PC Camera Controller

# SN9C105 Data Sheet

Released Version 1.0

March 16, 2004

1. General Description

The SN9C105 is a video/audio single-chip processor to pair with the resolution of VGA or CIF CMOS image sensor. It reads the 9 or 8 bits input raw image data (RGB Bayer pattern) from an image device and outputs through a USB port into the PC. This chip includes three individual digital color gains setting (named R, G, B gains), H/W color and JPEG compression engine, offset compensation, hardware windowing with random image size selection, scaling functions, and audio input interface.

2. Features

- 9-Bit CMOS image raw data input
- Up to 30fps@VGA for PC mode video
- Provide individual R/G/B digital color gains control
- Provide snapshot function
- Support pixel offset compensation
- Support CIF/VGA CMOS sensor, IC-media, TASC 5110/5130, Hynix 7131D/E/R, OmniVision, Pixart 106/202, Micron, NS, CI sensor, … etc
- Embedded two modes of AE calculation and report
- Built in microphone interface that includes pre-amplifier, PGA, and 10 bit audio ADC
- Built-in external EEPROM controller for customer V_ID, P_ID, defect pixel compensation and streaming setting
- Provide internal up to 26 various P_ID in default setting
- Provide hardware windowing, 1/2, 1/4 scaling function with smooth filter
- Built-in gamma correction and white balance gain circuit
- Support operation mode in image quality/frame rate selection
- USB 1.1 compliance and support suspend mode
- USB 5 endpoints: control, isochronous read, bulk read, interrupt read, and another ISO read for audio data
- Support video data transfer either in USB isochronous or bulk modes
- Up to 9 alternated setting for USB isochronous transfer of video data
- 12MHz crystal and 3.3 volt only
- 48 pins LQFP package
- Embedded hardware color DSP and JPEG baseline capability of compression encoder
- No external memory needed

