



Aveo Technology Corp.

AV319L SS1B

Datasheet

April 2011

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Revision History

Version	Modification	Date
1.0	Initiation.	4/14/2011

1. General Description

1.1. About AV319

AV319 audio & video controller offers a cost effective solution for USB2.0 PC camera application.

The key building blocks of this chip are VCL for flexible sensor interface, Turbo 8051 processor, analog ADC, amplifier and USB 2.0 controller that supports both USB video class and audio class driver.

There are many sensors setups as well as different image tuning effects built-in without the need of external EEPROM. In addition to the highly integrated functions and superior quality, it has 3 LDOs fully integrated to reduce the system cost.

Besides cost benefit and superior quality, this chip also consumes very low power and makes it very attractive for built-in camera applications. It also offers design flexibility to any different kind of sensor choice, size form factors, system cost, lens selection, focus algorithm, lighting adjustment and etc.

AV319 is for sure the best audio & video controller in the market.

1.2. Applications

- PC Camera

2. General Features

5 Sensors Setup in Chip

- 3 sensors include OV7670, GC0307, OV7725 default setup in chip

Image Data Input

- Support CCD and CMOS image sensor
- OmniVision, Aptina, Samsung, SET, Siliconfile, Pixelplus, GalaxyCore, BYD etc.
- CMOS 8bit ITU-R BT.601, YCbCr sensor input, or 8bit compressed data
- Resolution up to 2048*1536 YCbCr
- Digital video YUV capture speed: XGA15fps; VGA 30fps; QVGA 60fps; QQVGA 60fps
- MJPEG bypass mode speed: OV2640/MI2010 15fps@2M (Note: Limited by sensor output speed)

USB Controller

- Up to 480Mbps high speed USB2.0 compliant device
- High speed USB2.0 compliant device up to 480Mbps
- USB video class 1.1 Compliance (For YUV sensor inputs only, N/A for sensor raw inputs)

Audio

- Support single ended microphone input
- Audio output format: 48KHz (16 bit)
- ISO audio high-speed high bandwidth endpoint
- Support mute and volume control
- Support USB audio class driver
- Built-in mono voice SAR ADC with PGA (24dB), pre-amp (14dB)

Power Supply

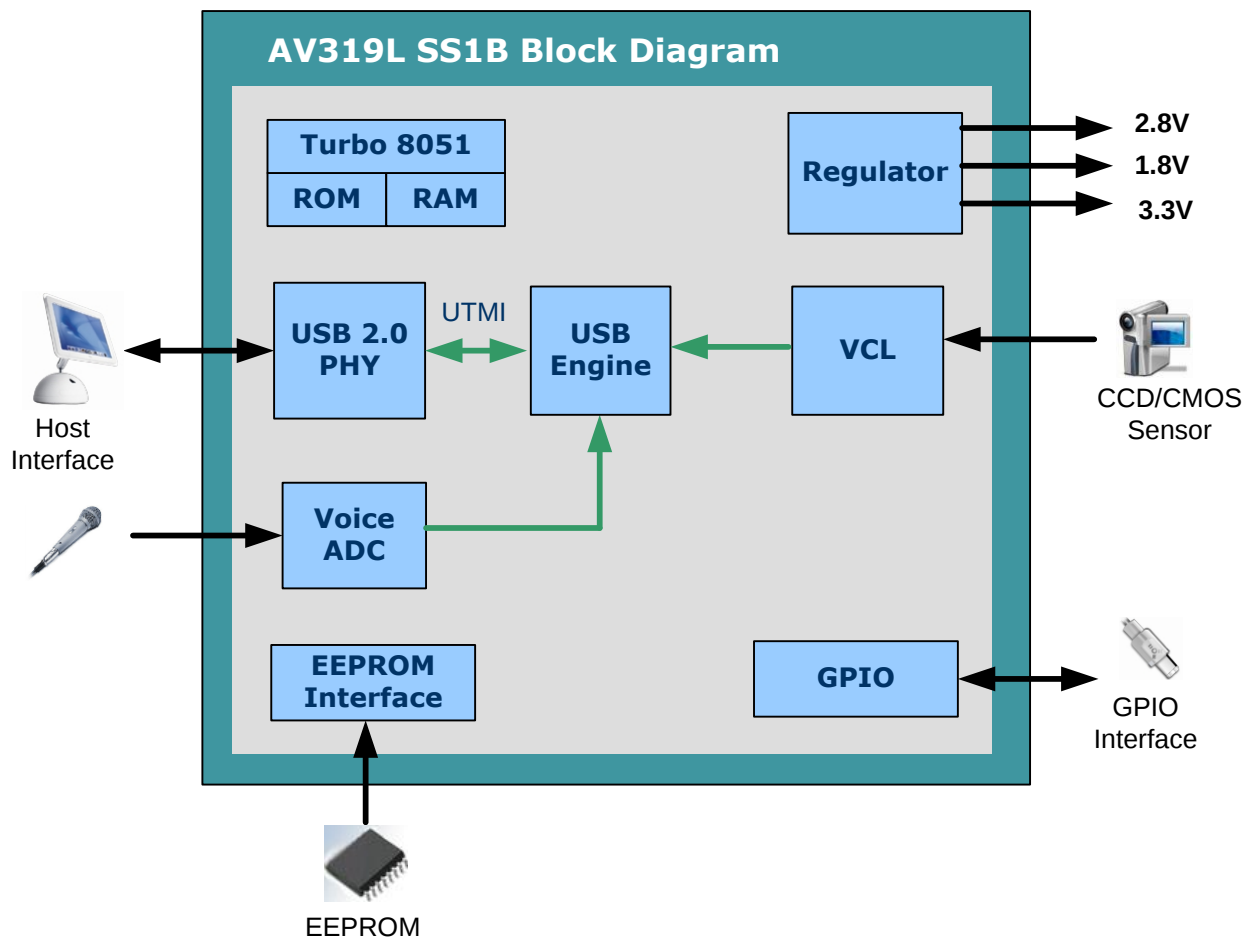
- Single 5.0V operating voltage
- Built-in 3.3V, 2.8V and 1.8V LDOs

