Overview

The MV9351 is a high-performance ISP device offering outstanding image quality and low power consumption. It supports up to 30 frames per second with 8M full resolution and 80 frames per second with 1080p full HD resolution.

The MV9351 provides two separate image sensor interfaces. One channel is MIPI RX 4 lane for the rear camera and the other is parallel 10 bit interface for the front camera. Furthermore, Since the MV9351 support not only Bayer input but also YUV input from the SOC image sensor.

The MV9351 realizes true zero shutter lag operation that supports the transfer of both 8M full size JPEG and YUV up to 1280x960 for LCD display during preview at 30 frames per second. Because two types of images for capture and preview transfers concurrently at 30 fps, host application processors can easily realize its capture and preview operation including zero shutter lag.

It has versatile functions for various camera applications like face detection, motion detection, JPEG capture and more.

Key Features

- 8M Pixel, 30 frames per second
- Full HD 1920x1080, 80 frames per second
- All functions are on-the-fly operation
- Dual camera control support
- MIPI RX 4 lane and parallel 10 bit input
- MIPI TX 4 lane and parallel 8 bit output
- True zero shutter lag operation
- MIPI interleaving – JPEG and YUV
- Simultaneous transmission of JPEG and YUV image
- 8M full size JPEG capture during Full HD recording
- Power down mode with CPU code retention
- Hardwired face detection engine
- MDIS motion vector generation
- 256 window based image statistic processing
- Adaptive luminance based on histogram equalization
- Bayer and 2 stage Y/C noise reduction
- Lens shading correction for multi light sources

Target Application

- Tablet devices / Portable imaging device
- Car driving recording
- Surveillance camera

Specification

- Technology : 65 nm
- Package : 6x6 mm 121 ball BGA Ball pitch 0.5 mm
  8x8 mm 121 ball BGA Ball pitch 0.65 mm
- Supply Voltage : core 1.2V / IO wide range (1.8~3.3V)
- CPU : i8051
- Input format : Bayer (8M) and YUV(2M)
- Output format : YUV, JPEG, Bayer and RGB565
- Max resolution : 8M pixel
- Frame rate : 30 fps @ 8M full resolution
  80 fps @ Full HD 1920x1080
- Operating frequency : 266 MHz for ISP /
  330 MHz for In/Out processing

- Zero shutter lag output format

| Mode	Format	FPS	Description
JPEG + YUV	8M JPEG + YUV 1280*960	30	Host processor can easily extract YUV Image from JPEG stream due to the simplified packet structure
MIPI Inter leaving	8M JPEG + YUV 1280*960	30	Hardware operation without CPU intervention
JPEG	8M JPEG	30	8M JPEG 30 fps
YUV	8M YUV	20	8M YUV 20 fps

- Power consumption

Parameter	Condition	current	unit
Dynamic IDD	1.2V @ Full HD 30 fps	95	mA
	1.2V @ 8M 15 fps / Full HD 60 fps	155	
	1.2V @ 8M 30 fps JPEG+YUV interleaving	300	
Static IDD	Power Down Mode	15	uA
	Power Down Mode (CPU code retention)	45	