3.   Functional Block Diagram
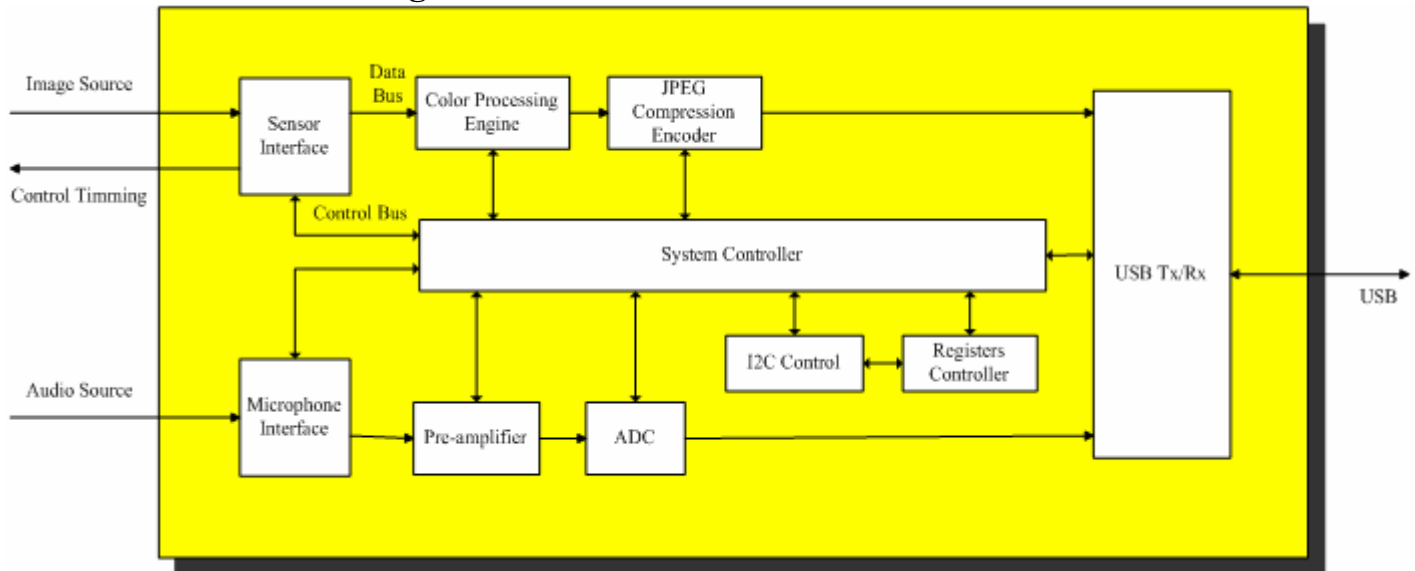
4.   Pin Assignment

SN9C105	PIN NAME	DIR	Description
1	GND	P	GND for core and I/O
2	GPIO2	B	General purpose I/O
3	PID_SEL2	I	Product ID selection (H,L,Z)**
4	PID_SEL1	I	Product ID selection (H,L,Z)**
5	PID_SEL0	I	Product ID selection (H,L,Z)**
6	KEY	I	KEY input
7	RST	I	chip reset
8	AVREFH	P	Vref+ for audio ADC
9	AVREFL	P	Vref- for audio ADC
10	VMID	P	Vcom for audio ADC
11	VSSA1	P	AVSS for audio ADC
12	VDDA1	P	AVDD for audio ADC
13	SIN_PGA	B	PGA input for audio ADC
14	OUT_PREA1	B	Pre-Amplify output for audio ADC
15	SIN_PREA1	B	Pre-Amplify input for audio ADC
16	TAVSS	P	Substrate Ground
17	DN	B	D- for USB
18	DP	B	D+ for USB
19	TAVDD	P	VDD for USB
20	GPIO0	B	General purpose I/O
21	GPIO1	B	General purpose I/O
22	TEST	I	test mode
23	S_PWR_DN	O	Power down for sensor

24	LED	O	LED output
25	VDD	P	VDD for core and I/O
26	GND	P	GND for core and I/O
27	SDA	B	I2C data
28	SCL	O	I2C clock
29	S_PCK	B	Sensor pixel clock
30	VDD	P	VDD for core and I/O
31	GND	P	GND for core and I/O
32	SEN_CLK	O	Sensor clock
33	S_VSYNC	B	Sensor vsync
34	S_HSYNC	B	Sensor hsync
35	S_IMG0	B	Sensor image data
36	S_IMG1	B	Sensor image data
37	S_IMG2	B	Sensor image data
38	S_IMG3	B	Sensor image data
39	GND	P	GND for core and I/O
40	VDD	P	VDD for core and I/O
41	S_IMG4	B	Sensor image data
42	S_IMG5	B	Sensor image data
43	S_IMG6	B	Sensor image data
44	S_IMG7	B	Sensor image data
45	S_IMG8	B	Sensor image data
46	VDD	P	VDD for core and I/O
47	XIN	I	OSC input
48	XOUT	O	OSC output

5. Electrical Characteristics

5.1 DC Operating Condition

a. Absolute maximum ratings:

Symbol	Parameter	Rating	Units
Vcc	Power Supply	-0.3 to 3.6	V
Vin	Input Voltage	-0.3 to Vcc+0.3	V
Vout	Output Voltage	-0.3 to Vcc+0.3	V
Tstg	Storage Temperature	-55 to 150	°C

b. Recommended operating conditions:

Symbol	Parameter	Min	Typ	Max	Units
Vcc	Power Supply	3.0	3.3	3.6	V
Vin	Input voltage	0		Vcc	V
Topr	Operating Temperature	0		70	°C

c. DC electrical characteristics:

(Under Recommended Operating Conditions and Vcc=3.0 ~ 3.6V, Tj=0 to +115 °C)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Vil	Input low voltage	CMOS	-0.3		0.3Vcc	V
Vih	Input high voltage	CMOS	0.7Vcc		Vcc+0.3	V
Vil	Input low voltage	TTL	-0.3		0.8	V
Vih	Input high voltage	TTL	2.0		5.3	V
Iil	Input low current	no pull-up or pull-down	-1		1	uA
Iih	Input high current	no pull-up or pull-down	-1		1	uA
Ioz	Tri-state leakage current		-1		1	uA
Vil	Schmitt input low voltage	CMOS		1.20		V
Vih	Schmitt input high voltage	CMOS		2.10		V
Vol	Output Low voltage	Iol=4mA			0.4	V
Voh	Output high voltage	Ioh=4mA	2.4			V
Cin	Input capacitance			2.8		pF
Cout	Output capacitance			2.7	4.9	pF
Cbid	Bi-directional buffer Capacitance			2.7	4.9	pF

