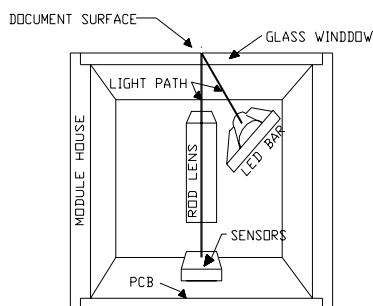## 1.0 General Description

The AMIS-710201 (PI201M-A4) is a contact image sensor (CIS) module using MOS image sensor technology for high-speed performance and high sensitivity. The AMIS-710201 is suitable for scanning A4 size (216mm) documents with 8 dots per millimeter (dpm) resolution. 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, 216mm scanning length
- 1.72ms/line scanning speed
- Wide dynamic range analog output
- Yellow-Green light source
- Compact size – 13.5mm x 18mm x 232mm
- Low power
- Light weight

3.0 Functional Description

The AMIS-710201 imaging array consists of 27 sensors 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-710201 module.

Figure 1: AMIS-710201 Cross Section

Illumination is 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-710201 is shown in Figure 1 and the block diagram in Figure 2.
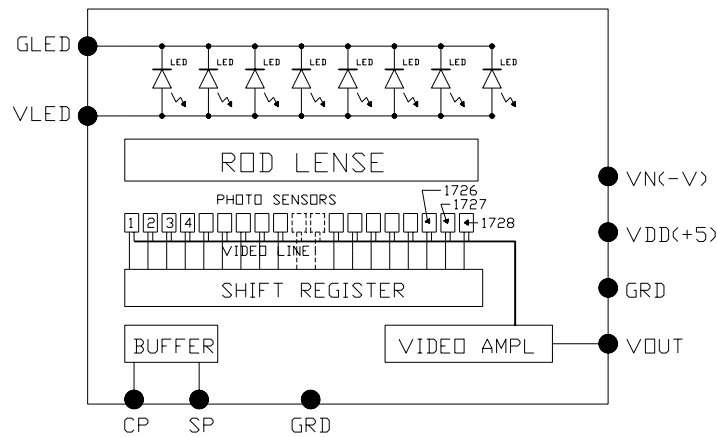

Figure 2: AMIS-710201 Module Block Diagram

4.0 Absolute Maximum Rating

Table 1: Absolute Maximum Rating

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	10	V
	Idd	40	mA
	Vn	-15	V
	In	10	mA
	VLED	5.25	V
	ILED	650	ma
Input clock pulse (high level)	Vih	Vdd – 0.5V	V
Input clock pulse (low level)	Vil	-0.8	V

5.0 Recommended Operating Conditions (25°C)

Table 2: Recommended Operating Conditions (25°C)

Item	Symbol	Min.	Typical	Max.	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Vn.	-4.5	-5	-12	V
	VLED		5		V
	Idd		11	30	ma
	Ivn		6.0	10.0	ma
	ILED		350	550	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			1.0 [(1)]	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		250			ns
Integration time	Tint	1.728		10.0	ms
Operating temperature	Top		25	50	°C

Note:
1. The module will produce video above 1.5MHz, but with adjacent pixel smearing. Hence, with signal degradation it can be used above 1.5MHz.

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	10 to 90	%

6.0 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)]	1.728	ms	@ 1.0MHz clock frequency
Clock frequency[(2)]		1.0	MHz	
Bright output voltage[(3)]		0.6	Volts	
Bright output non-uniformity[(4)]		<+/-30	%	
Adjacent pixel non-uniformity[(5)]		<25	%	
Dark non-uniformity[(6)]		<200	mV	
Dark output voltage[(6)]		<200	mV	
Modulation transfer function[(7)]		>30	%	

Definitions:
1. Tint: line scanning rate or integration time. Tint is determined by the interval of two start pulse (SP).
2. f: main clock frequency.
3. $Vpavg = \sum Vp(n)/1728$
4. $Up = [(Vpmax - Vp) / Vp] \times 100\%$ or $[(Vp - Vpmin) / Vp] \times 100\%$.
5. $Upadj = MAX[| (Vp(n) - Vp(n+l) | / Vp(n)] \times 100\%$ Upadj is the nonuniformity percentage pixel-to-pixel.
6. $Ud = Vdmax - Vdmin$
   Vdmin is the minimum output on a black document(O.D.=0.8).
   Vdmax: maximum output voltage of black document (O.D.= 0.8).
7. $MTF = [(Vmax - Vmin) / (Vmax + Vmin)] \times 100$ [%] Vmax: maximum output voltage at 4.0lp/mm Vmin: minimum output voltage at 4.0lp/mm.
8. lp / mm: line pair per mm.
9. O.D. Optical Density

