1.0 General Description

The AMIS-710226 (PI226M-A4) is a contact image sensor (CIS) module using MOS image sensor technology for high-speed performance and high sensitivity. The AMIS-710226 is suitable for scanning A4 size (216mm) documents with 8 dots per millimeter (dpm) resolution. Applications include fax machines, game systems, 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
- 347µsec/line scanning speed possible with optional light sources
- Yellow-Green LED light source, limits the typical line scan to 695µsec @ 2.5MHz
- Wide dynamic range
- Analog output
- Compact size ≅ 14mm x 19mm x 23mm
- Low power
- Light weight

3.0 Functional Description

The AMIS-710226 imaging array consists of 27 AMIS-720033 (PI3020) image 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 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-710226 module.

Illumination is accomplished by means of an integrated Yellow-Green LED light source. 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, 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. For pin 1 location, see Figure 4.

The cross section of the AMIS-710226 is shown in Figure 1 and the block diagram in Figure 2.

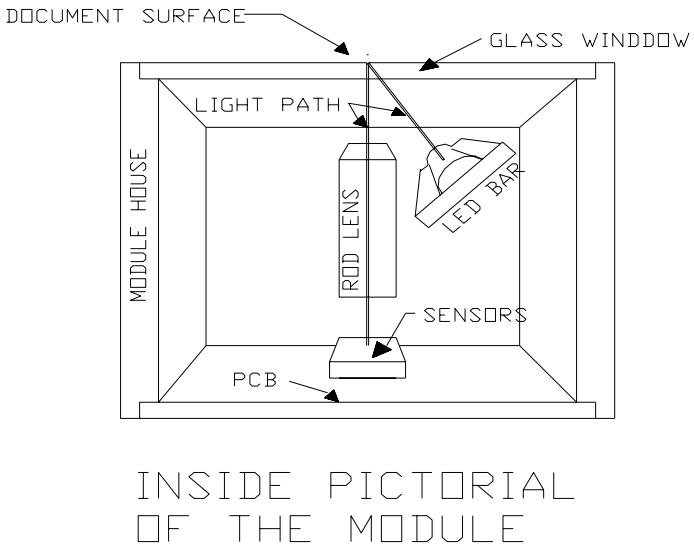

Figure 1: Inside Pictorial of the Module

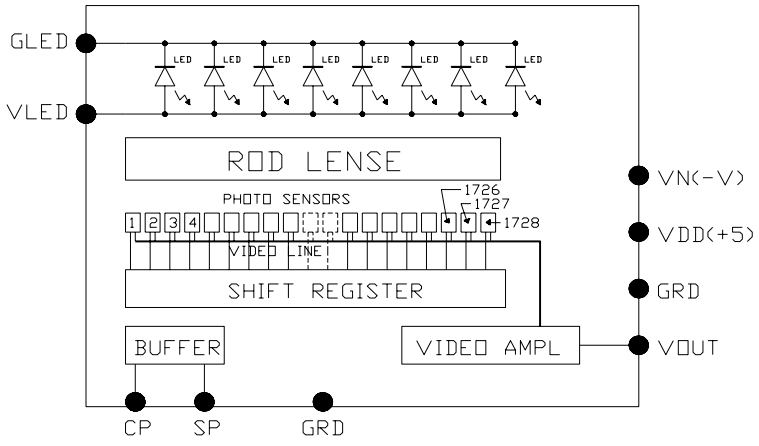

Figure 2: AMIS-710226 Module Block Diagram (See Table 1 for Pin Out Designation)

Table 1: Pin Configuration

Pin Number	Symbol	Names and Functions
1	Vout	Analog video output
2	Gnd	Ground; 0V
3	Vdd (+5V)	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 Absolute Maximum Rating

Table 2: Absolute Maximum Ratings

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	7	V
	Idd	60	mA
	Vn	-15	V
	In	7	mA
	VLED	6.0	V
	ILED	1.2	A
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 prolonged conditions.

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	%

5.0 Electro-Optical Characteristics (25°C)

Table 4: Electro-Optical Characteristics (25°C)

Parameter	Symbol	Parameter	Units	Note
Number of photo detectors		1728	Elements	
Pixel-to-pixel spacing		125	µm	
Line scanning rate	Tint(1)	695	µsec	@ 2.5MHz clock frequency
Clock frequency(2)	fclk	2.5	MHz	
Bright output voltage	Vpavg	1.0 +/-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) (8)	MTF	>40	%	

Definition:

