Imagery
- Medical Imagery
- Timelapse Filming (including HDR Support)
- Geotagging Applications
- Aerial Applications
- Digital Cinematography
- Robotics
- HD Video
- Security
- Document Scanning
- Panoramic Imagery and Video Applications (Panoramic Setups available)
- 3D Reconstruction
- Stereo/3D Imagery & Video
- Barcode Reading
- Sport (Photofinish)
- Computer Vision
- Education (Verilog, Image Processing, Networking, Circuit Design, Mechanical Design)
- Video Conferencing

Resolutions / FPS

Standard	Resolution	max. FPS (color)	max. FPS (JP4 RAW)
Full Sensor	2592x1936	10.6	14
Full HD (1080p)	1920x1088	25.2	30.9
2K	2048x1088	23.9	29.5
HD (720p)	1280x720	57.9	60
NTSC DV	640x480	126	126
PAL DV	720x576	100	100
	512x512	129	129
	320x240	310	310



Elphel NC353L-369-HDD with lens and internal 1.8" HDD



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OEM Options

Boards Overview

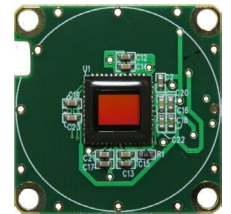
10353 System Board

- 200MHz 32-bit Axis ETRAX FS CPU
- 128 MB SDRAM (64MB system +64MB Video)
- 128 MB NAND flash memory
- Xilinx Spartan®3e 1200K gate FPGA
- 48V DC power supply
- 12-36V DC optional



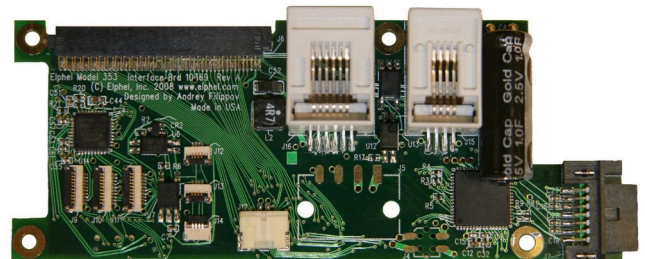
10338 Sensor Frontend

- Aptina MT9P031/MT9P001 5MPix sensor
- 2.5V LVTTTL interface



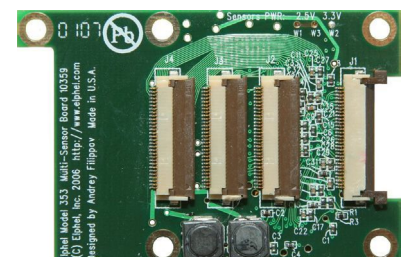
10369 IO Board

- SATA port for external disk drives
- Internal IDE port
- RS-232 port
- Opto-isolated I/O port for triggering the camera or synchronizing together multiple cameras (modular RJ14 external connector)
- Opto-isolated I/O port for synchronizing multiple camera modules in the same enclosure (flex cable connectors)



10359 Multi Sensor Board

- Acquire images from up to 3 sensors simultaneously or with programmed delay and send them to 10353
- Cascadeable to connect more sensors (6, 9, ...)
- Extract 3D information from multiple sensors in real time in FPGA
- FPGA provides many more possibilities





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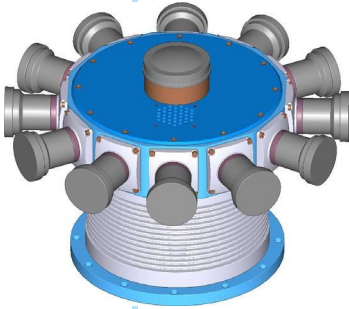
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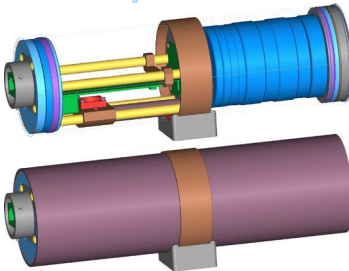
coming soon

