ARK3399

USB2.0 PC Camera Controller

(Primarily & Brief)

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1. General Description

The ARK3399 is a single-chip processor complied with high speed USB2.0, interfaces with the resolution of QVGA/CIF/VGA/SVGA/XGA/SXGA image sensors in a LQFP48 package for normal application. The ARK3399 combines USB2.0 transfer functions, image signal procession, image compression,audio sampling and the sensor interface. Thanks to the advanced functions, the ARK3399 provides PC Camera with a high cost-effectiveness solution

2. Technical Features

◆ USB Module

- Complied with USB specification version 2.0 for high-speed (480Mbps) and full-speed (12Mbps) USB
- Support video data transfer in USB isochronous
- Complied with USB Video Class Version 1.1 and USB Audio Class Version 1.1

◆ Sensor Module

- 8/10 Bit CMOS image raw data input
- Support QVGA/CIF/VGA/SVGA/XGA/SXGA CMOS sensor with RGB/YUV/YCbCr output
- Up to 30fps@VGA or 15fps@SXGA for PC mode video
- Provide individual R/G/B digital color gains control

◆ Image Processing Module

- Provide snapshot function
- Provide color special effect function
- Embedded AE calculation and report
- Built-in gamma correction and auto white balance gain circuit
- Provide Hardware scale with smooth filter function
- Embedded high performance color processor
  - JPEG baseline capability of compression encode
- Provide QQVGA/QCIF/QVGA/CIF/VGA/XGA/SXGA/WGA/WXGA output image format
- No external memory needed

◆ Other

- Integrate audio sampling function
- Integrate DFT/BIST function
- Integrate LDO, provide 3.3v, 1.8v and 1.2v output (internal 3.3v LDO is optional)
- Support general purpose I/O control
- Built-in EEPROM controller for custom V_ID, P_ID and other information, support EEPROM write protection function
- 3K program RAM, upload from EEPROM
- 48K Bytes ROM

