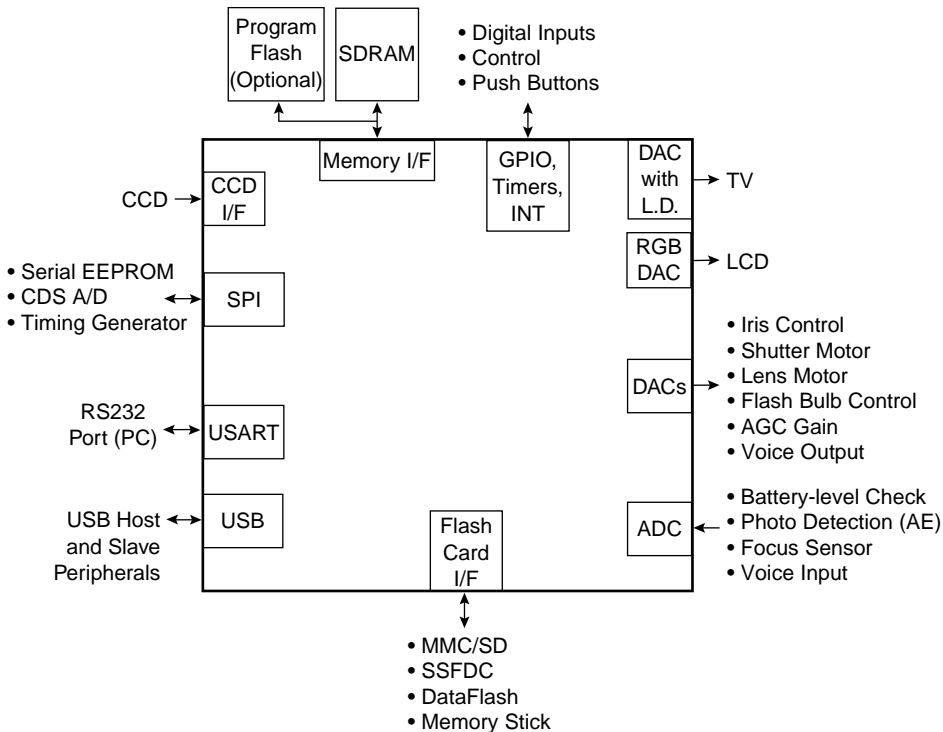


## Features

- DSP Functions for CCD/CMOS Image Processing
- Baseline JPEG Compression/Decompression
- MPEG-1 Encode/Decode at 24 fps QVGA
- Compatible with Various Types of Display Devices
- Video Encoder Including Line Driver for NTSC/PAL TV Signal
- Integrated DACs for LCD Interface
- Direct Interface to Epson® and AU LCDs
- Digital Outputs Include: Composite, 16-bit YC, RGB 565
- SDRAM Interface – Supports from 16M Bits to 256M Bits
- Unified Memory Architecture (All Program and Data Stored in SDRAM)
- Support for Most Flash Card Interfaces (Atmel DataFlash®, MMC, SD, SSFDC, Memory Stick™)
- USB 1.1 Host/Slave Controller and USART Interfaces for PC Camera and Printing Applications
- Up to Nine External Interrupts and Wake-up Pin
- Serial Peripheral Interface for Loading Boot Code and Controlling Camera Components
- Two DACs for Camera Control Functions and Audio Output
- Four ADC Channels for Monitoring Camera Analog Inputs, Audio Input, Switch Input, Etc.
- Audio Data Interface for Connection to External Stereo ADC/DAC
- Three General-purpose Timers for Waveform Generation (PWM, Etc.) and Event Monitoring
- Up to 62 Pins for General-purpose I/O
- Up to 2M Bytes Program Space
- Support for RTOS
- All Low-level Software, Application Samples are Provided
- 208-ball BGA Package
- 1.8-Volt Core and 3.3V I/O Operation

Figure 1. Typical DSC Application Using AT76C113



## High-Performance Digital Camera Processor

## AT76C113 Summary

Rev. 2391BS-IMAGE-05/03



Note: This is a summary datasheet. A complete document is available under NDA. For more information, please contact your local Atmel Sales Office.



## Description

The AT76C113 is a highly integrated solution for digital cameras. It combines a number of functions that are required in implementing digital cameras.

- Image data acquisition and capturing from either CCD or CMOS imagers
- Image display
- Image processing and image storing
- Overall camera management
- Control of general-purpose I/O functions
- Data communication
- Control of user functions
- On-screen Display

AT76C113 also provides a large number of interfaces that allow camera manufacturers to directly access a variety of devices that may be present in a digital camera.

- Communication with PCs
- Communication with Flash cards
- Serial communication ports for controlling other devices in the camera

The design is based on an ARM<sup>®</sup> microprocessor that controls the entire chip. A number of hardware resources, controlled by ARM, perform digital camera functions such as image DSP processing, JPEG coding/decoding, MPEG-1 coding/decoding, DMA access to SDRAM, and video encoding. All these computationally-intensive functions are implemented in hardware which can be programmed according to user specifications, thus allowing ARM to be free for other user-defined functions.

## Part Versions

The AT76C113 device comes in six versions, each with slightly different features. These are summarized in Table 1. In the rest of this document, the AT76C113-HU part is discussed.

**Table 1.** AT76C113 Part Versions

Part Number	Maximum Imager Resolution (Pixels)	Maximum SDRAM Size (Mbytes)	USB Functionality
AT76C113-S	≤ 2M	128	Slave Only
AT76C113-U	≤ 2M	128	Slave and Host
AT76C113-H	> 2M	512	Slave Only
AT76C113-HU	> 2M	512	Slave and Host
AT76C113-P	> 2M	512	Slave Only
AT76C113-PU	> 2M	512	Slave and Host

## Capabilities

- Supports up to 16-megapixel CCDs/CMOS (10 - 35 MHz CCDs)
- CCD colors are limited to the Bayer arrangements of the RGB primary colors
- Interfaces to 16 - 256-Mbit SDRAM, one or two pieces
- 30 frames/sec video display mode (NTSC)
- 30 frames/sec capture mode (VGA resolution)
- 24 frames/sec MPEG-1 encode/decode (QVGA resolution)
- Up to 1.5M bytes/sec read/write from/to Flash cards
- 2M bytes external Flash ROM for program space
- Full-speed USB 1.1 Host/Slave Controller (mass storage and image class for slave operation)
- Maximum 70 mA current in normal operation
- 1 - 5 mA in standby mode, < 100  $\mu$ A current in sleep mode



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