ICM532A CIF CMOS image sensor with USB output

Data Sheet

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Features

- CIF format (352x288) pixels, used with 1/7" optical system.
- QVGA format (320x240) pixels, used with 1/7" optical system
- QCIF format (176x144) pixels, cropped or subsampled, up to 37.5 fps.
- Progressive readout
- Output data format: compressed 8-bit raw data
- Image processing and decompression supported with proprietary software. Image processing functions include color interpolation, color correction, auto white balance, auto exposure, auto anti-flickering, and sharpening.
- Proprietary data compression
- Input/Output interface: USB 1.1 Full Speed
- Electronic exposure control
- On-chip 9-bit ADC
- Correlated double sampling
- Dead pixel and dead column removal
- Power down/Suspend mode
- 8 User Programmable GPIO pins
- Optional 3.3V Serial EEPROM register loading during power-up (24C02/04/08/16)
- Automatic optical black compensation
- Mirror image
- Single 3.3 V power supply

General Description

ICM-532A is a single-chip, CIF resolution, digital color PC camera with integrated data compression, line buffer and Full Speed USB 1.1 interface. All the image processing functions (color interpolation, color correction, auto white balance, auto exposure, auto anti-flickering, sharpening) are performed by software in the host computer. It incorporates a 352x288 sensor array operating at 6 ~ 30 frames per second in progressive manner. Each pixel is covered by a color filter, which forms a "Bayer pattern." Correlated double sampling is performed by the internal ADC and timing circuitry. The raw data can be adjusted with digital gain. The raw data is compressed using a proprietary compression scheme. The compression allows video out in 8-bit compressed data format through USB 1.1 with 30 frames per second video capability. For higher frame-rates, sub-sampled or cropped QCIF (176x144) modes are available that support 35 frames per second.
8 Pins are supplied that can be programmed by the driver as general purpose I/O pins, with individually selectable output enables. During power-up, the internal control registers can be loaded from an external serial EEPROM. This allows customization of Vendor ID and Product ID, as well as initialization of other device parameters.

The 48 MHz clock required for the ICM-532A is provided by an on-chip phase-lock loop that is driven by an external 6 MHz crystal oscillator. Using a PLL reduces power dissipation, electrical noise and the cost of the crystal. It also reduces the need for EMI shielding that would be required if a 48 MHz oscillator were used. The highest frequency external signal is the 12Mbps on the differential USB data pins.

Software Support

- Computer & OS requirements: 750 MHz, 64M memory for 30 fps; 300 MHz, 64M memory for 12 fps. Windows 95 / 98 / 98SE , Windows ME, Windows 2000 .
- Driver support
- WDM USB driver
- TWAIN
- DirectShow
- VFW extension driver
- Proprietary DirectShow decoder
- Installation software

Application

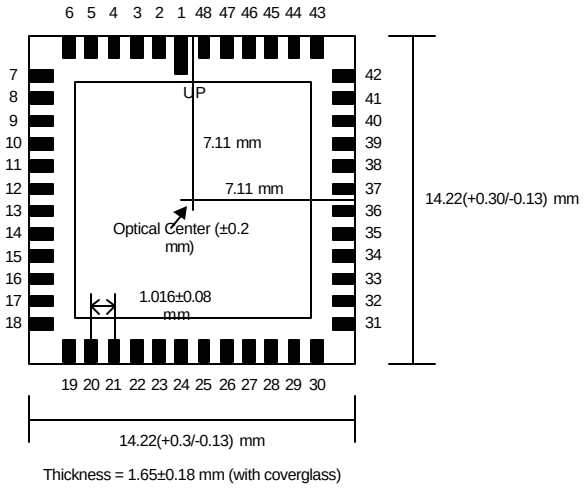
- PC camera
- Embedded solution (notebook, PDA, monitor etc.)

Key Parameters

- Number of Active Pixels: up to 352x288
- Number of Physical Pixels: 362x298
- Frame Rate: up to 30 fps (35 fps QCIF)
- Single Crystal Frequency: 6 MHz
- Exposure Time: 125 µs (@ 25 fps, 1 line) ~ 8 s (@ 12 fps)
- Digital Gain: 1 ~ 64 x @ 2^N for all pixels
- RGB Gain: 1 / 256 ~ 64 x for individual Bayer pattern pixels
- S / N Ratio: 30 dB @ TBD lux
- Dynamic range: 53dB
- Power Supply: 3.3 V
- Power consumption: 130mW typ.
- Package: Ceramic LCC48, Plastic LCC48, mini PLCC48 lens module

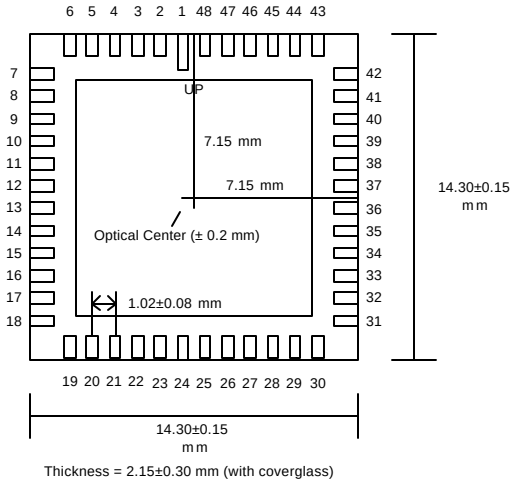
Mechanical Information

There are two types of available packaging. One is a Ceramic LCC48 (48-pin Ceramic Leadless Chip Carrier) and the other is a Plastic LCC48 (48-pin Plastic Leadless Chip Carrier). Note that pin 1 should face down when a lens and the default driver are used.



Ceramic LCC48 (Top View)

Figure 4. Ceramic LCC48 Packaging



Plastic LCC48 (Top View)

Figure 5. Plastic LCC48 Packaging

1. Board Design Information

Components:

- ICM-532A
- 6MHz Crystal
- RSET resistor
- USB connector or cable with 1.5kΩ pull-up on DP.
- 3.3v voltage regulator and associated components
- Power Supply filter capacitors
- Pull-up for SDA, SCL, GPIO0 GPIO1, and GPIO2
- If desired: Reset circuitry. A 0.1uF capacitor on RSTN is sufficient for power-on reset.

2. Ordering Information

Part number for different package:

Description	*Part Number*
Ceramic LCC 48 packaged, USB CIF resolution sensor (3.3 V)	ICM-532Aca
Plastic LCC 48 packaged, USB CIF resolution sensor (3.3 V)	ICM-532Apa
Miniature PLCC48 lens module , USB CIF resolution sensor (3.3V)	ICM-532Ala

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