1.0 General Description

The AMIS-710207-A4 (PI207MC-A4) contact image sensor (CIS) module uses MOS image sensor technology for high-speed performance and high sensitivity. The AMIS-710207-A4 is suitable for scanning A4 size (216mm) documents with 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
- 8dpm resolution, 216mm scanning length
- Dual LED light source, IR and Red, with a line scan time to 347μsec @ 5MHz
- Wide dynamic range
- Analog output
- Compact size ≅ 14.5mm x 19.5mm x 232mm
- Low power
- Light weight

3.0 Functional Description

The AMIS-710207-A4 imaging array consists of 27 AMIS-720233 (PI3033B) sensors, produced by AMIS, that are cascaded to provide 1728 photo-detectors with their associated multiplex switches and a digital shift register that controls its sequential readout. Mounted in the module is a one-to-one graded indexed micro lens array that focuses on the image of the scanned documents, then transfers it onto the sensors. The on-board amplifier processes the video signal to produce a sequential stream of video at the output pin of the AMIS-710207-A4 module.

Illumination is accomplished by means of integrated LED sources; Red (660nm) and IR (880nm). All components are housed in a small plastic housing, which has a cover glass that acts as the focal point for the object being scanned. In addition, it protects the imaging array, micro lens assembly and LED light source from dust. Inputs and outputs (I/O) to and from the module are by a 10-pin connector, JAE 1L-Z-10P-S125L3-E, located on one end of the module. For the Pin 1 location, see Figure 4, overall view of the module house. A cross section of the AMIS-710207-A4 module is shown in Figure 1 and a block diagram in Figure 2.

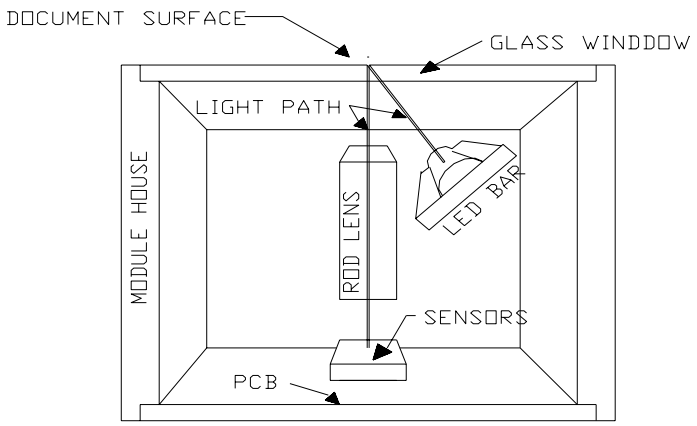

Figure 1: AMIS-710207-A4 Cross Section

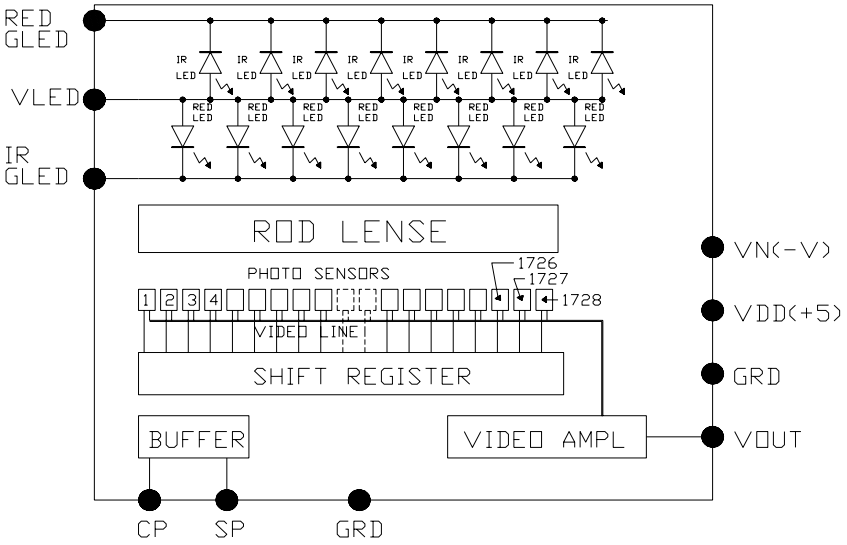

Figure 2: AMIS-710207-A4 Module Block Diagram

4.0 Connector Pin Out Designation

Connector is JAE part number 1L-Z-S125L3-E.

