500 万高清 720P 笔记本电脑 摄像头模组规格书

CAM Module Product Specifications

伟达科技有限公司（Wedatech)——是一家港资高新技术企业，以摄像视讯应用为主业的方案设计公司，旗下有苏州研发中心与生产中心，深圳海瑞洋科技有限公司为其深圳子公司，伟达科技有十几年的摄像头应用技术经验，现自主研发高像素高清系列摄像头产品,物理像素从30万、100万、200万、500万、800万、900万等系列产品；高清产品主要有720P、1080P、高速720P、高速1080P、高清宽动态等系列产品；主要应用领域包含：高清视频会议专用摄像头系列产品、高拍仪摄像头方案系列产品、VTM/ATM机专用摄像头系列产品、工业相机专用摄像头系列产品、笔记本电脑摄像头系列产品、3D摄像头系列主板等高端方案产品。

笔记本电脑摄像头系列产品：

百万高清定焦720P： SM-1M-BF01-FF

200万高清定焦720P： SM-2M-BF01-FF

高速100万高清定焦720P： SN-9712-2

500万像素自动对焦模组 SM-5M-OV02-AF

本规格书主要描述高速500万高清720P定焦USB2.0

摄像头模组

型号： **SM-5M-OV02-AF**

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Mfr M/N: SM-5M-OV02-AF
Revision 1.0

Customer					
Customer Approval					
Approval	**Check**				

Revision History

Revision No.:	Revised Date	Revised By	Description
1.0	2013-09-27	JARRY	First draft

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1. General Description

1.1 Modules Described

This camera module is a USB2.0 Auto focus camera that designed for FF CAMERA. The backend IC and image sensor is adoption the M732 and OV5640. It is fully compliant with the USB Video Class 1.1 standard. The dimension of the camera module is 64×9×6.0mm(L×W×H).

2. Features

2.1 Sensor Specification

features

- 1.4 µm x 1.4 µm pixel with OmniBSI technology for high performance (high sensitivity, low crosstalk, low noise, improved quantum efficiency)
- optical size of 1/4"
- automatic image control functions: automatic exposure control (AEC), automatic white balance (AWB), automatic band filter (ABF), automatic 50/60 Hz luminance detection, and automatic black level calibration (ABLC)
- programmable controls for frame rate, AEC/AGC 16-zone size/position/weight control, mirror and flip, cropping, windowing, and panning
- image quality controls: color saturation, hue, gamma, sharpness (edge enhancement), lens correction, defective pixel canceling, and noise canceling
- support for output formats: RAW RGB, RGB565/555/444, CCIR656, YUV422/420, YCbCr422, and compression
- support for video or snapshot operations
- support for internal and external frame synchronization for frame exposure mode
- support for LED and flash strobe mode
- support for horizontal and vertical sub-sampling, binning
- support for minimizing artifacts on binned image
- support for data compression output
- support for anti-shake
- standard serial SCCB interface
- digital video port (DVP) parallel output interface and dual lane MIPI output interface
- embedded 1.5V regulator for core power
- programmable I/O drive capability, I/O tri-state configurability
- support for black sun cancellation
- support for images sizes: 5 megapixel, and any arbitrary size scaling down from 5 megapixel
- support for auto focus control (AFC) with embedded AF VCM driver
- embedded microcontroller
- suitable for module size of 8.5 x 8.5 x <6mm with both CSP and RW packaging

key specifications (typical)

- **active array size:** 2592 x 1944
- **power supply:**
  core: 1.5V ± 5% (with embedded 1.5V regulator)
  analog: 2.6 ~ 3.0V (2.8V typical)
  I/O: 1.8V / 2.8V
- **power requirements:**
  active: 140 mA
  standby: 20 µA
- **temperature range:**
  operating: -30°C to 70°C junction temperature (see table 8-1)
  stable image: 0°C to 50°C junction temperature (see table 8-1)
- **output formats:** 8-/10-bit RGB RAW output
- **lens size:** 1/4"
- **lens chief ray angle:** 24° (see figure 10-2)
- **input clock frequency:** 6~27 MHz
- **max S/N ratio:** 36 dB (maximum)
- **dynamic range:** 68 dB @ 8x gain
- **maximum image transfer rate:**
  QSXGA (2592x1944): 15 fps
  1080p: 30 fps
  1280x960: 45 fps
  720p: 60 fps
  VGA (640x480): 90 fps
  QVGA (320x240): 120 fps
- **sensitivity:** 600 mV/Lux-sec
- **shutter:** rolling shutter / frame exposure
- **maximum exposure interval:** 1964 x t_{ROW}
- **pixel size:** 1.4 µm x 1.4 µm
- **dark current:** 8 mV/s @ 60°C junction temperature
- **image area:** 3673.6 µm x 2738.4 µm
- **package dimensions:** 5985 µm x 5835 µm

