PI325MC-A4
300DPI CIS Module
Engineering Data Sheet

Key Features

• Light source, lens, and sensor are integrated into a single module

• 11.8 dpm resolution, 216 mm scanning length

• Up to 500μsec/line scanning speed with optional 5.2MHz pixel rate

• Wide dynamic range

• Analog output

• Red (660nm) LED light source

• Compact size $\cong$ 14 mm x 19.5 mm x 232 mm

• Low power

• Light weight

General Description

The PI325MC-A4 is a CIS module. It is a contact image sensor, using MOS image sensor technology for high-speed performance and high sensitivity. The PI325MC-A4 is suitable for scanning A4 size (216 mm) documents with 11.8 dots per millimeter resolution. Applications includes fax machines, game systems, variety of mark readers, and other automation equipment requiring document scanners.

Functional Description

The PI325MC-A4 imaging array consists of 27 sensors, PI3021 produced by Peripheral Imaging Corp, that are cascaded to provide 2592 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 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 PI325MC-A4 module.

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 PI325MC-A4 is shown in Figure 1 and the block diagram in Figure 2.
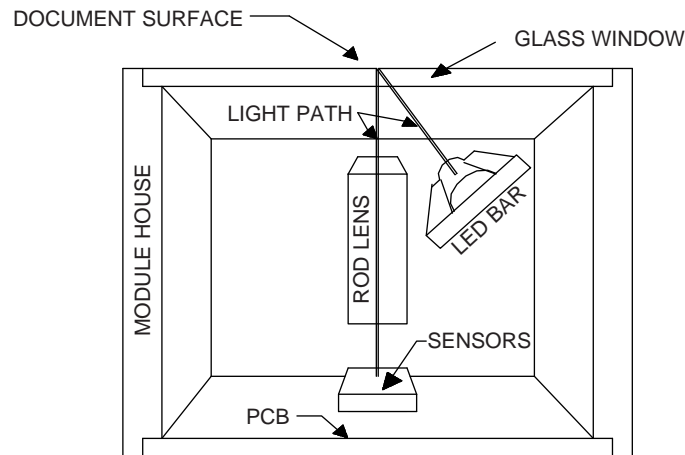
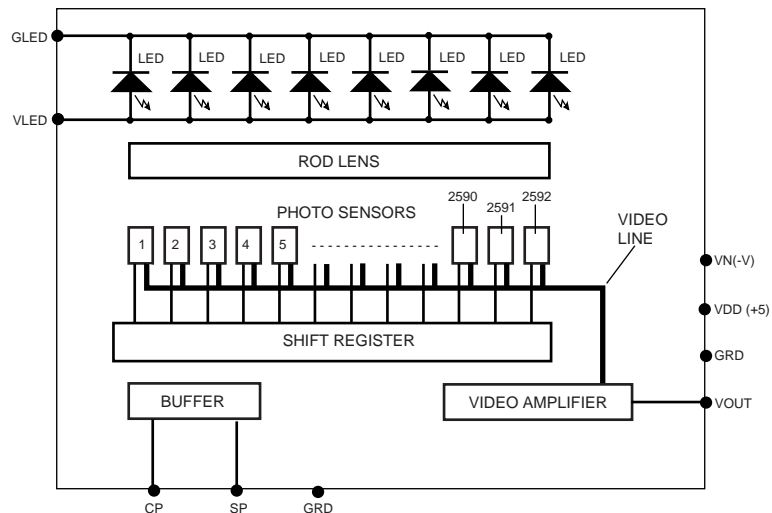INSIDE PICTORIAL OF MODULE

Figure 1. PI325MC-A4 Cross Section

Figure 2. PI325MC-A4 module block diagram.
(See Table 1 for pin-out designations)

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

Table 1. Pin configuration

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	10	V
	Idd	55	mA
	Vn	-15	V
	In	10	mA
	VLED	5.5	V
	ILED	0.55	A
Input clock pulse (high level)	Vih	Vdd – 0.5V	V
Input clock pulse (low level)	Vil	-0.8	V

Table 2. Absolute Maximum Ratings

Operating Environment

Operating temperature	Top	0 to 50	^{0}C
Operating humidity	Hop	10 to 85	%
Storage temperature	Tstg	-25 to+75	^{0}C
Storage humidity	Hstg	5 to 95	%

