

## Highlights

### ■ High resolution color for crisp, clear video

- Progressive image capture
- 720 x 480 digital video output
- Global electronic shutter

### ■ High sensitivity for low-light images

- Advanced noise reduction technology
- 0.5/0.8 lux (CMY/RGB) minimum illumination, f/1.2, 50 IRE

### ■ Wide dynamic range provides excellent image quality in high-contrast environments

- 102 dB typical
- 120 dB max

### ■ Single camera SKU supports NTSC, PAL, and TCP/IP cameras

- Analog: Single composite output for setup and focus
- Digital: 8-bit parallel digital video (ITU/BT656, SMPTE 125)

### ■ Optimum Exposure Mode presets

- Best pictures in a variety of applications

### ■ Numerous control options

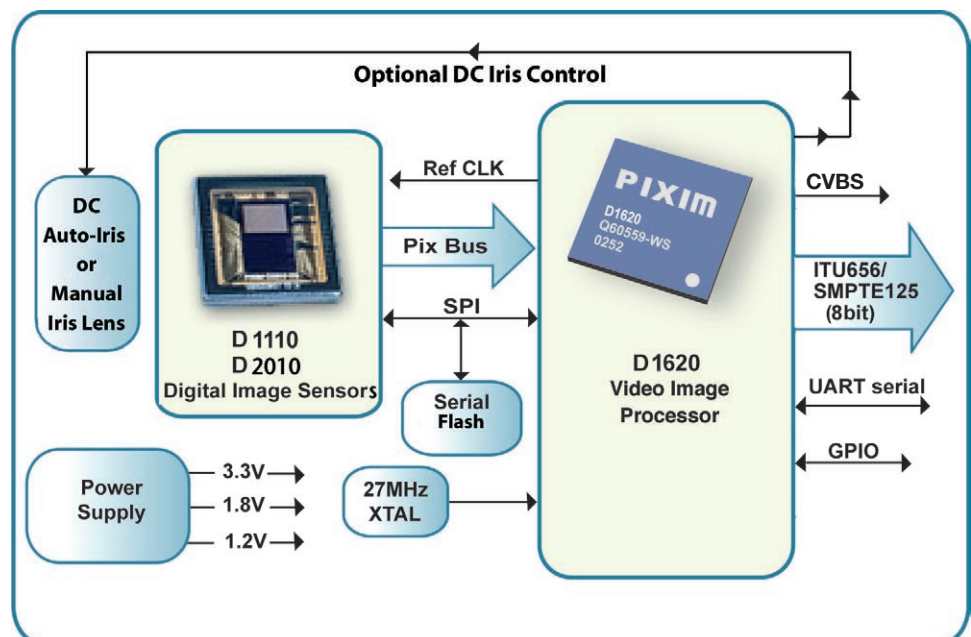
- Automatic White Balance
- Backlight Compensation
- Automatic Gain Control
- On-Screen Display
- Electronic Iris
- Auto-Iris (DC or Manual)

## Pixim D1600 Video Imaging System for Cost-Effective Network / IP Cameras

The Pixim D1600 is a highly integrated two-chip set utilizing Pixim's innovative Digital Pixel System® (DPS) technology that provides the image sensor, image processor, and the necessary intelligence to develop high-quality, cost-effective network / IP cameras. The D1600 is designed to deliver superior quality video, providing up to 102 dB dynamic range in typical operation (120 dB max) while providing excellent resolution, sensitivity and color fidelity. The image sensor is available with either complementary (CMY) or primary (RGB) color filter array allowing pin-compatible choice of the highest-sensitivity or the highest resolution.

The D1600 includes configurable software which allows camera manufacturers to get to market quickly and offer a number of camera products from a common base hardware design, including an option to select PAL / NTSC operation via software or switch. A digital video output bus is provided to interface to a video compression and/or video analysis subsystem, and a color composite analog output is provided for camera setup.

The D1110 and D2010 digital image sensors and D1620 video image processor are manufactured in low-power, high-volume commercial CMOS processes. The low power dissipation enables high performance camera designs under 1.5 watts.





## Specifications

### D1110(RGB) & D2010(CMY) Digital Image Sensor

- Pixel type: DPS technology
- Silicon process: 0.18  $\mu\text{m}$  CMOS
- Image size: diagonal 6.3 mm (1/3 inch optical format)
- Sensor array size: 5.04mm (H) x 3.78 mm (V)
- Pixel size: 7  $\mu\text{m}$  x 7  $\mu\text{m}$
- Picture elements: Total: 742 (H) x 552 (V): effective: 720 (H) x 540 (V)
- Color filter array:
  - Complementary (CMY: D2010)
  - Primary (RGB: D1110)
- Dynamic range: 102 dB typical, 120 dB max
- Horizontal resolution:
  - 540 horizontal TV lines equivalent (with High Resolution RGB kernel)
  - >504 TV lines typical (RGB)
  - 500 horizontal TV lines equivalent (CMY)
- Vertical resolution: 460 TV lines
- Minimal blooming
- Zero smear

### D1620 Video Image Processor

- Silicon process: 0.13  $\mu\text{m}$  CMOS
- ARM<sup>™</sup> processor core
- Custom image pipeline
- Wide dynamic range
- Built-in NTSC/PAL video encoder
- Extensive programmability
- DIP switch / push-button menu support
- Advanced on-screen display with scalable font size and outlined fonts, multiple language support including Asian characters
- Camera ID
- White balance: auto tracking, manual, and presets
- Gamma correction options
- Global electronic shutter
- Extended slow shutter
- Automatic gain control
- Backlight compensation control
- B/W mode
- Image flip: horizontal
- Four user configuration sets
- Exposure control: up to 1/30,720 sec electronic shutter at f/1.2 (RGB)

### Temperature Range

- D1110 & D2010 Operation: -10° to 60° C ambient
- D1620 Operation: -10° to 60° C ambient

### System Interfaces

- Boot Flash: Serial Programming Interface (SPI) flash memory reprogrammable via PC connection
- Analog output: color composite for camera setup (75 $\Omega$ )
- Digital video: ITU-R656 format 8-bit; SMPTE 125M 8-bit video (CCIR 601)
- UART: general purpose for configuration, alignment, and remote control (RS232 / RS485)
- GPIO: 14 general input/output pins for camera modes via DIP switches or push buttons

### Power

- D1110 & D2010: Standard 1.8V (core) and 3.3V (I/O) supply
- D1620: Standard 1.2V (core) and 3.3V (I/O) supply
- Typical power: <1.25 W for D1600 chip set
- Max. power: <1.5 W for D1600 chip set

### Package

- D1110 & D2010: 17mm x 17mm; 181 BGA, 1mm ball pitch
- D1620: 15mm x 15mm; 144 BGA, 1mm ball pitch

### System Tools

- Camera Development Kit (CDK)
- Property Access Tool (PAT)
- Heater Control Board

## About DPS

Pixim's patented Digital Pixel System (DPS) technology marks a fundamental breakthrough in imaging technology. Building upon technology developed at Stanford University in the 1990s, Pixim has created an image capture and processing system that provides high-quality pictures with enhanced dynamic range that significantly improves image quality in scenes consisting of both bright and dark areas.

The core invention in DPS is the inclusion of an analog-to-digital converter (ADC) within each pixel of the image sensor. The ADC translates the light signal into a digital value at the immediate point of capture, thus minimizing signal degradation and cross-talk in the array and allowing for greater noise reduction methods. Once the data is captured in a digital format, a variety of digital signal processing techniques are used for optimal image reproduction.