

Nethra® NI-9065

3.2 Megapixel Camera Solutions

The NETHRA® NI-9065 is a high quality Image Processor based on Nethra's second generation highly scalable and real-time image processing pipeline which allows designers of surveillance camera platforms to achieve high quality video with reduced cost and power consumption in a smaller form factor. With the wide choice of sensors available it is also possible to reduce the overall system design time.

The NI-9065 supports progressive scan sensors up to 3.2 megapixel (2048 x 1536) resolution, with pixel sizes ranging from 1.75 micron to the larger pixel sizes more commonly used in surveillance platform designs, meeting the needs of platforms designed for the low-end consumer to high end professional market places.

The accompanying firmware has also been designed provide a rich feature set for surveillance applications supporting pixel rates up to 75 megapixels/sec giving approximately 20 frames per second (fps) throughput at 3.2 megapixel (sensor dependent), and greater than 30 fps at HD resolution. The actual resolution and frame rate can be adjusted to meet key market goals within these limits.

Further tuning of the sensors for lens shading and color matching to regional tastes enabling additional optimization of the signal chain (implemented as configuration files) while meeting simple hardware needs for ease of production and supply chain management. A temperature performance range of -40 to +85 degrees C ensures that the NI-9065 can be used in a variety of applications with further design and supply chain flexibility.

Key surveillance needs of low light performance, automated switching from color to monochrome below a (programmable) threshold coupled with average lighting level readout and available GPIO ports enable smart implementation and control of low-light systems design, from color mode changes to outputs to support IR-cut filter motor control.

Additional low light performance enhancements through additive-binning of megapixel sensors to enhance low-noise performance under low light conditions is also supported; as is scaling of images to fit the needs of video encoders, giving highly optimized bright and smooth picture quality under a range of lighting conditions.

Backlight enhancement and color tuning further enhance picture quality under challenging light conditions, while continuous monitoring and control of bad-pixels ensure long-term picture quality.

Product Features

Sensor Interface

- Supports progressive scan sensors up to 3.2 MP
- Supports 8/10/12-bit interface
- Ability to reverse the sensor data bus [0:11] to [11:0] for easier PCB layout

Video Output

- Bayer data, RGB (15 and 16 bit), and YUV (4:2:2)
- Slow video clock support (divide by 2, 4, and 8)

CPU Subsystem

- Integrated 32-bit RISC CPU core to off-load host CPU
- Boot ROM plus 44 KB of internal SRAM for code and data
- Fast and general purpose interrupts

Scaling Engine

- High quality smooth scaling engine, supports down scaling
- Multiple scaling algorithms for image sizing perfection between megapixel sensors and the input sizes of various encoders.

Memory Support

- Internal 64 KB stacked flash memory for fast boot-up

Peripherals and Debugging

- Embedded debug interface using JTAG or UART
- 4 PWMs to create a motor control for auto focus and zoom
- 8 GPIOs, SPI for sensor or applications processor, on-board PLL to generate all on-chip clocks
- 2 I²C interfaces to communicate to sensor and host controller
- Direct glue-less interface to CMOS sensors

Nethra Imaging Engine

- Hardware-based image processing pipeline operates up to 75-million-pixels/second
- Intelligent true-color interpolation and conversion:
 - Adaptive Bayer to RGB conversion
 - YUV to RGB conversion and RGB to YUV conversion
- Nethra's PerfectColor™ features:
 - Auto focus, auto white balance & auto exposure
 - Automatic crosstalk removal
 - Programmable lens shading compensation
 - Automatic sensor bad pixel detection and correction
 - Fixed pattern noise correction
 - AdaptiveEye™ low light performance
 - Adaptive edge enhancement and noise filtering
 - Histogram and statistical engine



Applications

The NI-9065 is a high performance, high quality image processor for a wide range of low-cost imaging applications. The programmable image processor family is highly suitable for applications in low power and high performance camera designs.