Elphel MNC354L-13



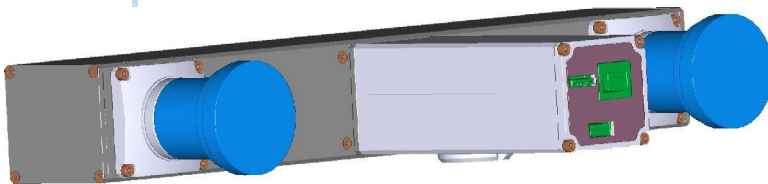
- Allows capturing full 360° video/images with 13 hardware synchronized (<20 microsecond latency) Elphel Cameras (Boards 10338, 10353 and 10369)
- 12 cameras in 360° array + 1x camera with fisheye pointing upwards
- Each camera has a 100Mbit Ethernet and SATA connector

Elphel ENC353L



- Suited for underwater / harsh environment operations
- Protection Class: IP68

Elphel MNC354-2

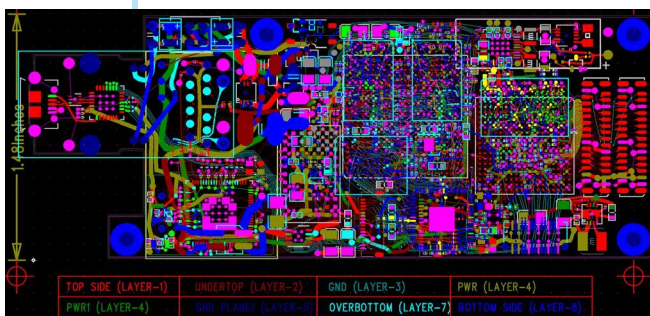


- Stereo / 3D camera Setup

under development

Elphel NC373L

- TMS320DM6467 as CPU (ARM9)
- Xilinx Spartan 6 FPGA
- 256 MiB NAND flash
- 256 MiB DDR2 system memory
- 256 MiB DDR3 dedicated FPGA memory
- 48V DC over Ethernet cable
- Gigabit Ethernet
- USB 2.0 Host
- optional internal 64GB SSD instead of CF cards
- SATA bridge
- USB 1.1 device with micro USB connector (connected to the CPU serial port to be used as a system console and alternative boot source)
- Two sensor ports, each can accommodate existent sensor front ends that work with NC353L cameras. Both sensors will be able to operate at full resolution/speed in parallel.



High density multilayer PCB Layout Design
(work in progress)



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Pricelist

Elphel Model 353

NC353L	Basic network camera (with 10353 main board + SF338M5C sensor installed)	575€
NC353L-369	Network camera with 10369 IO board (provides IDE, SATA, USB, RS232, and other interfaces)	930€
NC353L-369-HDD	Network camera with 10369 IO board and 1.8" 120 GB HDD (mounted internally)	1075€
NC353L-369-GEO	Network camera with 10369 IO board, one 4GB CompactFlash, internal OS5000 compass, and external GPS	1430€

Options for NC353L camera series

Monochrome Sensor	By default the camera is mounted with a 5 MPix color sensor. On request, we mount a 5 MPix monochrome sensor instead.	0€
3 MPix Color Sensor	For some applications, the 3 MPix sensor is more suitable than the default 5 MPix one. On request, we mount a 3 MPix color sensor instead.	0€
Remove IR-Cut	By default, we install an IR-Cut filter in front of the sensor. On request, we remove this filter for particular applications.	0€
12-36V DC/DC	On request we modify the camera to operate on 12-36V DC (for use with external batteries - not compliant with standard PoE equipment)	40€

Accessories for NC353L camera series

PW-130	Midspan power supply [by Ault or equivalent]	25€
EMS120150-P5P-SZ	XFRMR 18W 12V 1.5A MULTI PLUG [by CUI Inc] (this is useful for testing purposes with our 12-36V Battery-powered camera only)	20€
EZPOEPA02	Passive PoE Injector with CAT5 cable [by E-zy] (required for all 12V-36V or battery-powered cameras)	10€
H2Z0414C-MP	Computar Varifocal Lens, 4-8mm F1.4 Manual Iris Vari-Focal C-Mount, 3 MPix	105€
CompactFlash	Add one 4 GB Compact Flash to your NC353L-369 model (Up to two CF cards can be installed in the camera)	40€

Development Boards

10353	System Board	470€
10318	3MPix sensor board (color only)	110€
10338	5MPix sensor board (color or monochrome)	110€
10369	IO Board: CF/IDE/SATA, RS232, GPIO, ...	360€
10359	Multi Sensor Board	180€
CC353L	Standard camera body that can accommodate the 10353 with one 10318 / 10338 sensor board, and an optional 10369 IO Board.	110€
CCSFE	Standard C/CS mount sensor frontend bracket for 10318 and 10338 sensor boards	20€