3. Block Diagram

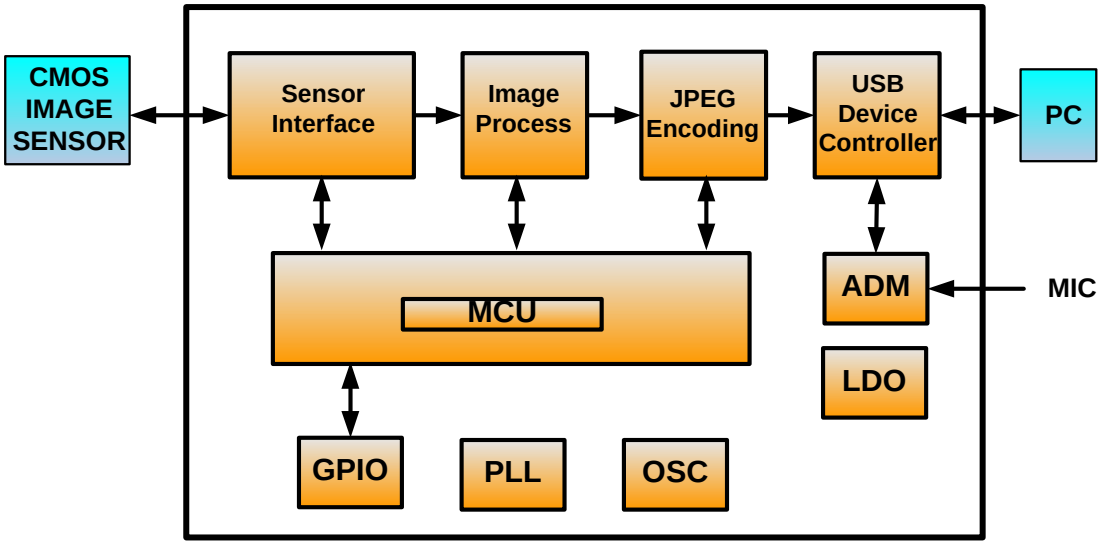
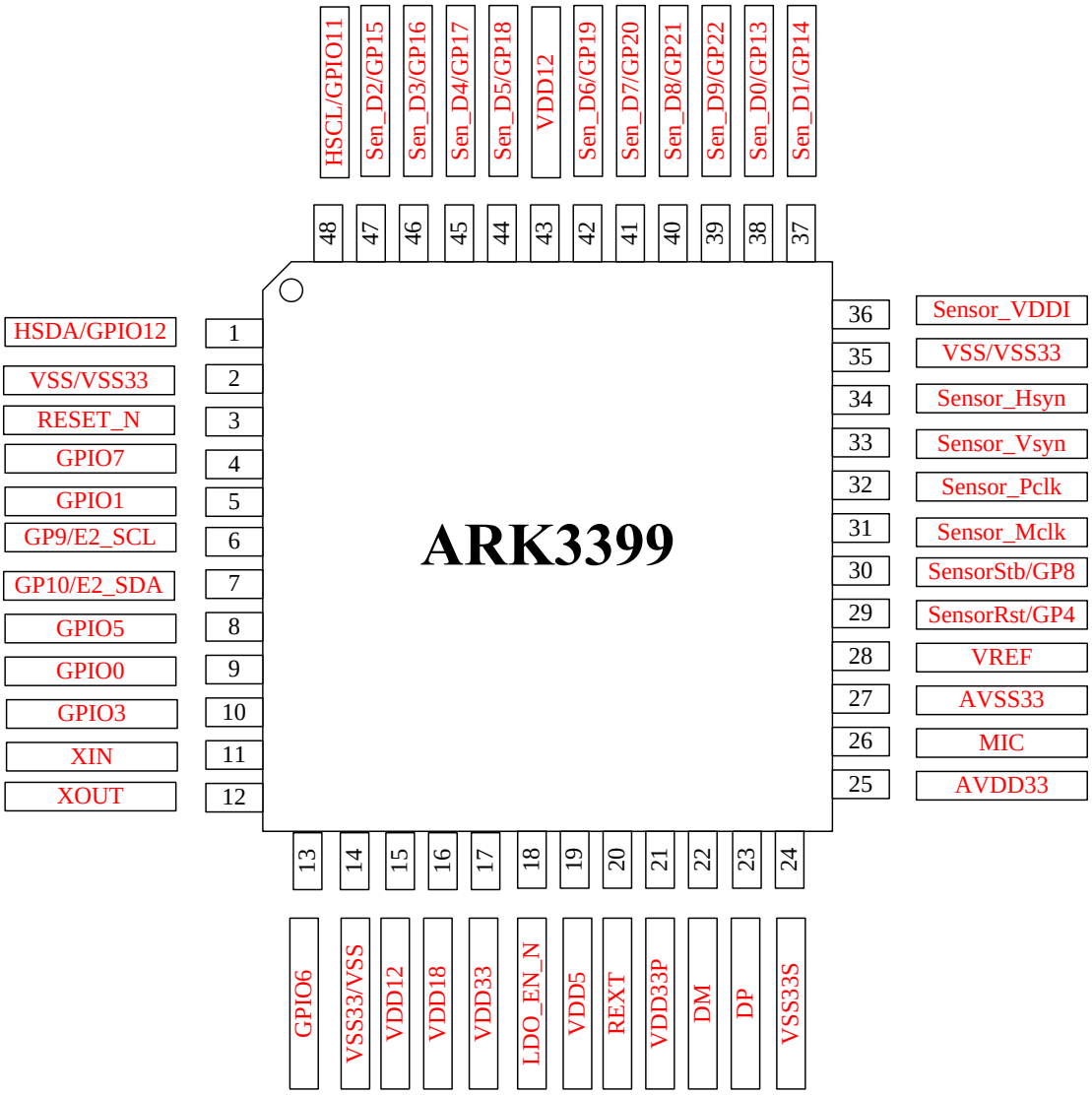