Miscellaneous

- Turbo 8051 interface for video data control
- VGA sensor default image effect can be modified through 2KB EEPROM
- Sensor full function tuning only requires EEPROM 4KB for 2M sensor and 8KB for 3M sensor
- External E2PROM code downloadable through USB port
- Programmable Vendor and Product ID through EEPROM
- Clock up to 30MHz

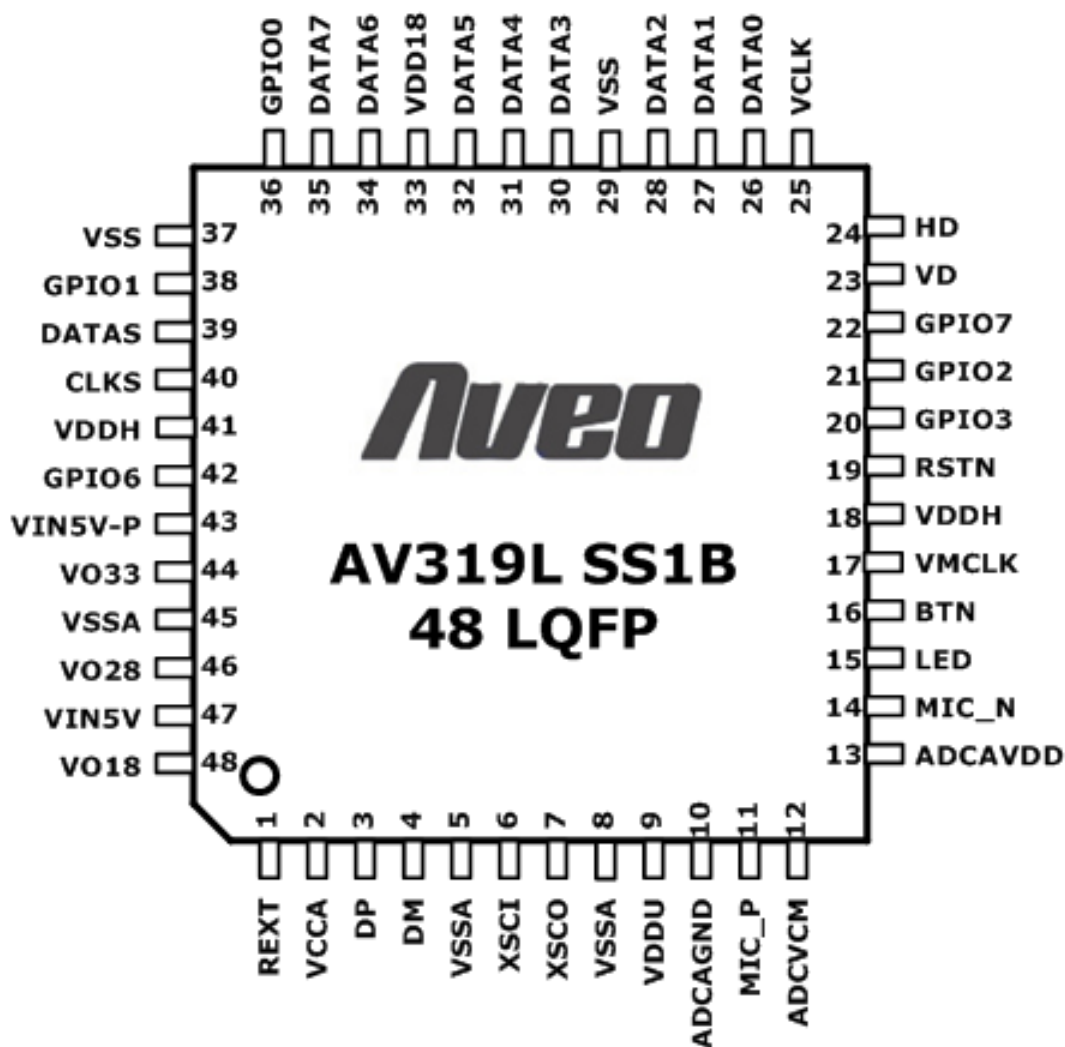
3. Block Descriptions

3.1. Block Diagram



4. Pin Assignment

4.1. Pin-out Diagram



4.2. Pin Description

Pin No.	Symbol	Dir.	Attribute	Description
1	REXT			Analog reference input (need external resistor 330 ~400 OHM to analog GND). When 330 has the best compatibility from the real test case. The purpose of REXT is to provide a reference for the current source of the high-speed driver.
2	VCCA			Analog 3.3V Power, USB/PHY analog power
3	DP	BI		USB2.0 data in data positive pin
4	DM	BI		USB2.0 data in data negative pin
5	VSSA			Analog Ground, USB/PHY analog ground
6	XSCI	IN		Analog input. Crystal oscillator input (12 MHz)
7	XSCO	OUT		Analog output. Crystal oscillator output (12 MHz)
8	VSSA			Digital Ground, USB/PHY Core Ground
9	VDDU			Digital 1.8V Power, USB/PHY Core power
10	ADCAGND			Audio Analog Ground
11	MIC_P	IN		Microphone Input P (AC coupled)
12	ADC_VCM			Audio ADC Reference. External Need Add 10u MLCC Cap.
13	ADCAVDD			Analog 3.3V power. Audio ADC analog power
14	MIC_N			Microphone Input N (AC coupled)
15	LED	BI/INP D	POR_IN INIT_UC SP_Low	LED ON / GPIO
16	BTN	IN	POR_IN Schmit_In	Video Capture Button Input
17	VMCLK	OUT	12mA POR_Low INIT_Low SP_UC	Video master clock