Current value has been measured under typical condition

Competitiveness

Section	MV9351	Description
Speed	8M 30 fps 266 MHz In/Output 330 MHz	8M 30fps processing
Performance	Lots of new features Including zero shutter lag processing	true zero shutter lag without any frame delay
power	95mA @Full HD 30fps 300mA @8M 30fps	8M full size operation can be done without power issue
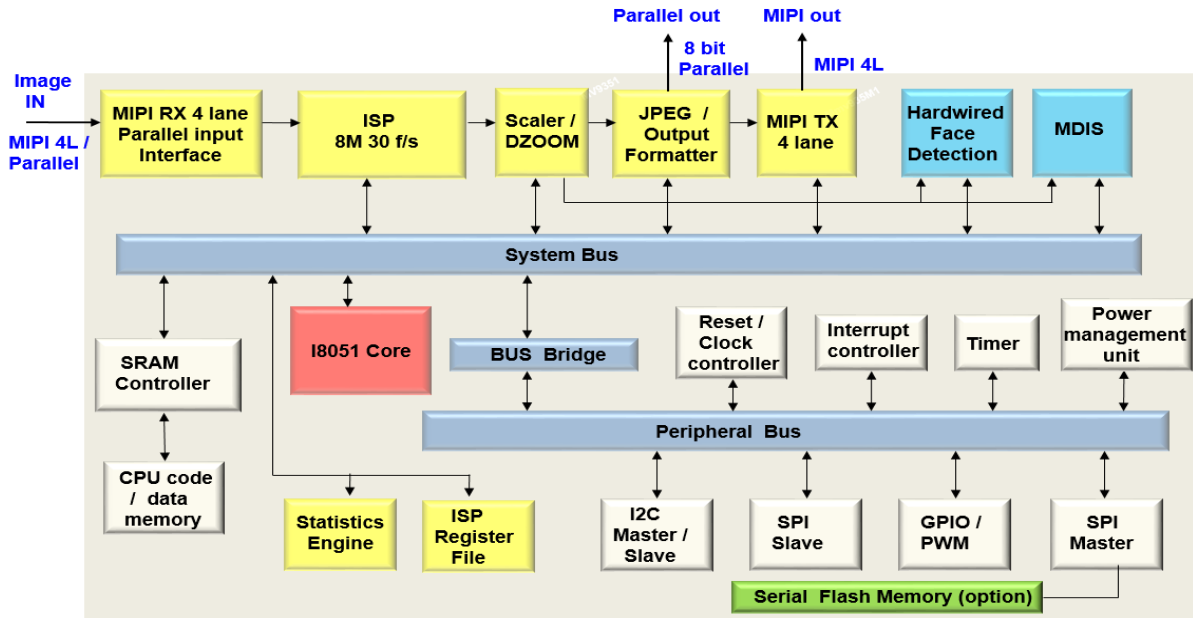
System Features

- Power down mode with CPU code retention
- 45 uA standby current under CPU code retention
- True single chip operation without SDRAM and flash memory
- I8051 CPU core
- SPI type serial flash memory stack option
- Two I2C master interfaces for 2 sensor control
- SPI master interface
- I2C slave for host interface
- SPI slave for host interface
- 16 GPIOs
- 2 channel controllable PWM
- 3 PLLs

Input / Output Features

- MIPI RX 4 lane and Parallel 10 bit input
- Dual camera control support with separate reset and clock signal
- Bayer and YUV input
- MIPI RX embedded data support

- MIPI TX 4 lane and parallel 8 bit output
- MIPI hardware interleaving (JPEG & YUV)
- MIPI TX embedded data support
- YUV data up to 1280x960 are transferred with 8M JPEG at 30 fps
- YUV422, YUV420, JPEG, JPEG+YUV, Bayer and REG565 output support
- True zero shutter lag operation
- 8M full size JPEG capture during Full HD recording

ISP Features

- Max resolution 8M pixel
- Processing image data width 12 bit
- ISP Pixel processing rate 266 MHz
- Input / Output processing rate 330 MHz
- Bayer and 2 stage Y/C noise reduction
- RGB and Y gamma correction
- 2x2 defect pixel compensation
- Optical Lens shading correction for multi light sources
- Hue, saturation control
- Pixel aligned edge enhancement
- Adaptive luminance based on histogram equalization
- 256 zones for image statistic processing
- AE, AWB, AF
- Flicker detection and correction
- Auto scene detection and continuous AF
- Color temperature detection
- Preferable color reproduction

Other Camera Features

- Hardwired face detection engine
- FD based AE, AWB and AF
- MDIS motion vector generation
- Bi-cubic digital zoom up to 4x
- Test pattern generator
- Y/C map function
- On-the-fly JPEG operation
- EXIF tag support
- Various image effect
- Scalado speedtag