1.0 General Description

The AMIS-710240 (PI240MC-A4) is a contact imaging sensor (CIS) module composed of 1728 AMIS-720033 (PI3020) sensor chips. The AMIS-720033 is a 200 dots per inch (dpi) solid-state line imaging array, also a product of AMI Semiconductor. This imaging device is fabricated using MOS imaging sensor technology for high-speed performance and high sensitivity. The AMIS-710240 is suitable for scanning A4 size (21mm) documents with 8 dots per millimeter (dpm) resolution. Applications include variety of document scanners, variety of mark readers and other automation equipment.

2.0 Key Features

- Inverted video signals (magnitude increases in a negative direction)
- Light source, lens and sensor are integrated into a single module
- 8dpm resolution
- 216mm scanning length
- 0.347ms/line scanning speed, operated @ 5.0MHz
- Wide dynamic range analog output
- 660nm light source
- Compact size: ≈ 14mm 19.5mm x 232mm
- Low power
- Light weight

3.0 Functional Description

The AMIS-710240 imaging array consists of 27 chips 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 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-710240 module.

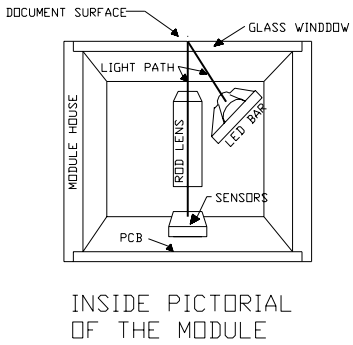


Figure 1: AMIS-710240 Cross Section

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 that 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. See Figure 4. The cross section of the AMIS-710240 is shown in Figure 1 and the block diagram in Figure 2.

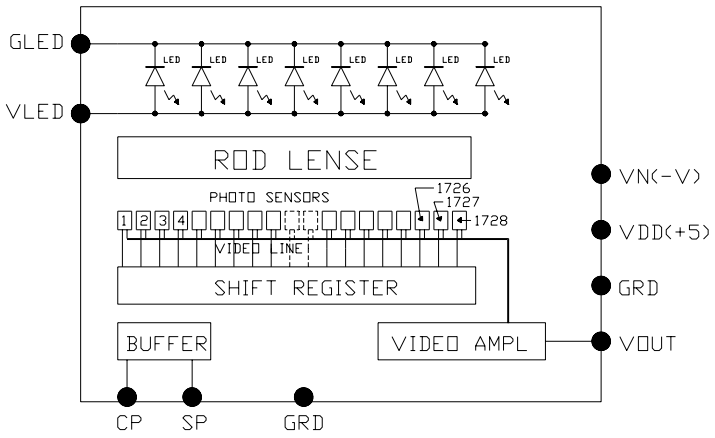


Figure 2: AMIS-710240-A4 Module Block Diagram

4.0 Recommended Operating Conditions (25°C)

Table 1: Recommended Operating Conditions (25°C)

Item	Symbol	Min.	Typ.	Max.	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Idd	24	30	35	ma
	Vn	-4.5	-5	-15	V
	Ivn	5	6	8	ma
	VLED	4.5	5.0	5.5	V
	ILED	305	430	560	ma
Video output level	Vid	0.8	1.0	1.2	V
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	F		3.0	5.0	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		50			ns
Integration time	Tint(1)	0.346	0.6	10.0	ms
Operating temperature	Top		25	50	°C

Note:

1. Tint is determined by the time interval between two SP. The longest integration time is determined by the degree of leakage current degradation that can be tolerated by the system. A 10ms maximum is a typical rule-of-thumb, thus the experienced CIS user can use his discretion in determining the integration time.

5.0 Electro-Optical Characteristics (25°C)

Table 2: 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(1)	Tint	347	µsec	@ 5.0MHz clock frequency
Clock frequency(2)	Freq	5.0	MHz	
Bright output voltage(3)	Vp	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(6)	Vd	<150	mV	
Modulation transfer function(7)	MTF	>30	%	

Definition:

1. Tint: line scanning rate or integration time. Tint is determined by the interval of two SPs.
2. Freq is the main clock frequency.
3. Vpavg = ∑ Vp(n)/1728
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 of adjacent pixels
6. Ud = Vdmax – Vdmin
   Vd is the voltage amplitude between the output video's reset level and its dark level.
   Vdmin is the minimum output with LED light off.
   Vdmax: maximum output voltage with the LED light off
7. MTF = [(Vmax - Vmin) / (Vmax + Vmin)] x 100 [%]
   Vmax: maximum output voltage at 4.0lp/mm
   Vmin: minimum output voltage at 4.0lp/mm
8. lp / mm: line pair per mm