AMI SEMICONDUCTOR

7.0 Switching Characteristics (25°C)
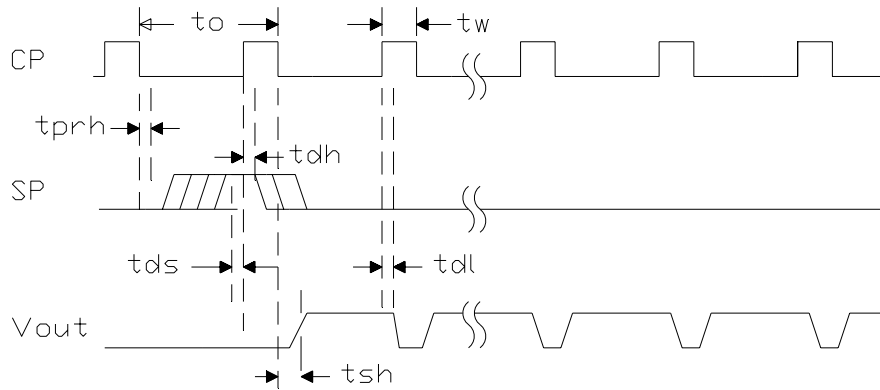
MODULE TIMING DIAGRAM

Note: See timing symbol definitions in the following table

Figure 3: AMIS-710201 Timing Diagram

Table 5: Symbol Definitions for the Above Timing Diagram

Item	Symbol	Min.	Typical	Max.	Units
Clock cycle time	to	1.0		4.0	μs
Clock pulse width	tw	250			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	350			ns

Table 6: Pin Configurations

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

8.0 Mechanical Model Dimensions
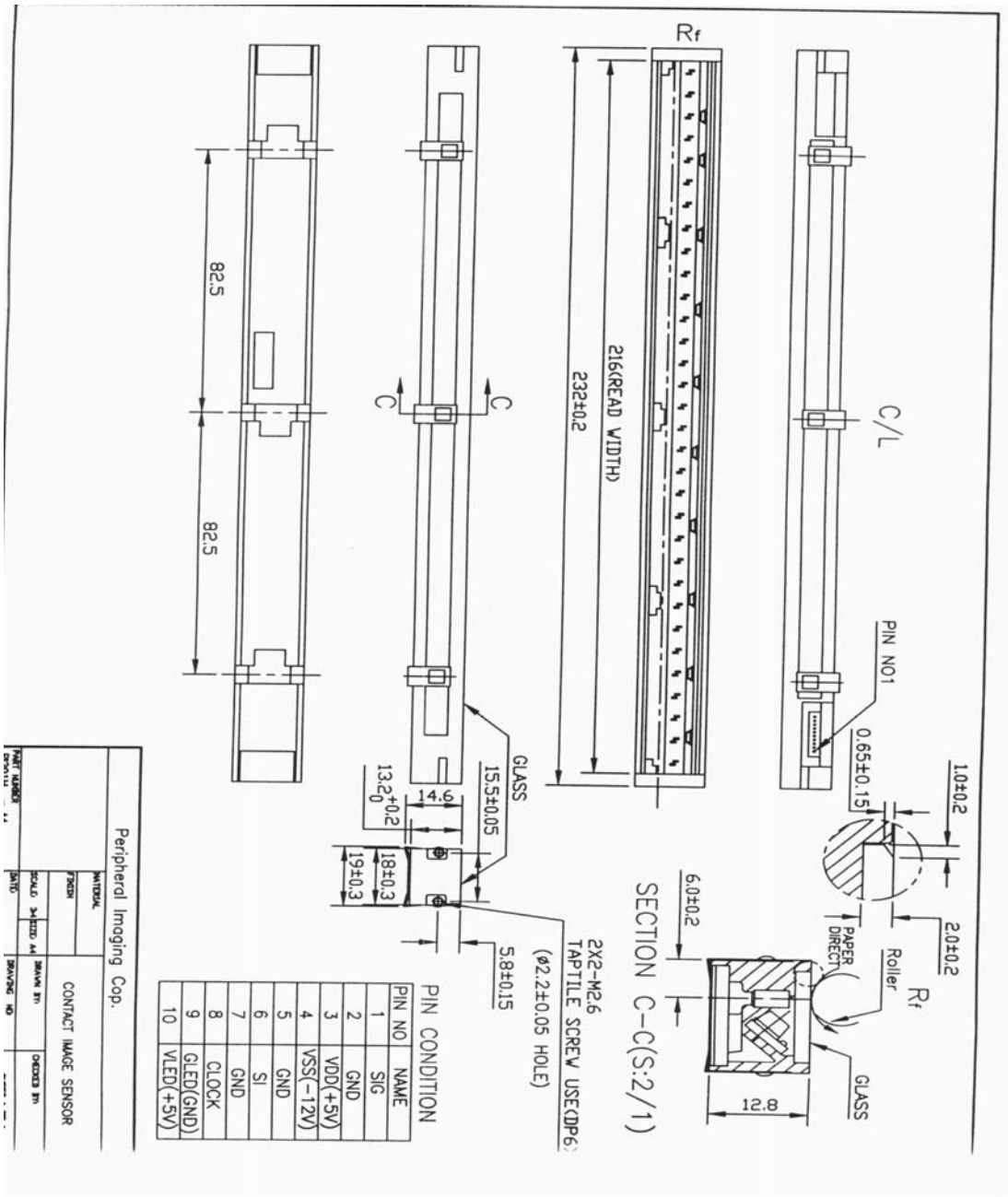
Figure 4: Mechanical Model Dimensions

9.0 Company or Product Inquiries

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