18	VDDH			Digital 3.3V Power
19	RSTN	IN	Schmit_In	Hardware reset, low active

Pin No.	Symbol	Dir.	Attribute	Description
20	GPIO3	BI	POR_Low INIT_Hi SP_Low	General purpose I/O, used as sensor I2C data.
21	GPIO2	BI	POR_Low INIT_Hi SP_Low	General purpose I/O, used as sensor I2C clock.
22	GPIO7	BI	POR_Low INIT_Hi SP_Low	General purpose I/O
23	VD	IN	POR_IN	Vertical Sync
24	HD	IN	POR_IN	Horizontal Sync
25	VCLK	IN		Video pixel clock
26	DATA0	IN		YUV Data0
27	DATA 1	IN		YUV Data1
28	DATA 2	IN		YUV Data2
29	VSS			Digital Ground
30	DATA 3	IN		YUV Data3
31	DATA 4	IN		YUV Data4
32	DATA 5	IN		YUV Data5
33	VDD18			Digital 1.8V Power, core power
34	DATA 6	IN		YUV Data6
35	DATA 7	IN		YUV Data7
36	GPIO0	BI	POR_Low INIT_High SP_Low	General purpose I/O, used as sensor standby control
37	VSS			Digital Ground
38	GPIO1	BI	POR_Low INIT_High SP_Low	General purpose I/O, used as sensor reset control

Pin No.	Symbol	Dir.	Attribute	Description
39	DATAS	BI	POR_Hi INIT_UC SP_Low	EEPROM Serial Bus Data
40	CLKS	OUT	12mA POR_Hi INIT_UC SP_Low	EEPROM Serial Bus Clock
41	VDDH			Digital 3.3V Power, I/O power
42	GPIO6	BI	POR_Low INIT_High SP_Low	General purpose I/O, used as sensor power control
43	VIN5V_P	IN		5V input for built-in 3.3V LDO
44	VO33			3.3V output of built-in LDO(Max driver 60mA)
45	VSS			Digital Ground, LDO Digital Ground
46	VO28			2.8V output of built-in LDO(Max driver 60mA)
47	VIN5V	IN		5V/3.3V input for built-in LDO
48	VO18			1.8V output of built-in LDO(Max driver 60mA)

Note:

1) INPU: input with pull-up resistor

INPD: input with pull-down resistor.

