1.0 General Description

The AMIS-710239-A3 (PI239MC-A3-R) is a contact image sensor (CIS) module. It is a long contact image sensor, which uses MOS image sensor technology for high speed performance. The AMIS-710239-A3 is suitable for scanning A3 size (307mm) documents with eight dots per millimeter (dpm) resolution. Hence, there are 38 AMIS-720233 (PI3033B) image sensors in the module, providing a total of 2432 pixels in a sequence. The sensors are 200 dots per inch (dpi) solid-state line imaging array, also a product of AMI Semiconductor. Applications include document scanners, mark readers and other office automation equipment.

2.0 Key Features

- Light source, lens and sensor are integrated into a single module
- 8dpm resolution, 307mm scanning read length
- High speed page scan - up to 490μsec/line @ 5MHz pixel rate
- Wide dynamic range
- One analog output
- Super super Red (630nm) LED light source
- Compact size ≅ 20.5mm x 21.5mm x 324mm
- Low power
- Light weight

3.0 Functional Description

The AMIS-710239-A3 imaging array consists of 38 sensor chips in the module, which are sequentially cascaded to provide 2432 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.

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 acting 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-710239-A3 is shown in Figure 1 and the block diagram in Figure 2.

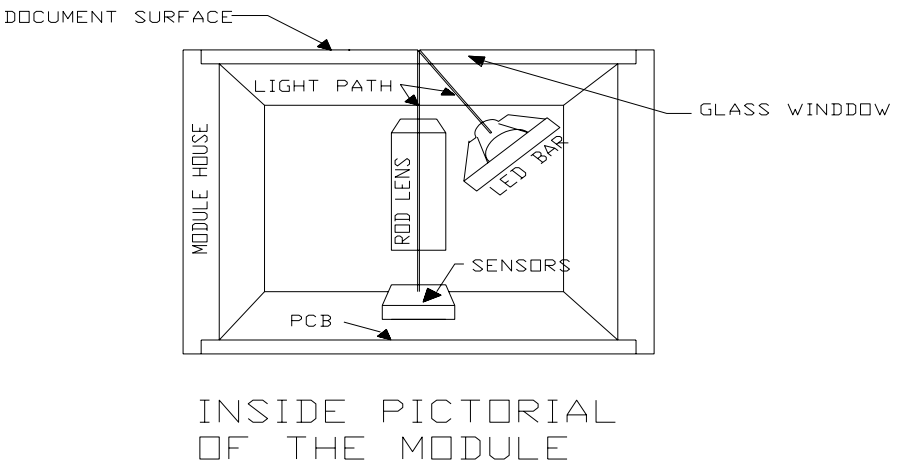


Figure 1: AMIS-710239-A3 Cross Section

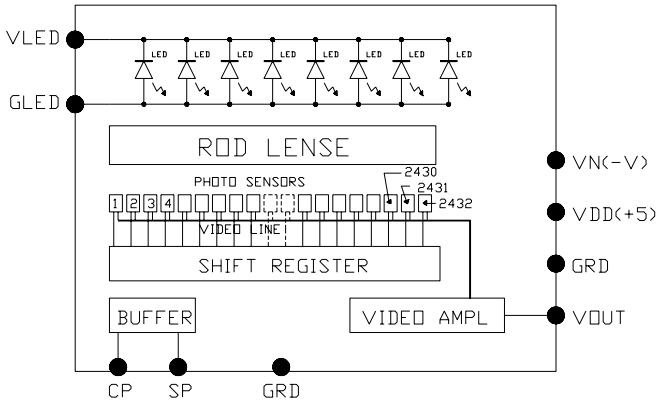


Figure 2: AMIS-710239-A3 Module Block Diagram

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 Rating

Parameter	Symbol	Maximum Rating	Units
Power supply voltage	Vdd	7.5	V
	Idd	90	ma
	Vn	-15	V
	In	15	ma
	VLED	5.5	V
	ILED	1200	ma
Input clock pulse (high level)	Vih	Vdd – 0.5V	V
Input clock pulse (low level)	Vil	-0.6	V

Note: These parameters are absolute maximums and are not for operation. Extended operation may cause catastrophic failure.

5.0 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	%

6.0 Electro-Optical Characteristics (25°C)

Table 4: Electro-optical characteristics at 25°C.

