

1.0 General Description

The AMIS-710322-A4 (PI322MC-A4) is a contact image sensor (CIS) module, which uses MOS image sensor technology for high-speed performance and high sensitivity. The AMIS-710322-A4 is suitable for scanning A4 size (216mm) documents with 11.8 dots per millimeter (dpm) resolution. Applications include fax machines, game systems, a variety of mark readers, and other automation equipment requiring document scanners.

2.0 Key Features

- Light source, lens and sensor are integrated into a single module
- 11.8dpm resolution, 216mm scanning length
- Up to 500 μ sec/line scanning speed with optional light source
- Wide dynamic range
- Analog output
- Yellow-green LED light source
- Compact size \cong 14mm x 19.5mm x 232mm
- Low power
- Light weight

3.0 Functional Description

The AMIS-710322-A4 imaging array consists of 27 sensors, AMIS-720341 (PI3041) produced by AMIS, which are cascaded to provide 2592 photo-detectors with their associated multiplex switches and a digital shift register, which controls its sequential readout. Mounted in the module is a one-to-one graded indexed micro lens array, which focuses the scanned documents to image onto its sensing plane. The on-board amplifier processes the video signal to produce a sequential stream of video at the video output pin of the AMIS-710322-A4 module.

Illumination is accomplished by means of an integrated LED light source. All components are housed in a small plastic housing which has a cover glass, which acts as the focal point for the object being scanned and protects the imaging array, micro lens assembly and LED light source from dust. I/O to the module is the 10-pin connector located on one end of the module. The cross section of the AMIS-710322-A4 is shown in Figure 1 and the block diagram in Figure 2.

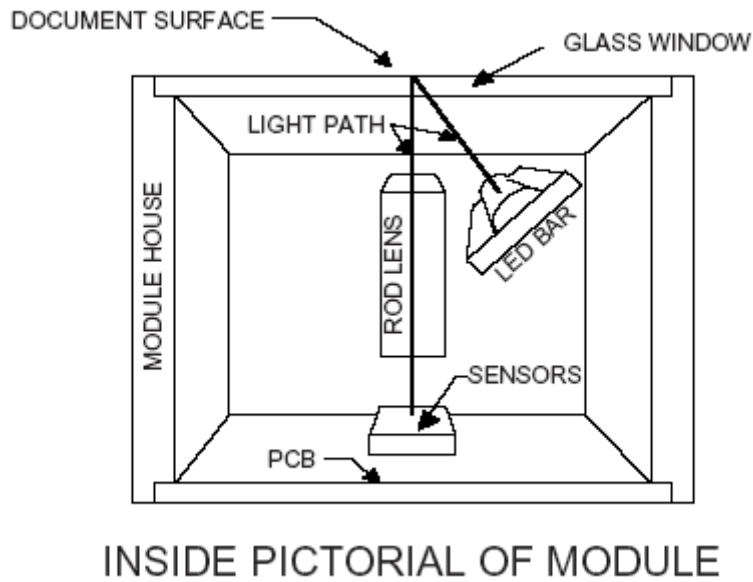


Figure 1: AMIS-710322-A4 Cross Section

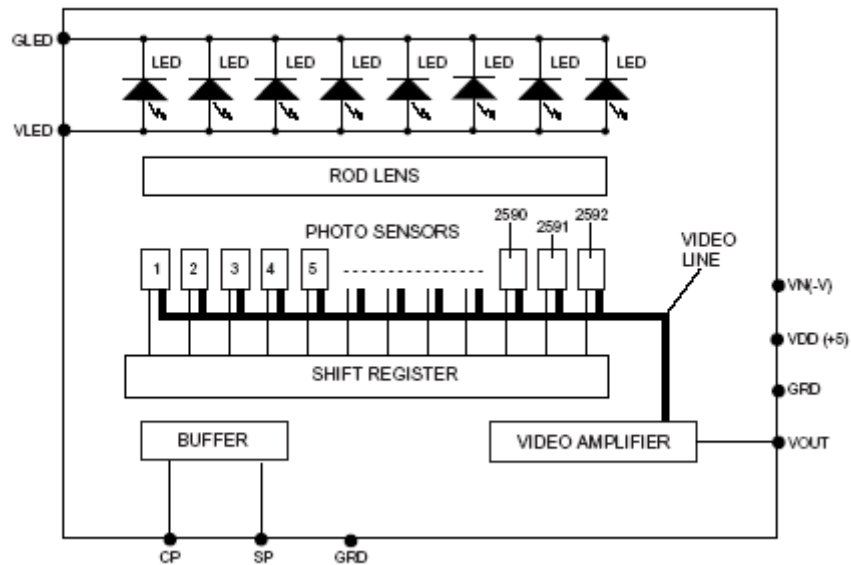


Figure 2: AMIS-710322-A4 Module Block Diagram (See Table 1 for Pin Out Designation)