Table 1: Pin Out Configuration

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

5.0 Maximum Ratings

Table 2: Maximum Ratings

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	7	V
	Idd	80	mA
	Vn	-15	V
	In	7	mA
	VLED IR	5.5	V
	VLED RED	5.5	V
	ILED IR	500	mA
	ILED RED	600	mA
Input clock pulse (high level)	Vih	Vdd	V
Input clock pulse (low level)	Vil	-0.5	V

Note: These are the maximum ratings and are not to be used in a prolonged condition.

6.0 Operating Environment

Table 3: Operating Environment

Parameter	Symbol	Range	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	%

7.0 Electro-Optical Characteristics

The tabled values are measured at 25°C.

Table 4: Electro-Optical characteristics at 25°C

Parameter	Symbol	Typical	Units	Note
Number of photo detectors		1728	Elements	
Pixel-to-pixel spacing		125	µm	
Line scanning rate (1)	Tint	347	µsec	@ 5.0MHz clock frequency
Clock frequency (2)	fclk	5.0	MHz	
Bright output voltage (3)	Vpavg	$1.1^{+0.2/-0.1}$	Volts	
Bright output non-uniformity (4)	Up	<|+/-30|	%	
Adjacent pixel non-uniformity (5)	Uadj	<25	%	
Dark non-uniformity (6)	Ud	<75	mV	
Dark output voltage (6)	Vd	<200	mV	
Modulation transfer function (7)	MTF	>40	%	

Notes:

1. Tint is the line scanning rate or integration time. Tint is determined by the interval of two start pulses, SP. The integration time of 347µsec is set at the factory. For additional comments, see Note (1) under Table 5.
2. fclk: main clock frequency.
3. Vpavg = ∑ Vp(n)/1728.
4. Up = [(Vpmax - Vpavg) / Vpavg] x 100% or [(Vpavg - Vpmin) / Vpavg] x 100%, where Vpmax = maximum pixel amplitude in the line scan and Vpmin = minimum pixel amplitude in the line scan.
   Upadj = MAX[| (Vp(n) - Vp(n+l) | / Vp(n)) x 100%.
   Upadj is the non-uniformity in percent between adjacent pixels, where Vp(n) is the n^{th} pixel in the line scan.
5. Ud = Vdmax – Vdmin.
   Vd = the average dark output level.
   Vdmin is the minimum output on a black document (LED is turned off).
   Vdmax: maximum output voltage of black document (LED is turned off).
6. MTF = [(Vmax - Vmin) / (Vmax + Vmin)] x 100 [%].
   Vmax: maximum output voltage at 50lp/in and Vmin: minimum output voltage at 50lp/in, where lp / in is the line pairs per inch.

8.0 Recommended Operating Conditions

The tabled values are measured at 25°C.

Table 5: Recommended Operating Conditions at 25°C

Parameter	Symbol	Min.	Mean	Max.	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Vn.	-4.5	-5	-12	
	VLED IR	4.5	5	5.5	V
	VLED RED	4.5	5	5.5	V
	ILED IR	200	300	500	ma
	ILED RED	250	350	600	ma
	Idd	55	60	70	ma
	Ivn	4.0	5.0	5.5	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 (1)	fclk			5.5	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		45.5			ns
Integration time(1)	Tint	316		10000	µs
Operating temperature	Top		25	50	°C

Note:

1. Electrically, including the image sensors, the circuits will operate above 5.5MHz with tint at 316µs. However, the light power is fixed, so with the shorter integration time, the exposure is reduced. This reduction limits the specification call out to integration time of 0.347ms at 5.0MHz for 1.0V output.