Figure 3.1 Simple Block Diagram

4. Pin Configuration



5. Pin List

Pin No.	Name	Attribute	Function Description
Power Supply			
2	VSS/VSS33	P	Ground
14	VSS/VSS33	P	Ground
15	VDD12	P	1.2V Power Supply
16	VDD18	P	1.8V Power Supply
17	VDD33	P	3.3V Power Supply
19	VDD5	P	5V Power Supply
21	VDD33P	P	USB PHY 3.3V Power Supply
24	VSS33S	P	USB PHY Ground
25	AVDD33	P	3.3V Analog Power Supply
27	AVSS33	P	Analog Ground
35	VSS/VSS33	P	Ground
36	Sensor_VDDI	P	Sensor Power Supply
43	VDD12	P	1.2V Power Supply
USB			
20	REXT	I	Reference for USB Driver (R=10kΩ to Ground)
22	DM	I/O	USB D-
23	DP	I/O	USB D+
SENSOR			
29	GPIO4	I/O	Sensor Reset [2]; General Purpose I/O
30	GPIO8	I/O	Sensor Standby[2]; General Purpose I/O
31	Sensor_Mclk	O	Sensor Mclk output
32	Sensor_Pclk	I	Sensor Pclk input
33	Sensor_Vsyn	I	Sensor Vertical SYNC Input
34	Sensor_Hsyn	I	Sensor Horizontal SYNC Input
37	GPIO14	I/O	Sensor DATA 1; General Purpose I/O
38	GPIO13	I/O	Sensor DATA 0; General Purpose I/O
39	GPIO22	I/O	Sensor DATA 9; General Purpose I/O
40	GPIO21	I/O	Sensor DATA 8; General Purpose I/O
41	GPIO20	I/O	Sensor DATA 7; General Purpose I/O
42	GPIO19	I/O	Sensor DATA 6; General Purpose I/O
44	GPIO18	I/O	Sensor DATA 5; General Purpose I/O
45	GPIO17	I/O	Sensor DATA 4; General Purpose I/O
46	GPIO16	I/O	Sensor DATA 3; General Purpose I/O
47	GPIO15	I/O	Sensor DATA 2; General Purpose I/O
Other IO			
1	GPIO12	I/O	SDA0; General Purpose I/O[1]
3	RESET_N	I	External Reset Input, Active Low

4	GPIO7	I/O	Image Indicator; General Purpose I/O(1)
5	GPIO1	I/O	Special Effect/Hardware Snapshot Key; General Purpose I/O(1)
6	GPIO9	I/O	SCL1; General Purpose I/O(1)
7	GPIO10	I/O	SDA1; General Purpose I/O(1)
8	GPIO5	I/O	USB1.1/USB2.0 Select; General Purpose I/O(1)
9	GPIO0	I/O	VGA/QVGA Window Select; General Purpose I/O(1)
10	GPIO3	I/O	50Hz/60Hz Select; General Purpose I/O(1)
13	GPIO6	I/O	MIC Function Select; General Purpose I/O(1)
18	LDO_EN_N	I	Internal LDO Enable, Active Low
48	GPIO11	I/O	SCL0; General Purpose I/O(1)
AUDIO			
28	VREF	I	MIC Reference Voltage Input
26	MIC	I	Audio Input
Crystal			
11	XIN	I	Crystal Input
12	XOUT	O	Crystal Output

Note 1: All GPIOs except GPIO15-GPIO22 are internal pullup.
Note 2: The function of pads are defined by software according to applications.