2.2 DSP Specification

The M732 is a USB 2.0 High-Speed (HS) compatible PC Camera controller. The superior image signal processing engine brings sight video experience. The high performance Motion-JPEG / compression engine makes variant compression ratio to satisfy bandwidth requirement.The compliant with USB Video Class . With the integrated sensor interface and color processing engine, it can support most available CMOS sensors that range from VGA to UXGA or HD..

M732 is controlled by the embedded micro-controller, and the statistics for 3A (AE / AWB / AF) are built-in. The flexible architecture consists of mask ROM, internal RAM and external serial-flash which can store the customized codes and parameters. With the highly-integrated firmware architecture and the developing kit provided ,it’ s easy for 3rd party to fulfill customized features..

Maximum Frame Rate	XSGA	SXGA	VGA	CIF	QVGA	QCIF	QQVGA
	2592x1944	1280x960	640x480	352x288	320x240	176x144	160x120
Non-compressed (YUY2)	9fps	25fps	30 fps	30 fps	60 fps	60 fps	60 fps
MJPEG	15fps	30fps	60fps	60fps	60fps	60fps	60fps

2.3 500 万像素定焦 USB 模组 FF（SM-5M-OV02-AF）

【产品描述】

1) 接口：USB2.0；
2) 像素：500 万;
3) 高清：感光尺寸：1/4；
4) 板型： 70 ×8×5.0mm(L×W×H).
5) 镜头参数：

For 1/4 Sensor;
FOV68º

6) 功能支持：线控、硬件拍照、录影等功能；
7) 捕获画面：2592*1944（拍照默认窗口）;

8) 输出格式：YUV2/ MJPG 15fps/2592*1944；

9) 支持操作系统：Windows XP SP2、Vista、Windows7.0、Windows8.0、Windows8.1

10) 驱动方式：UVC 免驱；

11) 单桢捕获存储格式：BMP/JPG；

12) 动态捕获存储格式：AVI/WMV；

13) 模组内容：含线控电路、拍照电路、晶振；

14) 光感：支持光感功能；

15) 工作温度：-30~75℃；

16) 功耗：<0.07W；

3.Pin Description

Number	Name	Pin Type	Description
Pin1	USB+5V	Power	Power Supply for module board
Pin2	USB D-	IO	USB differential signal
Pin3	USB D+	IO	USB differential signal
Pin4	USB GND	GND	Ground of module board
Pin5	SHEWEI GND		