9.0 Timing Characteristics

The timing characteristics for the I/O clocks are shown in Figure 3. See the timing symbol definitions in Table 6. The listed values are measured at ~25°C.

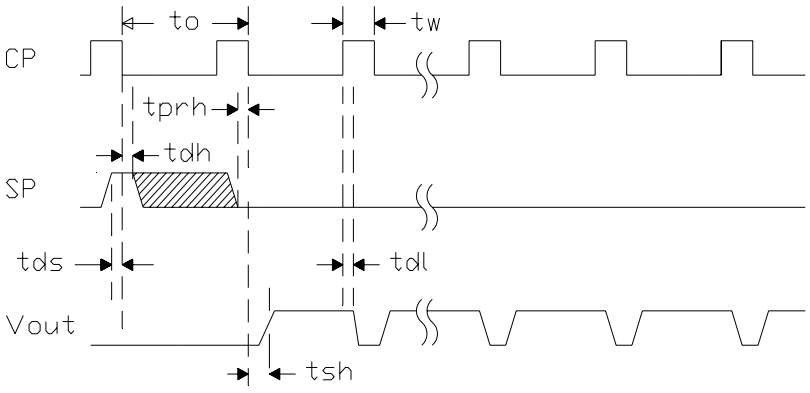

Figure 3: Timing Diagram

Table 6: Timing Symbol Definitions for Figure 3

Parameters	Symbol	Min.	Typ.	Max.	Units
Clock cycle time	to	0.333		5.8	µs
Clock pulse width	tw	82			ns
Clock duty cycle		25		75	%
Prohibit crossing time of Start Pulse	tprh	15			ns
Data setup time	tds	20			ns
Data hold time	tdh	20			ns
Signal delay time	tdl	50			ns
Signal settling time	tsh	120			ns

10.0 AMIS-710207-A4 Module and Its Mechanical Dimensions

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

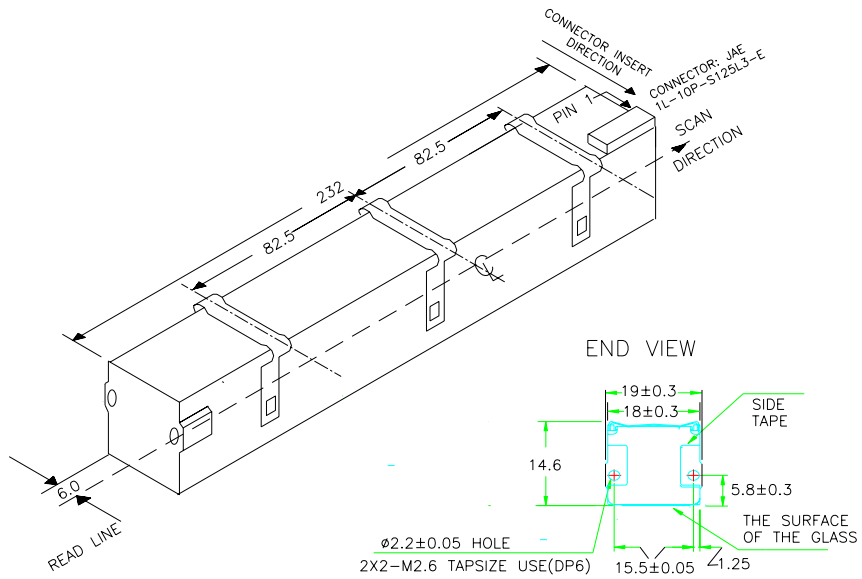

Figure 4: Overall View of the Module Housing

11.0 Company or Product Inquiries

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