6. Electrical Characteristics

6.1 DC Operating conditions：

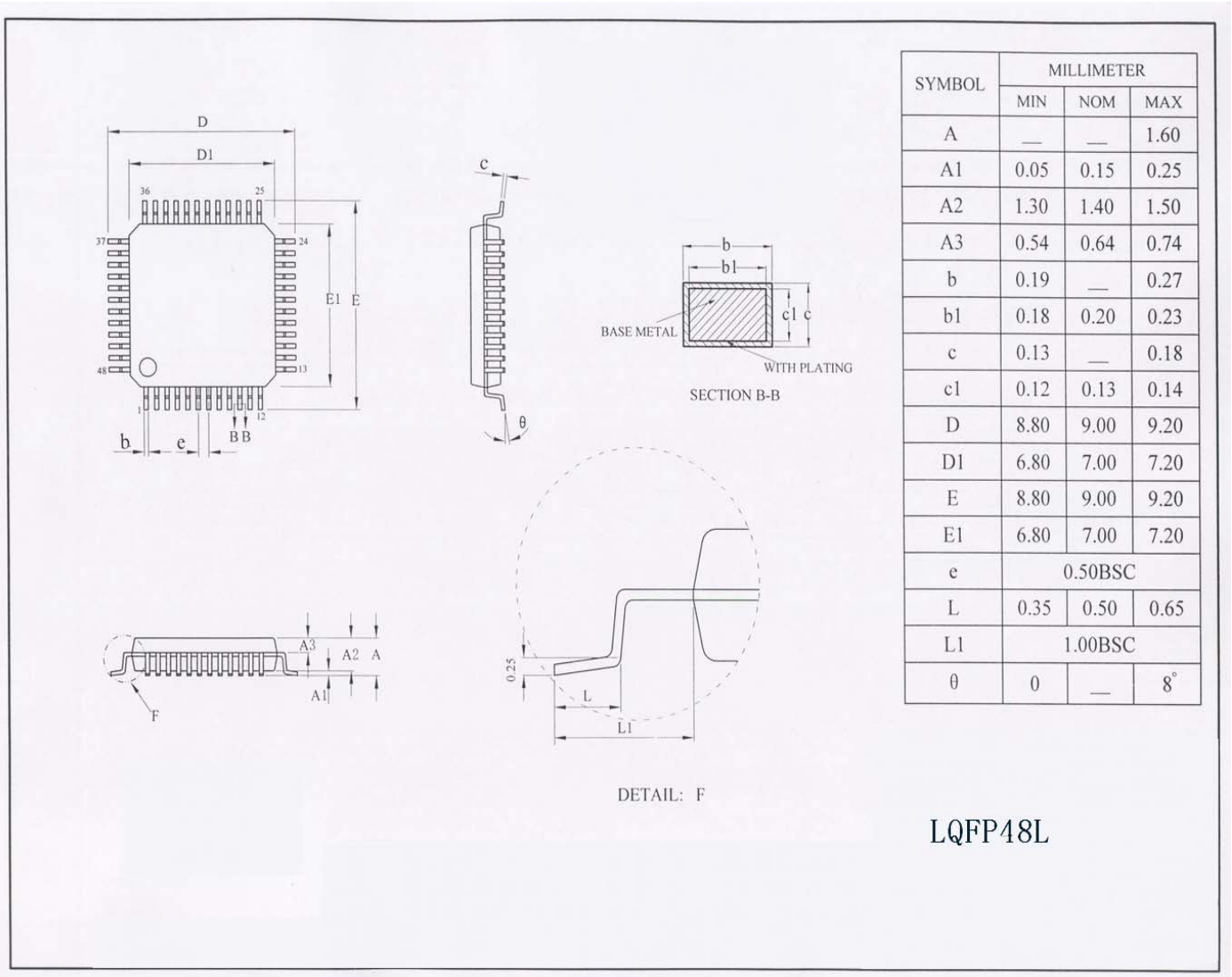
Symbol	Parameter	Min	Typ	Max	Unit
VDD33	Power Supply	2.85	3.0	3.15	V
VDD18	Power Supply	1.6	1.7	1.8	V
Vin	Input voltage	3.7		5.6	V
Topr	Operating temperature	-10		70	℃

Note1: 3.3V LDO output voltage can be adjusted for 2.7V/ 2.8V/ 2.9V/ 3.0V/ 3.1V/ 3.2V/ 3.3V，the default value is 3.0V
Note2: 1.8V LDO output voltage can be adjusted for 1.2V /1.5V /1.7V /1.75V /1.8V /1.85V /1.9V，the default value is 1.7V

6.2 AC Operating conditions:

Symbol	Description	Max Operating Frequency
MCLK	Sensor clock (adjust)	24MHz (default)
XI	Crystal input clock	12MHz±6KHz
SIO_C	I^2C clock frequency	400KHz

7. Package Diagram



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	0.15	0.25
A2	1.30	1.40	1.50
A3	0.54	0.64	0.74
b	0.19	—	0.27
b1	0.18	0.20	0.23
c	0.13	—	0.18
c1	0.12	0.13	0.14
D	8.80	9.00	9.20
D1	6.80	7.00	7.20
E	8.80	9.00	9.20
E1	6.80	7.00	7.20
e	0.50BSC		
L	0.35	0.50	0.65
L1	1.00BSC		
θ	0	—	8°

LQFP48L