Table 1: Pin Configuration

Pin Number	Symbol	Names and Functions
1	Vout	Analog video output
2	Gnd	Ground; 0V
3	Vdd (+5 V)	Positive power supply
4	Vn (-5V to -12V)	Negative power supply
5	Gnd	Ground; 0V
6	SP	Shift register start pulse
7	Gnd	Ground; 0V
8	CP	Sampling clock pulse
9	GLED	Ground for the light source; 0V
10	VLED	Supply for the light source

4.0 Operational Environment

4.1 Absolute Maximum Rating

Table 2: Absolute Maximum Rating

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	10	V
	Idd	55	ma
	Vn	-15	V
	In	10	ma
	VLED	12.5	V
	ILED	0.6	A
Input clock pulse (high level)	Vih	Vdd – 0.5V	V
Input clock pulse (low level)	Vil	-0.8	V

4.2 Operating Environment

Table 3: Operating Environment

Parameter	Symbols	Maximum Rating	Units
Operating temperature	Top	0 to 50	°C
Operating humidity	Hop	10 to 85	%
Storage temperature	Tstg	-25 to +75	°C
Storage humidity	Hstg	5 to 95	%

4.3 Electro-Optical Characteristics (25°C)

Table 4: Electro-Optical Characteristics at 25°C

Parameter	Symbol	Parameter	Units	Note
Number of photo detectors		2592	Elements	
Pixel-to-pixel spacing		84.7	µm	
Line scanning rate	Tint ⁽¹⁾	865	µsec	@ 3.0MHz clock frequency
Clock frequency ⁽²⁾	f	3.0	MHz	
Bright output voltage	Video output	1.0	V	
Bright output non-uniformity ⁽⁴⁾	Up	<+/-30	%	
Adjacent pixel non-uniformity ⁽⁵⁾	Uadj	<25	%	
Dark non-uniformity ⁽⁶⁾	Ud	<100	mV	
Dark output voltage	Vd	<150	mV	
Modulation transfer function ⁽⁷⁾	MTF	>50	%	See Note 7 for MTF & DOF

- Notes:**
- (1) Tint: line scanning rate or integration time. Tint is determined by the interval of two start pulses (SP). The minimum integration time of 500µs is available at a 5.2MHz pixel rate but it will require optional light sources.
 - (2) f: main clock frequency
 - (3) $V_{pavg} = \bar{a} V_p(n)/2592$
 - (4) $U_p = [(V_{pmax} - V_p) / V_p] \times 100\%$ or $[(V_p - V_{pmin}) / V_p] \times 100\%$
 - (5) $U_{adj} = \text{MAX}[| (V_p(n) - V_p(n+1)) | / V_p(n)] \times 100\%$
Uadj is the non-uniformity percentage pixel to pixel
 - (6) $U_d = V_{dmax} - V_{dmin}$
Vdmin is the minimum output on a black document (O.D.=0.8).
Vdmax: maximum output voltage of a black document (O.D.= 0.8).
 - (7) $MTF = [(V_{max} - V_{min}) / (V_{max} + V_{min})] \times 100 [\%]$
Vmax: maximum output voltage at 75lp/in
Vmin: minimum output voltage at 75lp/in
 - (8) O.D. = optical density
 - (9) lp / in: line pairs per inch