Parameter	Symbol	Parameter	Units	Note
Number of photo detectors		2432	Elements	
Pixel-to-pixel spacing		125	µm	
Line scanning rate	Tint(1)	490	µsec	@ 5MHz clock frequency
Clock frequency(2)	f	5	MHz	
Bright output voltage(3)	Video output	1.0 +/- 0.1	V	@ Tint=490us
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	<200	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 module shall be tested at 490us, but it will operate to us with a clocking speed of 5.0MHz.
(2) f: main clock frequency. The module was tested at 5.0MHz, but electrically it reliably operates above 5.0MHz.
(3) Vpavg = ∑ Vp(n)/2432
(4) Up = [(Vpmax - Vp) / Vp] x 100% or [(Vp - Vpmin) / Vp] x 100%
(5) Upadj = MAX[| (Vp(n) - Vp(n+l) | / Vp(n)] x 100%
Upadj is the non-uniformity percentage pixel to pixel
(6) (6) Ud = Vdmax – Vdmin
Vdmin is the minimum output on a black document (O.D. = 0.8)
(7) Vdmax: maximum output voltage on a black document (O.D. = 0.8)
(7) MTF = [(Vmax - Vmin) / (Vmax + Vmin)] x 100 [%]. The DOF range is defined with the MTF. MTF is a measure at the glass surface and at 0.4mm from the glass > 50 percent and peaks at approximately a mid-point of 0.2mm.
Vmax: maximum output voltage at 50lp/inch (at 1/2 of the optical Nyquest frequency)
Vmin: minimum output voltage at 50lp/inch
(8) O.D. = optical density
(9) lp / inch: line pair per inch

7.0 Recommended Operating Conditions (25°C)

Table 5: Recommended Operating Conditions at 25°C

Item	Symbol	Min.	Mean(1)	Max.	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Vn.	-4.5	-5	-12	V
	VLED	4.5	5	5.5	V
	Idd	66	76	86	ma
	In	5	10	15	ma
	ILED	550	800	1200	ma
Input voltage at digital high	Vih	Vdd-1.0	Vdd-0.5	Vdd	V
Input voltage at digital low	Vil	0		0.6	V
Clock frequency	f		5.0(2)	5.5	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		50			ns
Integration time	Tint(3)		490	5000	µs
Operating temperature	Top		25	50	°C

Notes:

(1) Will be tested at 5.0MHz and 490us.
(2) Will be used as a test for typical value.
(3) Proposed tint (min.) is the lowest line integration time available at a 5.5MHz clock rate.

8.0 Switching Characteristics (25°C)

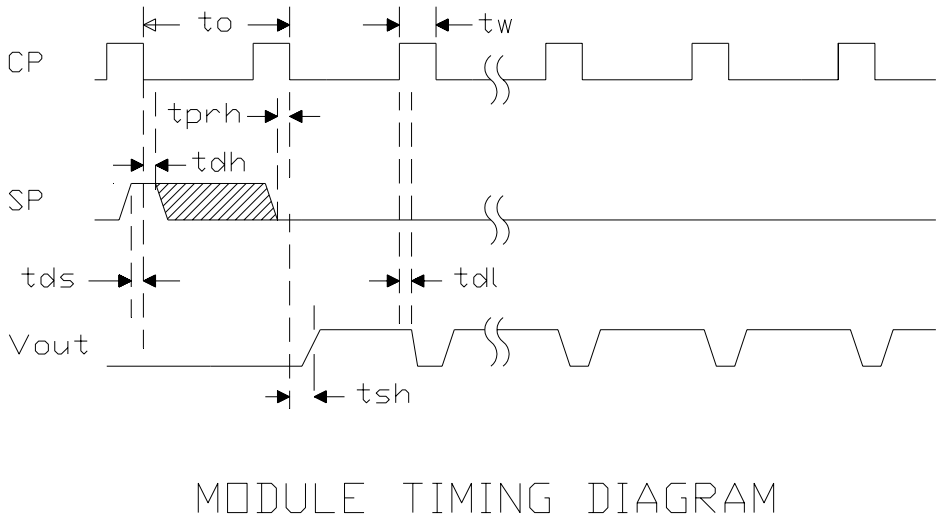


Figure 3: Clock and Start Pulse Timing Diagram

The switching characteristics for the I/O clocks are shown in Figure 3. The corresponding definitions for the timing symbols are given in Table 6.

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

Item	Symbol	Min.	Typ.	Max.	Units
Clock cycle time	to	0.2		4.0	µs
Clock pulse width	tw	50			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

Note: These are the proposed times. There may be minor changes in actual implementation.

9.0 AMIS-710239-A3 Module Mechanical Dimensions

The sketch of this module is provided as a pictorial of the module size and structure. A detailed drawing is available upon request.

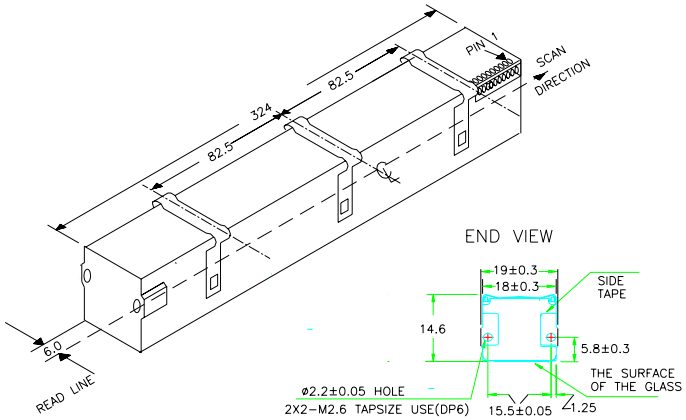


Figure 4: Module and its Mechanical Dimensions

10.0 Company or Product Inquiries

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