4.Outline Dimensions

Outline Dimension	64.0±0.2mm（W）x 9.0±0.2mm（L）x6.0±0.2mm（H）

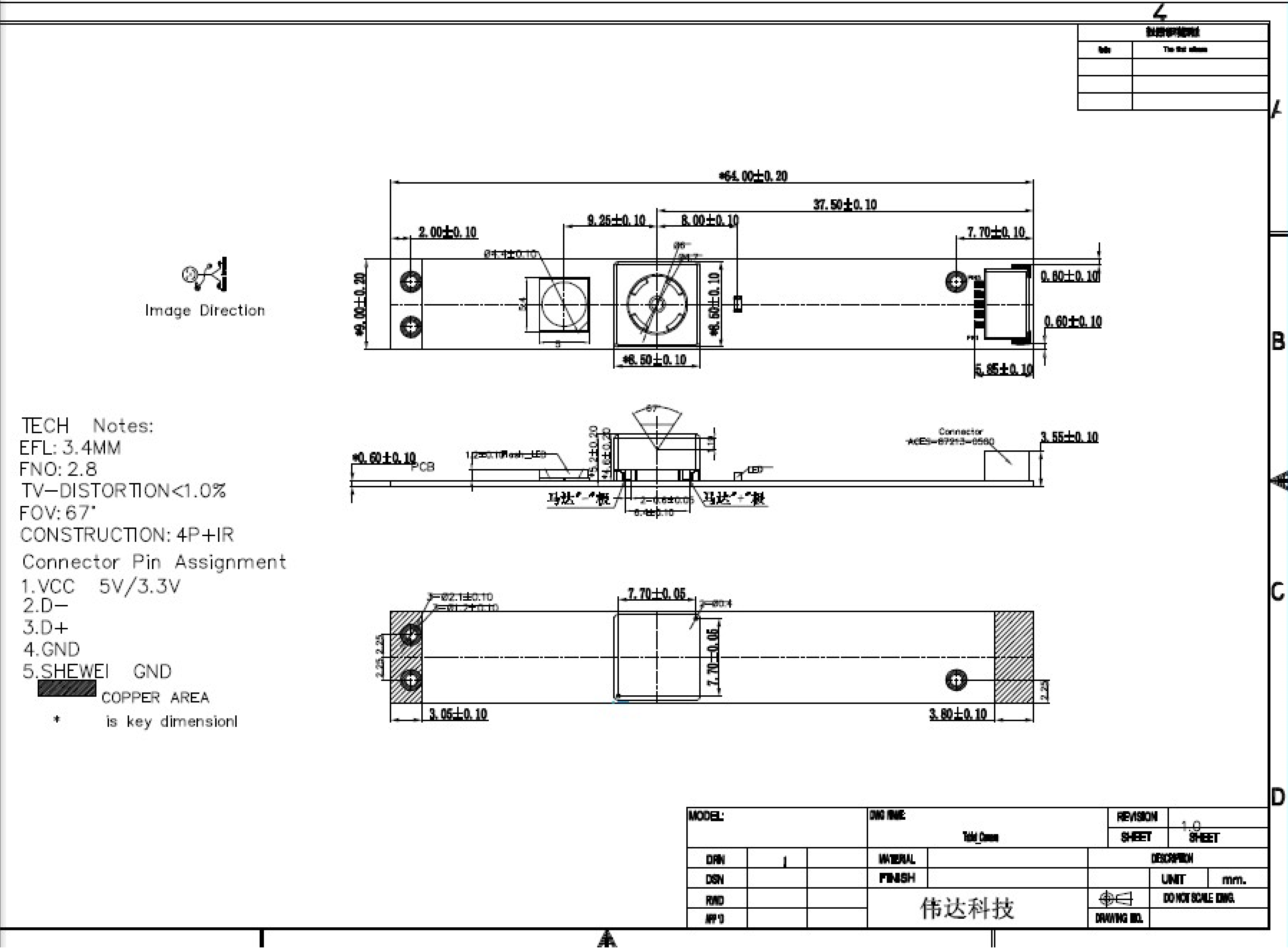


Image Direction
TECH Notes:
EFL: 3.4MM
FNO: 2.8
TV-DISTORTION<1.0%
FOV: 67°
CONSTRUCTION: 4P+IR
Connector Pin Assignment
1.VCC 5V/3.3V
2.D-
3.D+
4.GND
5.SHEWEI GND
COPPER AREA
* is key dimensionl
*64.00±0.20
37.50±0.10
2.00±0.10
9.25±0.10
8.00±0.10
7.70±0.10
0.80±0.10
0.60±0.10
5.85±0.10
*6.50±0.10
*9.00±0.20
*0.60±0.10
PCB
3.55±0.10
7.70±0.05
3.05±0.10
3.80±0.10
MODEL:
REVISION
SHEET
1.0
DRN
DSN
MATERIAL
FINISH
DESCRIPTION
UNIT
mm.
DO NOT SCALE DWG.
DRAWING NO.
伟达科技