5.2 AC Operating Condition

Symbol	Description	Max operation Frequency	Notes
SEN_CLK	Sensor clock	48MHz	
XIN	Crystal input clock	12 MHz	
SCK	I2C clock frequency	400KHz	

6. System Applications

7. Application Circuit

sensor interface

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Title	SONiX TECHNOLOGY CO.,LTD.		
Size B	Document Number SN9C105_EVB_AMP		Rev X1
Date:	Friday, February 13, 2004	Sheet 1 of 2	
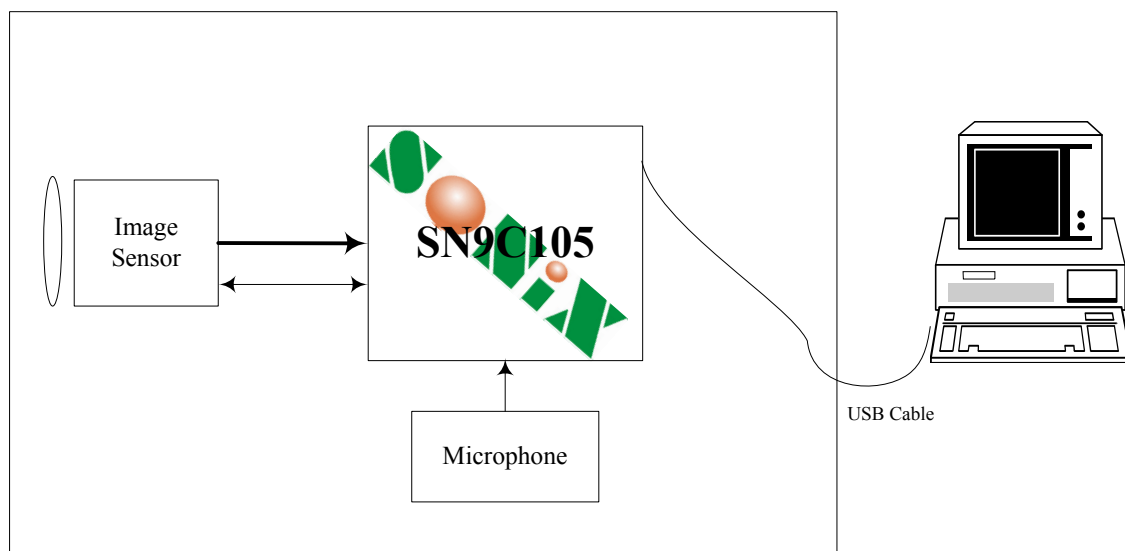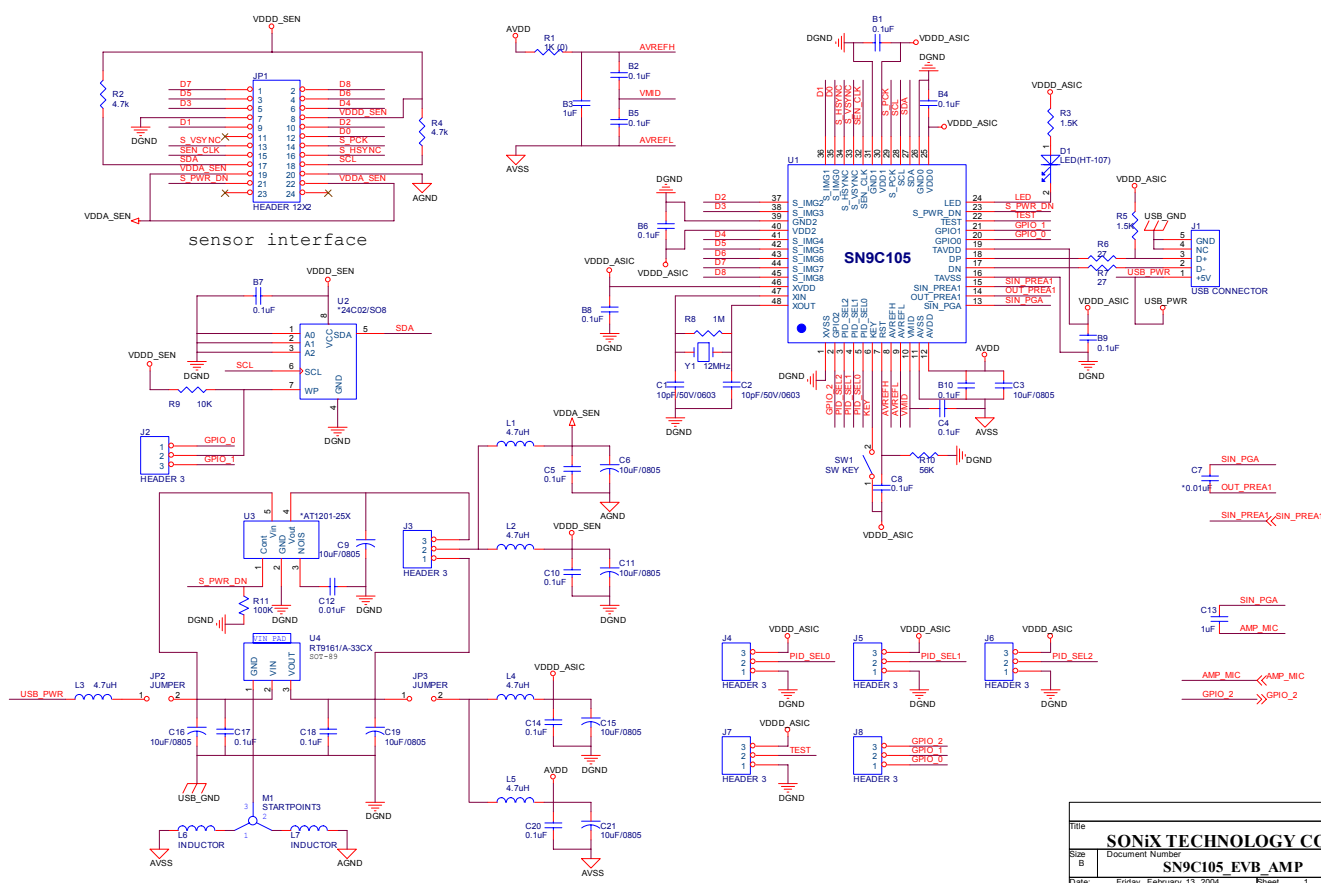
8. Package Information