Table 3. Operating Environment

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

Parameter	Symbol	Parameter	Units	Note
Number of photo detectors		2592	elements	
Pixel to pixel spacing		84.7	μm	
Line scanning rate	Tint [1]	522	μsec	@ 5.0 MHz clock frequency
Clock frequency [2]	f	5.0	MHz	
Bright output voltage	Video Output	1.0	Volts	
Bright output nonuniformity [4]	Up	<+/-30	%	
Adjacent pixel nonuniformity [5]	Uadj	<25	%	
Dark nonuniformity [6]	Ud	<100	mV	
Dark output voltage	Vd	<150	mV	
Modulation transfer function [7]	MTF	>50	%	

Definition:

(1) Tint: Line scanning rate or integration time. Tint is determined by the interval of two SP, start pulses. The minimum integration time of 500us is available at 5.2 MHz pixel rate.
 (2) f: main clock frequency
(3) Vpavg = Σ Vp(n)/2592
(4) Up = [(Vpmax - Vp) / Vp] x 100% or [(Vp - Vpmin) / Vp] x 100%
(5) Upadj = MAX[| (Vp(n) - Vp(n+I) | / Vp(n)] x 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)] x 100 [%]
Vmax: maximum output voltage at 75 lp/in
Vmin: minimum output voltage at 75 lp/in
(8) O.D. = Optical Density
(9) lp / in: line pairs per inch

Table 5. Recommended Operating Conditions (25 ℃)

Item	Symbol	Min	Mean	Max	Units
Power Supply	Vdd	4.5	5.0	5.5	V
	Vn.	-4.5	-5	-12	V
	VLED		5.0	5.5	V
	Idd		50	55	ma
	Ivn		6.0	10.0	ma
	ILED		430	470	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			5.5	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		50			ns
Integration time	Tint	0.500*		5.0	ms
Operating temperature	Top		25	50	^{0}C

Note: Tint (Min) is the lowest line integration time available with 5.2 MHz clock. See note (1) under Optical-Characteristic, Table 2.

Switching Characteristics (25℃)
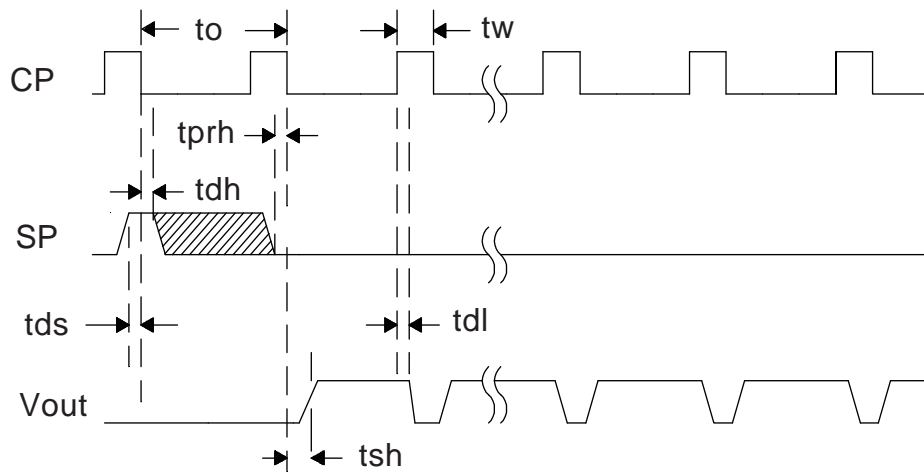

MODULE TIMING DIAGRAM

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

Item	Symbol	Min.	Typical	Max.	Units
Clock cycle time	to	0.180		4.0	µs
Clock pulse width	tw	45			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	90			ns

Table 6. Symbol Definitions for the Above Timing Diagram

PI325MC-A4 Module and Its Mechanical Dimensions

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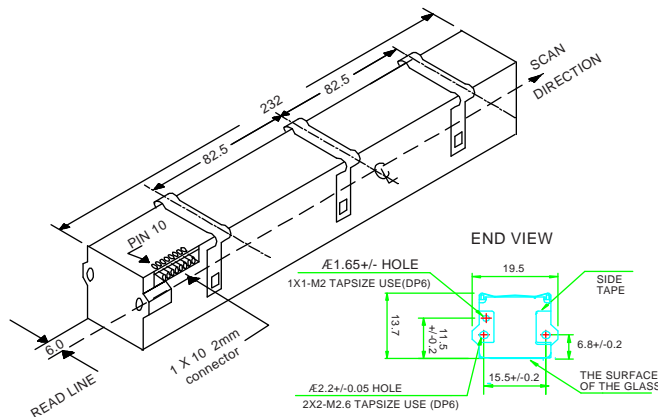
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