5.Image Quality Specifications

5.1 TEST Condition:

Environment luminance: Light Box，500~800lux

Inspection distance: 45cm

Test chart: chart,500*332,LP Width 1.05mm,Around 1.20mm

5.2 Image Quality Specifications

5.2.1 MTF

	Middle	UL	UR	BL	BR
Spec	450	400	400	400	400

5.2.2 Color/Gray/Noise

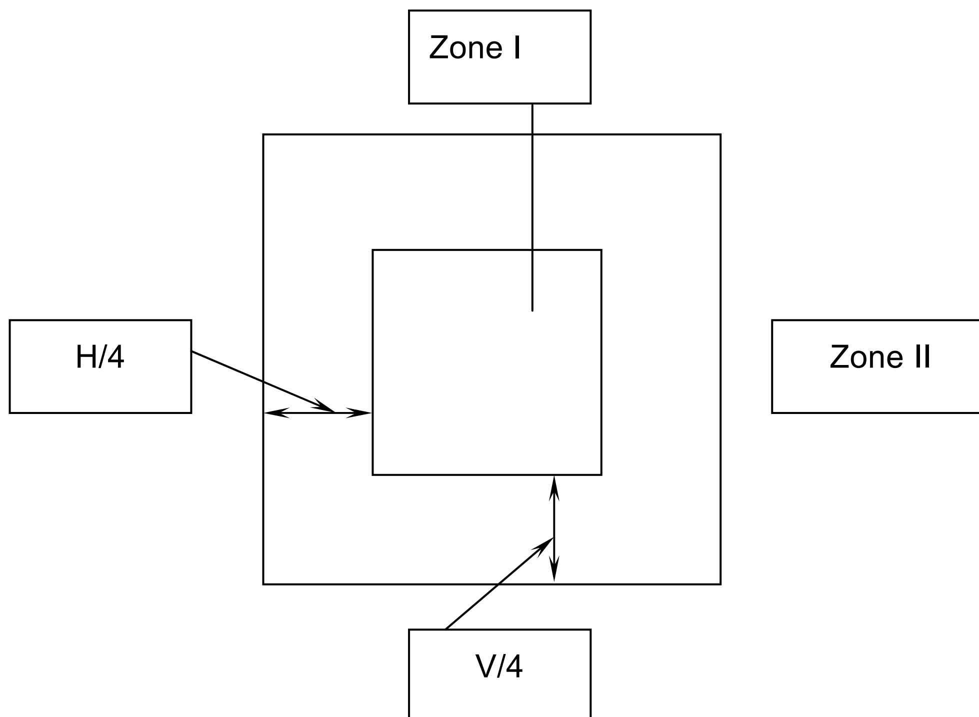
ColorAverageDeltaE	GrayLevel	NoiseBlock0_B	NoiseBlock0_G	NoiseBlock0_R
≤40	≥6	≤30	≤30	≤30

5.2.3 Blemish

There should be no blemish.

5.2.4 Wound Pixel

Dead and Wound Pixel criteria



Zone definition: See diagram above

Table A1: Table of Grading(Under Bright Condition)

Grade	Dead Pixels		Wound pixels		Small Wound Clusters
A	Zone I	Zone II	Zone I	Zone II	Zone I+ Zone II
	2	8	4	32	<=8

Table A2: Table of Grading(Under Dark Field)

Grade	Dead Pixels		Wound pixels		Small Wound Clusters
A	Zone I	Zone II	Zone I	Zone II	Zone I+ Zone II
	2	8	4	32	<=8

Dead pixels include black pixel and bright pixel.

Black Pixels are more than 30% darker than the normal mean pixel are labeled as black pixels.

Bright Pixels are more than 30% brighter than the normal mean pixel are labeled as bright pixels.

Wound Pixel is between 14% and 30% darker or brighter than mean pixel.

A small wound cluster is defined as 1x1 to 2x2 wound pixel size in RGB raw data output and for YUV outputs are defined as 2x2 to 4x4 wound pixel size.

5.2.5 Shading

Each Corner compares with the Center ≥50%

6. Inspection Standard

6.1 Sampling Plan

Follows up *MIL-STD-105E* *LEVEL II* single and Normal plan

Major AQL=0.65 ; Minor AQL=1.5

6.2 Inspection Items and Process

6.2.1 Visual Inspection

Visual inspection need to be done under illuminant 500 ~ 600 lux, Puts the sample around 30 cm far from inspector, checks it from 0 ~ 60 degree to each side at least 5 second by following the sequence from UP to DOWN, then, LEFT to RIGHT by screening.