1. Tint: line scanning rate or integration time; tint is determined by the interval of two start pulses (SP). This integration time of 695µsec typically set at the factory for Yellow-Green LED. The minimum integration time of 347us is available at 5.0MHz pixel rate, but it will require optional light sources.
2. fclk: main clock frequency
3. Vpavg = ∑ Vp(n)/1728
4. Up = [(Vpmax - Vpavg) / Vpavg] x 100% or [(Vpavg - Vpmin) / Vpavg] x 100%
5. Upadj = MAX[| (Vp(n) - Vp(n+l) | / Vp(n)] x 100%
   Upadj is the non-uniformity in percent between adjacent pixels.
6. 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).
7. MTF = [(Vmax - Vmin) / (Vmax + Vmin)] x 100 [%]
   Vmax: maximum output voltage at 50lp/in
   Vmin: minimum output voltage at 50lp/in
8. lp / in: line pairs per inch

Table 5: Recommended Operating Conditions (25°C)

Item	Symbol	Min.	Mean	Max.	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Vn.	-4.5	-5	-12	
	VLED	4.5	5	5.5	V
	Idd	25	30	35	ma
	Ivn	4.0	4.0	5.0	ma
	ILED	350	560	790	ma
Input voltage at digital high	Vih	Vdd-1.0	Vdd-0.5	Vdd	V
Input voltage at digital low	Vil	0		0.8	V
Clock frequency (1)	fclk			3.0	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		82			ns
Integration time(1)	Tint	0.576		5.0	ms
Operating temperature	Top		25	50	°C

Note: Electrically, including the image sensors, the circuits will operate above 5.5MHz. However, with the Yellow-Green light option, the light exposure limits the operation to a maximum of 3.0MHz, hence the integration time, tint of 0.576ms.

6.0 Switching Characteristics (25°C)

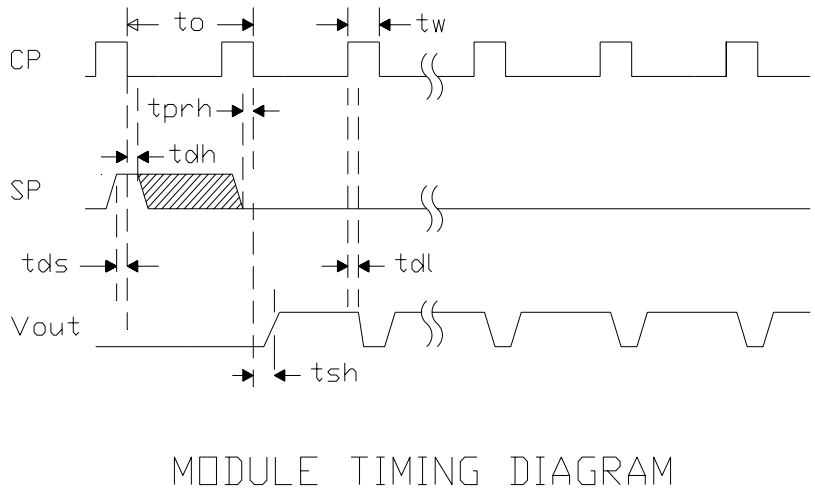

Figure 3: Timing Diagram

The switching characteristics for the I/O clocks are in the above diagrams. See timing symbol definitions in the following Table 6.

Table 6: Symbol Definitions for the Above Timing Diagram

Item	Symbol	Min.	Typ.	Max.	Units
Clock cycle time	to	0.333		4.0	µs
Clock pulse width	tw	82			ns
Clock duty cycle		25		75	%
Prohibit crossing time of SP	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

7.0 AMIS-710226 Module and its Mechanical Dimensions

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

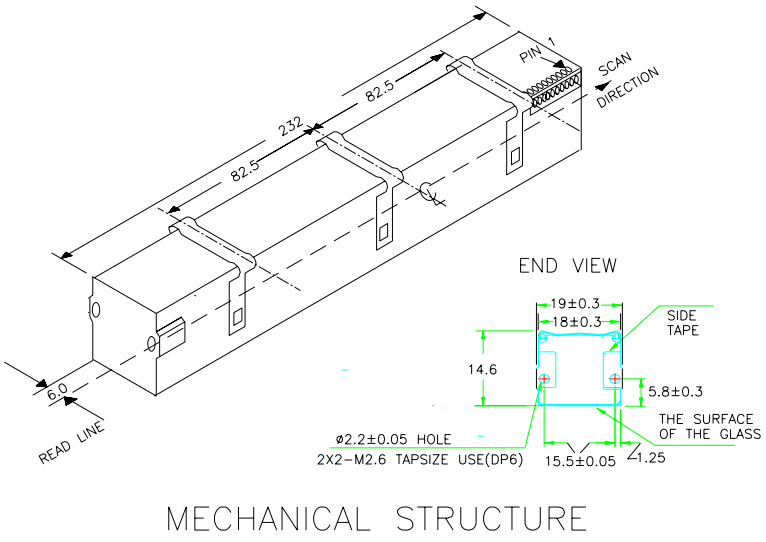

Figure 4: Overall View of the Module House

8.0 Company or Product Inquiries

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