6.0 Switching Characteristics (25°C)

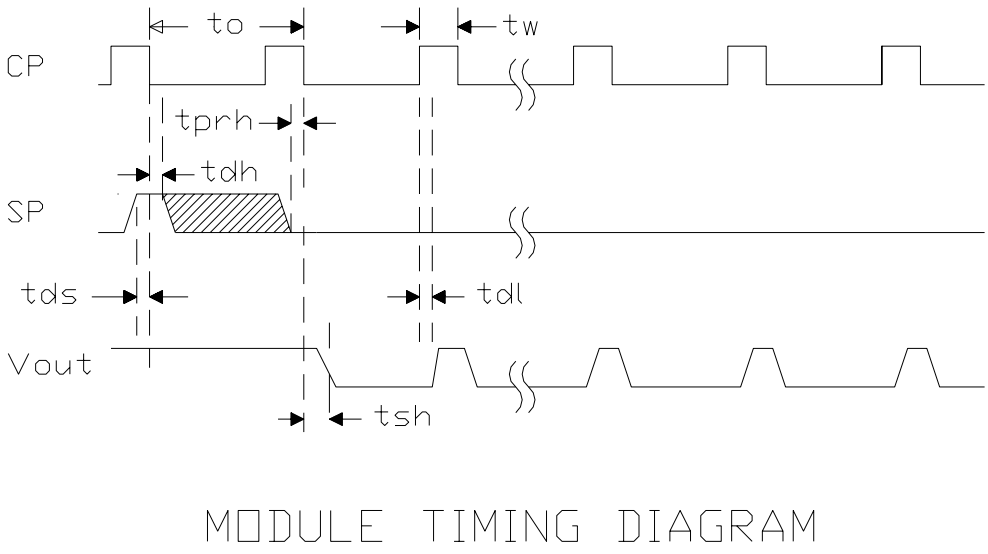


Figure 3: Module Timing Diagram

Table 3: Symbol Definitions for the Above 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	90			ns

7.0 Absolute Maximum Rating

Table 4: Absolute Maximum Rating

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	10	V
	Idd	30	mA
	Vn	-15	V
	In	15	mA
	VLED	6	V
	ILED	650	ma
Input clock pulse (high level)	Vih	Vdd – 0.5V	V
Input clock pulse (low level)	Vil	-0.5	V

Note:

1. These parameters are absolute maximums and should not be used to operate the module.

Table 5: 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	10 to 90	%

8.0 Mechanical Considerations

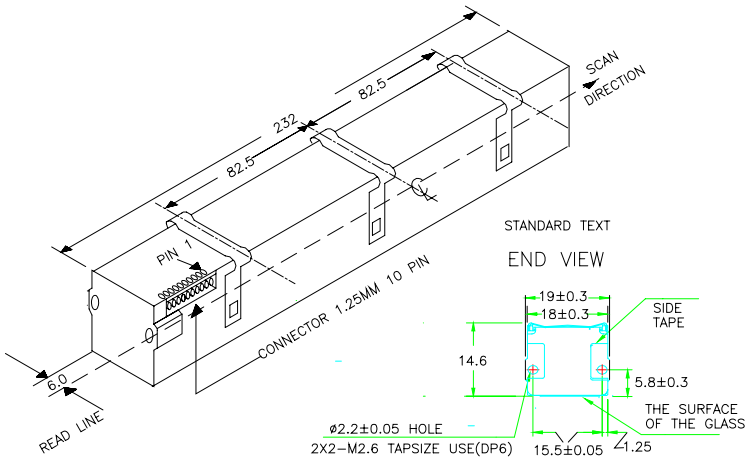
The connector is a 1.25mm 10-pin JAE IL-Z-10P-S125L3-E. Its location, along with its Pin 1 location, is shown in Figure 4.

Table 6: I/O Connector 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 SP
7	Gnd	Ground; 0V
8	CP	Sampling clock pulse
9	GLED	Ground for the light source; 0V
10	VLED	Supply for the light source

9.0 Module Housing Dimensions

The AMIS-710240-A4 module outline and its mechanical dimensions are shown below. A detailed housing drawing is available upon request.



MECHANICAL STRUCTURE
FIGURE 4

10.0 Company or Product Inquiries

For more information about AMI Semiconductor, our technology and our product, visit our Web site at: http://www.amis.com

North America
Tel: +1.208.233.4690
Fax: +1.208.234.6795

Europe
Tel: +32 (0) 55.33.22.11
Fax: +32 (0) 55.31.81.12