Preliminary

Contact Image Sensor (CIS) Module

Product Name	**M208-A8**

Approval	Notes

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Approved	Checked	Designed

Issued		Revision no.	

All specifications of this device are subject to change without notice.

Revision control sheet

Revision No.	Date	Item of change and content	Reason	Approved	Designed

CMOS Sensor Inc.

M208-A8

600 dpi Compact Image Sensor (CIS) module

Feature:

- 1344 x 1 image sensing elements
- 600 (dpi) resolution
- 56 mm scanning length
- 15 mm x 15 mm x 70 mm compact size
- Better than 5Mhz pixel output rate
- LED light source
- high MTF
- light weight
- single 5 V power supply
- low power consumption
- high dynamic range > 1000
- high integration for light source, lens and sensor
- 8 pin connector for input and output

Description:

The M208-A8 compact image sensor module is a contact type image sensing module that composes of a line of LED light source, a long Selfoc rod lens array, and 1344 pixels of photo-detector array. Input and output electronic contact is via a 8-pin connector. The cross section view and functional block diagram of the M208-A8 is shown in figure 1 and figure 2, respectively.

The module is suitable to scan an A8 size (56 mm) document. Applications include fax machine, document scanner, mark reader, and other office automation equipment.

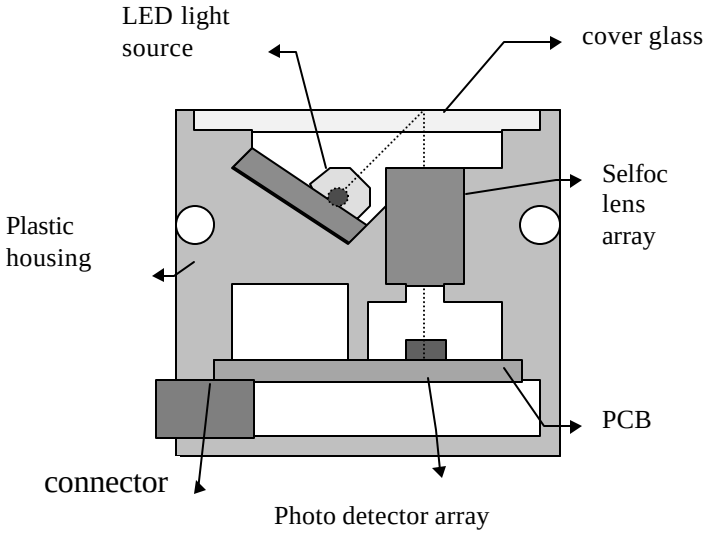

Figure 1. Cross section view of M208-A8.

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Functional block diagram:

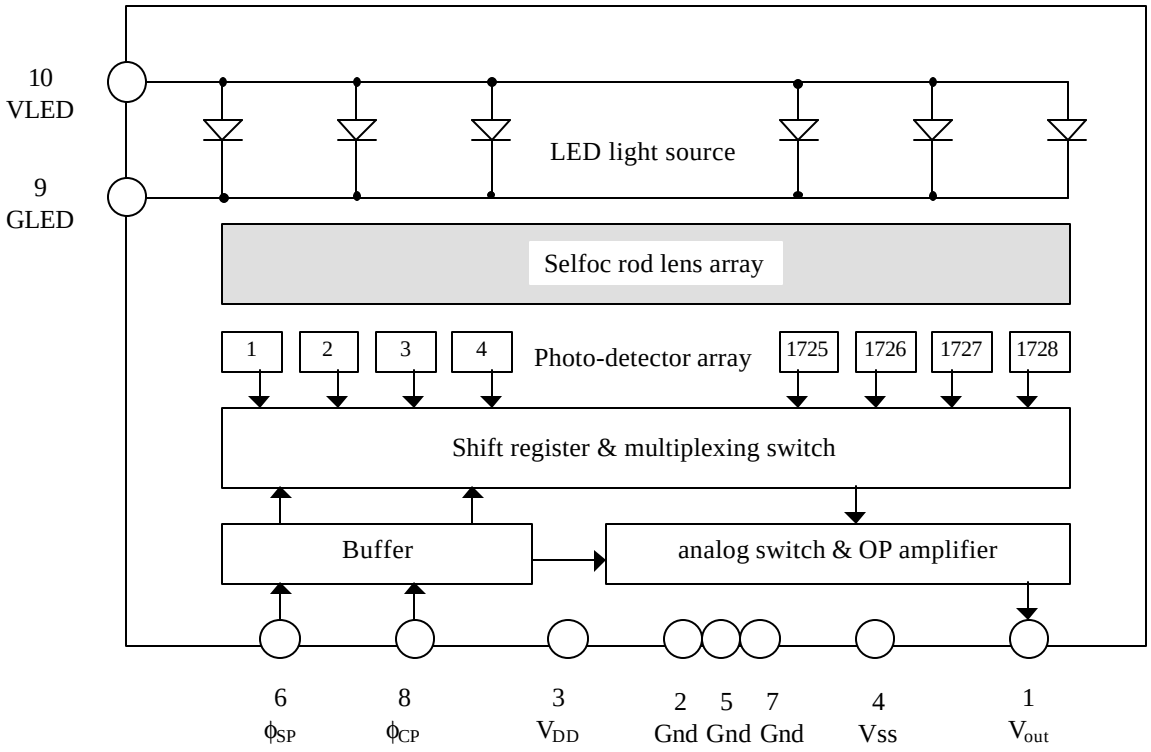


Figure 2 Functional block diagram of M100-A6.

Pins Description:

Pin #	Symbol	Description
1	VOUT	Output video signal
2	GND	Ground 0V
3	VDD	Module power supply voltage (+5V)
4	SP	Start pulse input
5	VREF	Reference voltage (input)
6	CP	Clock pulse input
7	GLED	LED power supply ground; 0V
8	VLED	LED power supply voltage; 5 V

Electro-optical characteristics:

at f = 500 kHz, V_{DD} = 5 V, T_{int} *(1) = 5 ms, λ *(2) = 570 nm, Ta *(3) = 25 °C
(unless otherwise noted)

symbol	Parameter	test conditions	min.	typ	max	unit
V_p *(4)	Analog output voltage at white paper	O.D. *(11) = 0.05 ~ 0.1	1.4	1.6	1.8	V
U_p *(5)	White paper non-uniformity	O.D. = 0.05 ~ 0.1	-30		30	%
U_{padj} *(6)	Adjacent pixel non-uniformity	O.D. = 0.05 ~ 0.1	-25		25	%
V_d *(7)	Analog output voltage at dark paper	light off, O.D. = 0.8	-100		+100	mV
U_d *(8)	Dark signal non-uniformity	light off, O.D. = 0.8			200	mV
MTF *(9)	Modulation transfer function	at 3.85 lp/mm *(12)	30			%
γ *(10)	Linearity		0.85		1.1	

Definition:

1. T_{int} is an integration time. It is determined by the internal of two start pulses.
2. λ is a wavelength of the light source.
3. Ta is ambient temperature.
4. Vp = (Vpmax + Vpmin) / 2
   where Vpmax is a maximum voltage of whole module on white document.
   Vpmin is a minimum voltage of whole module on white document.
5. Up is a pixel - pixel photo response non-uniformity within whole module.
   Up = [(Vpmax - Vpmin) / Vp] x 100%
6. Upadj = Max [|(Vp(i) - Vp(i+1)| / Vp(i)] x 100%
   where Vp(i) is the video signal output of each pixel # i
   Vp(i+1) is the video signal output of each pixel # (i+1)
7. Vd = (Vdmax + Vdmin) / 2
   where Vdmax is a maximum dark signal on whole module.
   Vdmin is a minimum dark voltage on whole module.
8. Ud = Vdmax - Vdmin
9. MTF = [(Vmax - Vmin) / (Vmax + Vmin)] x 100%
   where Vmax is the maximum output voltage at 3.85 lp/mm document.
   Vmin is the minimum output voltage at 3.85 lp/mm document.
10. γ = log[(V2-Vd) / (V1-Vd)] / log (E2/E1) or log [(V2 - Vd) / (V1 - Vd)] / log (T2/T1)
    where V1 is the output voltage of E1 illumination or T1 integration time
    V2 is the output voltage of E2 illumination or T2 integration time
    at 10 ~ 90% of saturation conduction.
11. O.D. = optical density of the paper.
12. lp / mm = line pair per millimeter

Absolute maximum ratings:

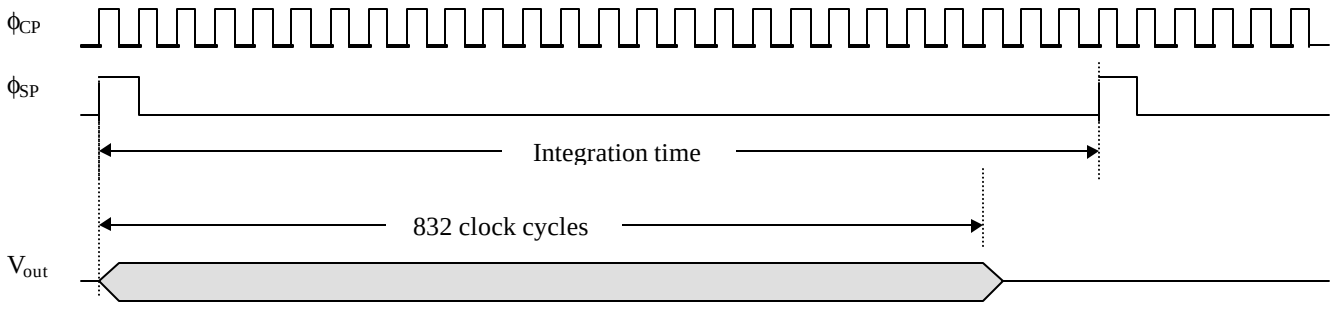
Parameter Name	Symbol	Max Value	Units
Power supply voltage	VDD	6	V
Power supply current	IDD	40	mA
LED light power supply voltage	VLED	7	V
LED light power supply current	ILED	60	mA
Digital input voltage range high	VIH	5.5	V
Digital input voltage range low	VIL	-0.5	V
Operating temperature	Ta	0 ~ 50	C
Storage temperature	Tstg	-25 ~ 70	C

❢ Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress rating only, and functional operation of the device at these or any other conditions beyond those indicated under " recommended operating conditions" is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommend operating conditions:

Item	Symbol	Min.	Typ.	Max.	Unit
Positive power supply voltage	V_{DD}	4.75	5	5.25	V
Negative power supply voltage	Vss	- 11	- 12	-13	V
LED power supply voltage	V_{LED}		2.1		V
High level input voltage	V_{IH}	VDD-0.7		VDD	V
Low level input voltage	V_{IL}	0		0.7	V
Clock frequency	CP	0.5	1.0	1.5	MHz
Pixel output frequency	F	1.0	2.0	3.0	MHz
Clock pulse high duration	Tw		0.5	1.0	us
Wavelength of light source	λ		570		nm
Operating free-air temperature	Ta	0	25	50	°C

Timing Diagram:



PRODUCT RELIABILITY TESTS

Items of Test	Testing Conditions	Inspection items	Pass Criterions
Life Test	Temp = 25 ± 5 °C, Humidity = 20 ~ 80 RH% Time = 2000 hrs	ΔVp, ΔVd: the change of Vp, Vd respectively after the life testing.	-30 % < ΔVp < 10 % -25 mV < ΔVd < 15mV
High Temp Test	Temp = 80 ± 5 °C Time = 144 hrs	electrical parameters, module structures.	Parameters must be within specs, no change, no damage in module structures
Low Temp Test	Temp = -30 ± 5 °C Time = 144 hrs		
Temp/Humidity Test	Temp = 50 ± 5 °C, Humidity = 85 ± 5 RH% Time = 144 hrs	ΔVp: the change of Vp after the life testing.	-30%< ΔVp < 10%
Temp Cycling	Temp = -30, 25, 80 °C Time = 30, 5, 30 min. Cycles = 10, 50	Electrical parameters, Module structures.	All electrical parameters must be within the specs. No distortion and damage on module.
Drop Test	Packaged product drops from 1 m height. Perform test for 3 sides.		
Vibration Test	Cycling: 10 ~ 50 ~ 10 Hz Cycle time = 1 min Amp = 2 mm,Time = 1 Hr		

Precautions before use:

1. Dirty Glass Surface:
   The glass surface should be kept clean.
   Do not wipe the sensor by hand or use in a dust polluted environment. Should the glass surface become dirty, soak a cloth lightly alcohol and wipe the surface gently.
   Care should be taken so as not to scratch the surface while wiping it. Any loose dust lying on the sensor surface can be cleaned using an air gun.

2. Dust and the CIS unit
   The unit is housed in an air tight structure to protect it from dust. The side plates should be removed, otherwise dust may enter the unit. When using the side holes to fix the sensor, insert the screws slowly until tight, so as not to damage the screw hole thread.

3. Extracting / Inserting the connector

   The maximum number of times that the connector should be extracted and connected is ten. If the connector is inserted / extracted more than ten times, the connector "burrs" will be eroded, thereby making the connector ineffective.

4. Stable operation

   4.1 The connector pins should not be touched by bare hand or Electro-statically charged material.

   4.2 Noise:

   a. Insert a low frequency noise suppressing capacitor (100 μF) between V_{DD} (+5 V) and Gnd. A high frequency noise suppressing capacitor is already integrated into the circuit.
   b. Ensure that the sensor connecting cables are 30 cm or less in length. The ϕ_{CP} and Gnd, ϕ_{SP} and Gnd respectively from twisted cable pairs.

   4.3 Latch Up

   When the voltage is higher than the absolute maximum, "latch up" will cause the sensor to break, even if the voltage is caused by a surge. If the current varies rapidly in the external circuit, or when the power is turned off and then on again, ensure that the voltage on each terminal does not exceed the values indicated in "absolute maximum rating".