Design Flexibility

The NI-9065 is available in a 5 mm x 6 mm package and consumes under 0.2 Watts at maximum power, allowing camera designers to design smaller form factor camera modules with reduced thermal management complexity and cost. In addition, by providing a consistent programming interface to a variety of progressive scan sensors, design flexibility to meet specific market needs is more easily enabled with tighter control of related software costs in the design and testing.

Image Processing Engine

The NI-9065 features a high quality, real-time image processing engine. Though the solution is in hardware, it is highly programmable. It is specifically designed to provide high throughput from progressive scan sensors while keeping the cost and power low.

The proprietary image processing algorithms in the NI-9065 image pipeline directly address specific image quality issues of progressive scan sensors making the Nethra chip a compelling solution in enabling mainstream progressive scan sensors to be used for surveillance.

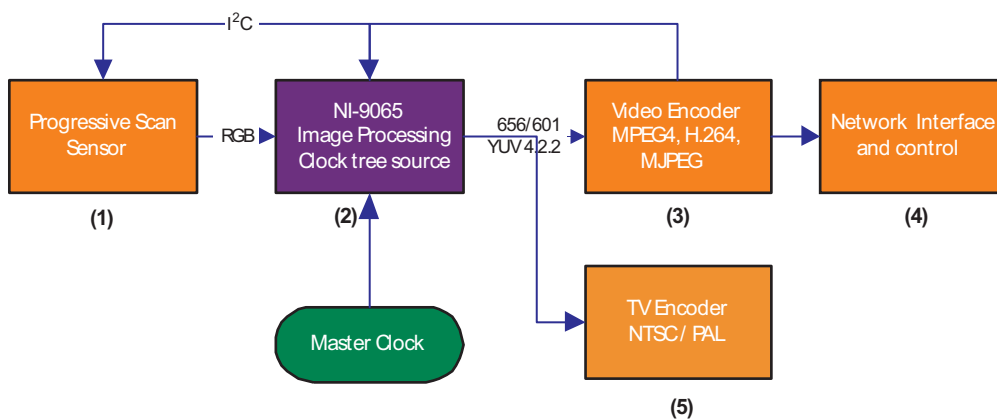
System Integration

The NI-9065 integrates a high performance 32-bit RISC CPU core. This eliminates the need for an external CPU where sophisticated Auto Exposure and Auto White Balance algorithms are implemented on the camera module instead of loading the host processor. Additional capability includes DC auto iris control support with hysteresis settings.

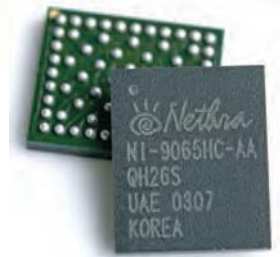
Furthermore, the NI-9065 includes a 64 KB flash memory which allows fast boot-up, and field upgrade of the module parameters. This allows module vendors to update sensor tuning parameters for easy sensor upgrade and fast time-to-market and enables development of standalone camera modules.

The NI-9065 can be used to implement quality camera solutions illustrated below.

- Analog Camera solution: (1) + (2) + (5)
- IP Camera solution: (1) + (2) + (3) + (4)



Typical Camera Implementation - with Progressive Scan Sensor Interface



NI-9065 in 68-pin Package

NI-9065 BGA Package

- 5 mm x 6 mm, 68-pin package
- Mounted height 0.93 mm
- 0.5 mm ball pitch
- RoHS Compliant Device

Voltages

- Core: 1.2 V
- I/O: 1.8, 2.7 and 3.3 V

Development Kit

The kit includes:

- EnVision™, Nethra's ISP development platform
- NICAM, Nethra Imaging Camera Control, -- a proprietary PC application
- Necessary documents and support for customers to calibrate their system to achieve high image quality with various sensors.
- Sample code for use with the Micron T031 sensor for qualified surveillance customers.

Pricing & Availability

Contact NETHRA IMAGING, Inc. for product availability and pricing information.

Reference Design

Nethra's image processing reference design, the Merced platform, is a production-ready IP camera unit designed to enable OEMs to develop fast time-to-market IP cameras for the surveillance market. With minor GUI customization and adjustments to fit OEM specific implementation needs, the camera design is ready to move into production.