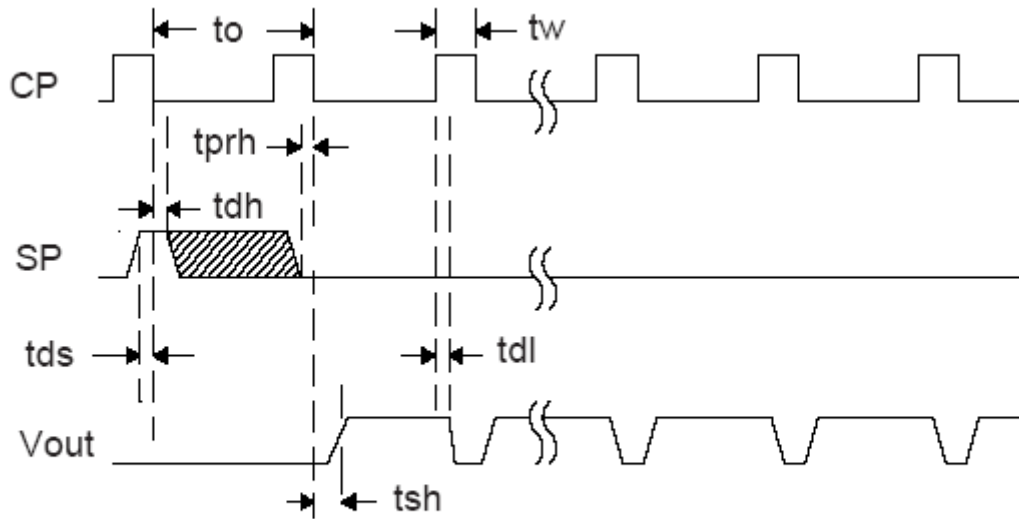
4.4 Recommended Operating Conditions

Table 5: Recommended Operating Conditions at 25°C

Item	Symbol	Min.	Mean	Max.	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Vn	-4.5	-5	-12	V
	VLED		12	12.5	V
	Idd		35	55	ma
	Ivn		6.0	10.0	ma
	ILED		460	600	ma
Input voltage at digital high	Vih	Vdd-1.0	Vdd-.5	Vdd	V
Input voltage at digital low	Vil	0		0.8	V
Clock frequency	f			5.5	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		50			ns
Integration time	Tint	0.500*		5.0	ms
Operating temperature	Top		25	50	°C

Note: Tint (min.) is the lowest line integration time available with a 5.2MHz clock (see Note 1 under Optical Characteristics, Table 2).

5.0 Switching Characteristics (25°C)



MODULE TIMING DIAGRAM

Figure 3: Module Timing Diagram

The switching characteristics for the I/O clocks are shown in Figure 3. See the timing symbol definitions in Table 6.

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Table 6: Symbol Definition for Timing Diagram (Figure 3)

Item	Symbol	Min.	Typ.	Max.	Units
Clock cycle time	t_o	0.2		4.0	μ s
Clock pulse width	t_w	50			ns
Clock duty cycle		25		75	%
Prohibit crossing time of SP	t_{prh}	15			ns
Data setup time	t_{ds}	20			ns
Data hold time	t_{dh}	20			ns
Signal delay time	t_{dl}	50			ns
Signal sample and hold time	t_{sh}	120			ns

6.0 AMIS-710322-A4 Module and its Mechanical Dimensions

This is an overview drawing of the module. A full size drawing is available upon request.

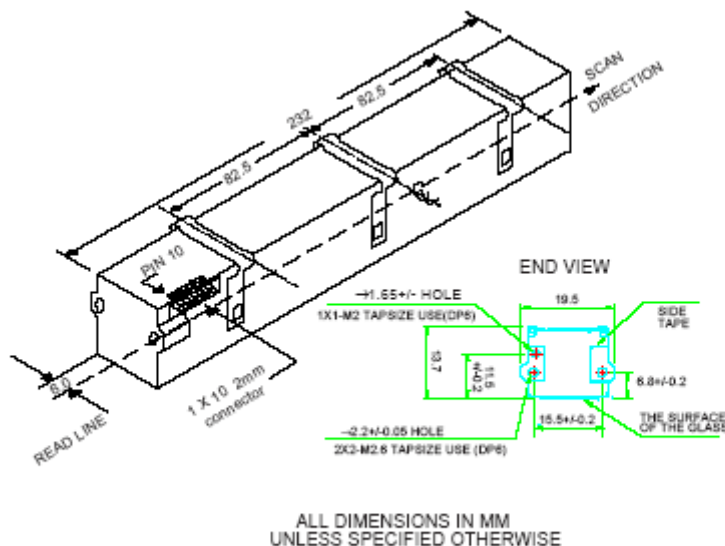


Figure 4: 6.0 AMIS-710322-A4 Module and its Mechanical Dimensions

7.0 Company or Product Inquiries

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