Dimensions measuring must use a Vernier and/or an Altimeter.

6.2.2 Checking list

Inspection Items	Criteria	Defect	
		Maj.	Min.
Label or Mark	Model name, Part number and Quantity must be filled in correctly.	V	
Anti-Static packing	1. A desiccative must put into Bag. 2.Must be a vacuum-packed after Sealed bag off.		V
PCB surface	Not allow to see serious scratched, excess glue or broken	V	
Lens surface	Must be fixed well by glue		V
Lens joint	Not allows to excess glue over the width of Lens Holder.		V
Total Height from Lens to PCB surface.	6±0.2 MM	V	
Connector	Not allow scratch and dirty	V	
Width of Module	14.0±0.2 MM	V	
Joint of Lens Holder and PCB	Must be firmed, not allows to see gap or warp.	V	
Image Function(Bad Pixel, Wound Pixel Dark, Shut-down, Resolution and Blemish)	Must be according to Image quality specification	V	

Remark:

1. Serious Scratch: Copper or metal should be covered by painting/ coating clear to see caused by Scratch.
2. Slight scratch: Copper or metal under coating / painting can not be seen.

7. Reliability Test

7.1 Test element

Each test should use a new module unless specified.

7.2 Test Schedule

Qualification: During the product development and before the mass production Maintenance: when a design change can influence the function test and when the production place is changed.

Vibration Test

Procedure	The Camera Module device is to be tested for all three axes, whereby a new device should be used for each axis. During the test no device part must loosen or disconnect.
Test parameters	Set on a dummy set(100g), then test according to the condition listed below test condition: Frequency range: 5 ~ 500 Hz G value: 3 G-rms Direction: X, Y and Z-axis Duration: 15 minutes for each axis
Procedure after test / Requirement:	Visual inspection: No loose parts, no evidence of any damage! Functionality test: Full functionality of the Camera Module must be verified.

Drop Test

Purpose	Checks the robustness of the Camera Module against drop.
Scope of testing:	Set on a dummy set(100g) drop from 150 cm Each 6 planes for twice. Notice that the material of the dummy set is wood.
Product requirements:	The function of the device may not be affected or impaired in any way. There may be no loose parts inside/on the test device.

Thermal Shock

Purpose:	Checks the resistance of the Camera Module against a change of the temperature. Mode of operation: Camera Module disconnected.
Test parameters:	Place test samples in Temperature Shock Chamber for 24 cycles (24 hours) at -40℃ for 30min, then +85℃ for 30min, each cycle test are 1 hour.
Procedure after test / Requirement:	•Visual inspection: No physical change. Slight dew formation is permissible. •Functionality test after the camera has returned to ambient temperature for 24hr. Full functionality of the camera must be verified.

High Temperature and Humidity Storage

Purpose:	Checks the resistance of the Camera Module in a high temperature and high humidity environment. Mode of operation: Camera Module disconnected.
Test parameters:	Place test samples in Thermal/Humidity Chamber set at 65℃/90%RH, 48hrs.

Procedure after test / Requirement:	• Visual inspection: No physical change. • Functionality test after the camera has returned to ambient temperature: Full functionality of the camera must be verified.

Low Temperature Storage

Purpose:	Checks the resistance of the Camera Module in a low temperature environment. Mode of operation: Camera Module disconnected.
Test parameters:	Place test samples in Thermal Chamber set at -30℃, 48hrs.
Procedure after test / Requirement:	• Visual inspection: No physical change. • Functionality test after the camera has returned to ambient temperature: Full functionality of the camera must be verified.

Connector Mating

Purpose:	Check the robustness of the Connecter.
Test parameters:	(1). Mating/Un-mating male & female connector (2). Duration : 25 cycles (3). Function test every 5cycles
Procedure after test / Requirement:	•The function of the device may not be affected or impaired in anyway. •Visual inspection: No loose parts, no evidence of any damage.