● **48pin LQFP**
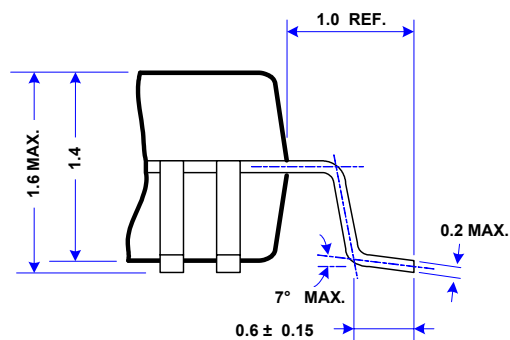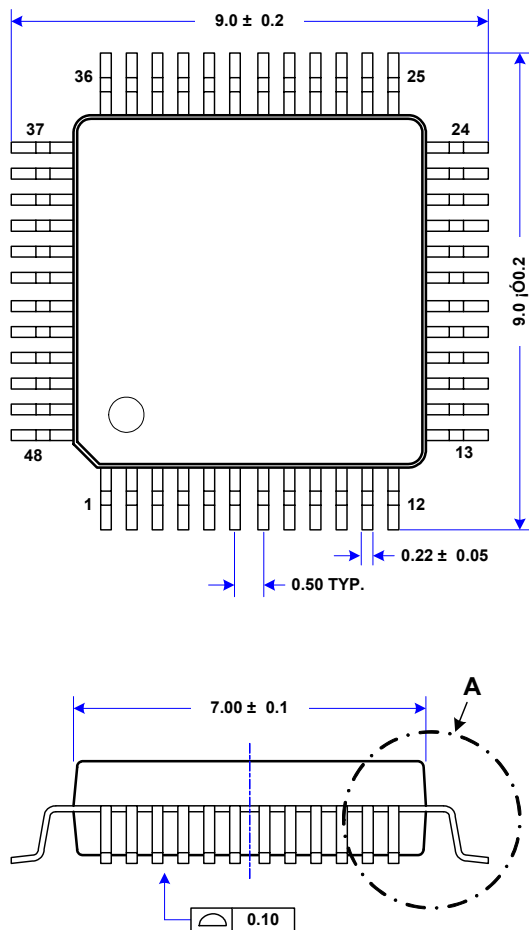
DETAIL VIEW A

(All dimensions are in Millimeters)

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