Design engineers seeking a development platform for a high-performance digital IP video surveillance device need look no further than Freescale Semiconductor. The i.MX27 IP camera reference design provides the requisite hardware engine and robust software applications to enable an OEM to quickly add their differentiating IP or go straight to manufacture.

**IP Camera Features**
- **Form factor design** is based on the Freescale i.MX27 multimedia applications processor and Freescale Linux® 2.6 Board Support Package (BSP)
- **Comprehensive IP camera system solution** ready for manufacture or OEM customization
- Real-time compression of full-color (720 x 480) (D1) video in H.264, H.263 or MPEG-4 part 2 format at 30 fps
- Wired streaming of compressed video to standard browser
- Simple Web-based interface allows for easy setup and evaluation of key system parameters
- **Freescale i.MX27 multimedia applications processor**
  - ARM926EJ-S™ processor targeted for low-power, high-performance video applications
  - Multi-standard hardware video codec
    - Enables high-quality, low-power video compression and decompression
    - Leaves ample headroom on the ARM® core to implement your differentiating software features
- Advanced power management enables low-power design targets to be met
- Integrated 10/100 Ethernet, SDIO, USB 2.0
- Support for external data storage to SD/MMC card, USB or hard disk
- Provides the connectivity to integrate external Power over Ethernet (PoE) and Wi-Fi solutions
- Industrial temperature for outdoor applications

**Comprehensive Development Kit**
- Camera unit with enclosure and tripod
- Robust documentation suite, including Quick Start Guide, and hardware and software design documents
- Design files include schematics, Gerber files and Bill of Materials (BOM)
- Linux BSP provided with IP camera application code

**IP Camera Hardware Features**
- **i.MX27 multimedia applications processor**
- **Aptina MT9D131 2MP sensor**
- Tamron M13VM246 C-Mount lens
- PoE (IEEE® 802.3.af)
- Wolfson® WM8974 audio codec
- Microphone
- USB 2.0 and OTG are supported
- SD connector for expandable storage

**IP Camera Software Features**
- D1 resolution H.264 or MPEG-4 video compression and streaming
- 10/100 Ethernet physical layer
- Video stream to client application from video server under HTTP control
- Embedded Web server provides basic network, camera and encoder configuration page to client
- FFPLAY client for rendering captured data
- Motion detection

**Aptina MT9D131 Image Sensor**
The MT9D131 is a 1/3 inch, 2-megapixel CMOS image sensor with an integrated, advanced camera system. The system features a microcontroller and a sophisticated image flow processor (IFP) with a real-time JPEG encoder. The excellent low-light performance of MT9D131 is one of the hallmarks of DigitalClarity® technology—Aptina’s breakthrough low-noise imaging technology that achieves CCD image quality (based on signal-to-noise ratio and low-light sensitivity) while maintaining the inherent size, cost, power consumption and integration advantages of CMOS.

For more information on image sensor solutions from Aptina Imaging, visit [www.aptina.com](http://www.aptina.com)

Freescale and the Freescale logo are trademarks or registered trademarks of Freescale Semiconductor, Inc. in the U.S. and other countries. ARM is the registered trademark of ARM Limited. ARM926EJ-S is the trademark of ARM Limited. All other product or service names are the property of their respective owners. © Freescale Semiconductor, Inc. 2008.
Aptina MT9D131 (Color, Pb-Free)
1/3.2-Inch System-On-A-Chip (SOC) CMOS Digital Image Sensor

Features

- DigitalClarity® CMOS imaging technology
- Superior low-light performance
- Ultra-low-power, cost-effective
- Internal master clock generated by on-chip phase-locked loop oscillator (PLL)
- Electronic rolling shutter (ERS), progressive scan
- Integrated image flow processor (IFP) for single-die camera module
- Automatic image correction and enhancement, including lens shading correction
- Arbitrary image decimation with anti-aliasing
- Integrated real-time JPEG encoder
- Integrated microcontroller for flexibility
- Two-wire serial interface providing access to registers and microcontroller memory
- Selectable output data format
  - ITU-R BT.601 (YCbCr)
  - 565RGB
  - 555RGB
  - 444RGB
  - JPEG 4:2:2
  - JPEG 4:2:0
  - Raw 10-bit
- Output FIFO for data rate equalization
- Programmable I/O slew rate

Applications

- Security surveillance cameras
- ePTZ cameras
- Wireless cameras
- Consumer video products
- High-resolution security cameras

Key Performance Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical format</td>
<td>1/3.2-inch (4:3)</td>
</tr>
<tr>
<td>Active imager size</td>
<td>4.73mm x 3.52mm</td>
</tr>
<tr>
<td>Active pixels</td>
<td>1600 x 1200 pixels (UXGA)</td>
</tr>
<tr>
<td>Pixel size</td>
<td>2.8µm x 2.8µm</td>
</tr>
<tr>
<td>Shutter type</td>
<td>Electronic rolling shutter (ERS)</td>
</tr>
<tr>
<td>Maximum frame rate</td>
<td>15 fps at full resolution, 30 fps in preview mode, (800 x 600)</td>
</tr>
<tr>
<td>Maximum data rate/master clock</td>
<td>80 MB/s 6 MHz to 80 MHz</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>An. 2.5−3.1V</td>
</tr>
<tr>
<td></td>
<td>Digital 1.7−1.95V</td>
</tr>
<tr>
<td></td>
<td>I/O 1.7−3.1V</td>
</tr>
<tr>
<td></td>
<td>PLL 2.5−3.1V</td>
</tr>
<tr>
<td>ADC resolution</td>
<td>10-bit, on-die</td>
</tr>
<tr>
<td>Responsivity</td>
<td>1.0V/lux-sec (550nm)</td>
</tr>
<tr>
<td>Dynamic range</td>
<td>71dB</td>
</tr>
<tr>
<td>Output gain</td>
<td>16 e-/pix/s at 55°C</td>
</tr>
<tr>
<td>Read noise</td>
<td>3.6 e-RMS at 16X</td>
</tr>
<tr>
<td>Dark current</td>
<td>30 e-/pix/s at 55°C</td>
</tr>
<tr>
<td>SNRMAX</td>
<td>42.3dB</td>
</tr>
<tr>
<td>Power consumption</td>
<td>348mW at 15 fps, full resolution 223mW at 30 fps, preview mode</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>–30°C to +70°C</td>
</tr>
<tr>
<td>Package</td>
<td>Bare die, 48-pin CLCC</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT9D131C12STC ES</td>
<td>48-pin CLCC (Pb-free) ES</td>
</tr>
<tr>
<td>MT9D131C12STCD ES</td>
<td>Demo kit</td>
</tr>
<tr>
<td>MT9D131C12STCH ES</td>
<td>Demo kit headboard</td>
</tr>
</tbody>
</table>