SP_ {Hi, Low, In, UC}: When USB suspend, this pin is in the state of Output High, Low, Input or UC (Unchanged and stay the same value).

POR_ {Hi, Low, in}: After Power on reset, this pin is in the state of High, Low, and Input.

INIT_ {Hi,Low,In,UC}: After Firmware Initialization, this pin is in the state of High, Output Low, Input, UC (Un-changed and stay as same value).

Schmit_In: Schmitt trigger input.

2) All other pads except mentioned above imply 4 mA current.

5. Electrical Characteristics

5.1. DC Operating Condition

5.1.1. Absolute Maximum Ratings

Rating	Symbol	Value	Unit
DC supply voltage	V _{CC}	-0.3 to +4.0	V
Voltage, any pin to ground	V	-0.3 to V _{CC} +0.3	V
DC current drain per pin(excluding VDD,VSS)	I	±10	mA
Operating temperature range	T _A	0 to + 70	°C
Storage temperature	T _{stg}	-40 to 150	°C

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the optional sections of this datasheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

5.1.2. Recommended Operating Conditions

Symbol	Parameter	Min	Type	Max	Unit
VDD	Core power supply	1.62	1.8	1.98	V
VCC3O	Power supply of 3.3V I/O	2.97	3.3	3.63	V
VCC2V8	Power supply of 2.8V	2.52	2.8	3.08	V
VIN3	Input voltage of 3.3V I/O with 5V tolerance	0	3.3	5.25	V
T _j	Commercial junction operating temperature	-20	25	85	°C
I _{ccu}	USB Unconfigured state current		39.7		mA
	core VDD		27.4		
	VCC3O		1.3		
I _{cc}	AVCC		11.1		mA
	Operation supply current		46.5		
	core VDD		30.8		
I _{ccs}	VCC3O		0.7		uA
	AVCC		17.4		
	Suspend supply current		300		
I _{ccs}	core VDD		0		uA
	VCC3O		20		
	AVCC		170		

Note: VDD is connected to pin V1_8, output of the built-in 1.8V regulator.

5.1.3. Leakage Current and Capacitance

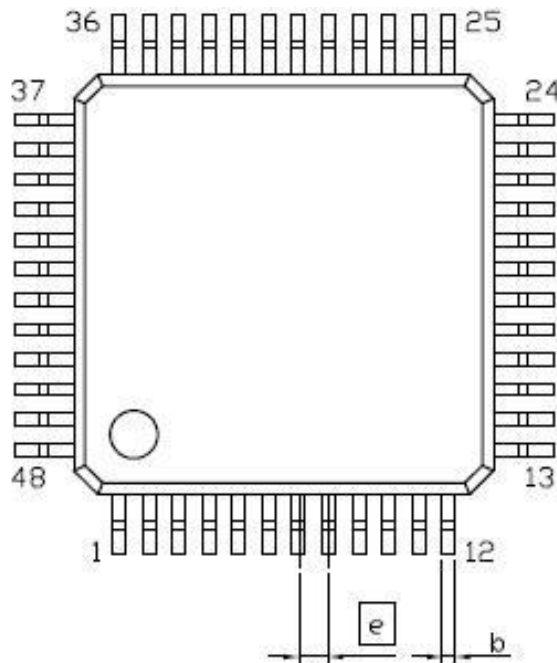
Symbol	Parameter	Condition	Min	Type	Max	Unit
I_{in}	Input current	No pull-up or pull-down	-10	--	10	uA
IOZ	Tir-state leakage current		-10	--	10	uA
CIN	Input capacitance			2.8		pF
Cout	Output capacitance			2.8		pF
CBID	Bi-directional buffer capacitance			2.8		pF

Note: The capacitance listed above does not include pad capacitance and package capacitance. One can estimate pin capacitance by adding a pad capacitance of about 0.5pF and the package capacitance.

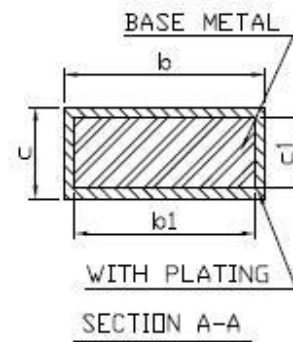
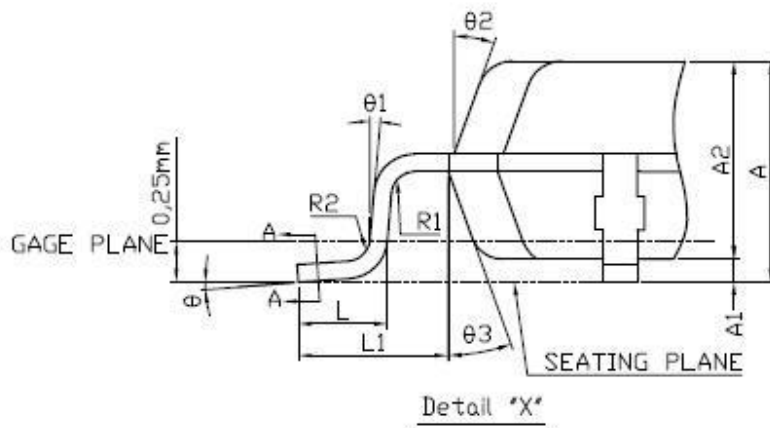
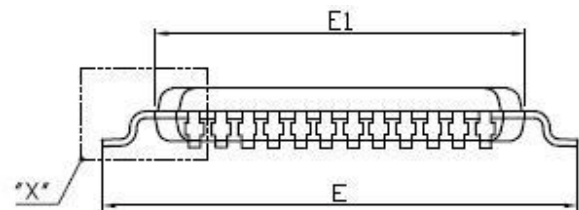
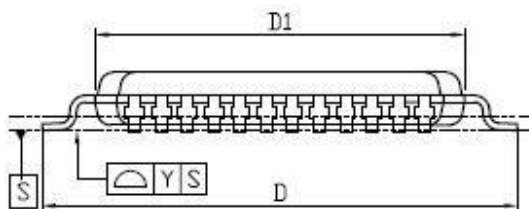
5.1.4. DC Characteristics of 3.3V I/O Cells (Temp = 25 °C)

Symbol	Parameter	Condition	Min	Type	Max	Unit
VDD	Core power supply	Core area	1.62	1.8	1.98	V
VCC3O	Power supply of 3.3V I/O		3.0	3.3	3.6	V
VCC2V8	Power supply of 2.8V		2.52	2.8	3.08	V
Temp	Junction temperature		0	25	125	°C
V_{il}	CMOS Input low voltage	LVTTL			0.8	V
	Schmitt trigger low voltage		0.8		1.2	
V_{ih}	CMOS Input high voltage		2.0			V
	Schmitt trigger high voltage		1.4		2.0	
V_t	Schmitt trigger Hysteresis		0.6		0.9	V
V_{ol}	Output low voltage	$ I_{ol} =2,4,8,16,24mA$			0.4	V
V_{oh}	Output high voltage	$ I_{oh} =-2,-4,-8,-16,-24mA$	2.4			V
I_{in}	Input leakage current	VCC3O=MAX, 0V<= V_{in} <=5.5V	-10		10	μA
	Input current with 40kΩ pull down	$V_{in}=VCC3O$	40		160	μA
	Input current with 40kΩ pull up	$V_{in}=0$	-160		40	μA

6. Package Information



SYMBOL	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A			1.60			63
A1	0.05		0.15	2		6
A2	1.35	1.40	1.45	53	55	57
b	0.17	0.22	0.27	7	9	11
b1	0.17	0.20	0.23	7	8	12
c	0.09		0.20	4		8
c1	0.09		0.16	4		6
D	9.00 BSC			354 BSC		
D1	7.00 BSC			276 BSC		
E	9.00 BSC			354 BSC		
E1	7.00 BSC			276 BSC		
ⓔ	0.50 BSC			20 BSC		
L	0.45	0.60	0.75	18	24	30
L1	1.00 REF			39 REF		
R1	0.08			3		
R2	0.08		0.20	3		8
Y			0.075			3
θ	0°	3.5°	7°	0°	3.5°	7°
θ1	0°			0°		
θ2	11°	12°	13°	11°	12°	13°
θ3	11°	12°	13°	11°	12°	13°



AV319L (LQFP)

7. Contact Information

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Note:

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