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**PI625MC-A6**  
**600DPI CIS Module**  
**Engineering Data Sheet**

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## Key Features

- Light source, lens, and sensor are integrated into a single module
- 23.62 dots/mm resolution, 104 mm scanning length
- Up to 500  $\mu$ sec/line scanning speed, with 5MHz pixel rate
- Wide dynamic range
- Analog output
- Red 660 nm LED light source
- Compact size  $\cong$  14 mm x 19.5 mm x 120 mm
- Low power
- Light weight

## General Description

The PI625MC-A6 is a contact-imaging sensor, CIS, module, which is composed of 13 PI3039 sensor chips. The PI3039 is a 600 DPI solid-state line imaging array, also a product of Peripheral Imaging Corporation. This imaging device is fabricated using MOS imaging sensor technology for high-speed performance and high sensitivity. The PI625MC-A6 is suitable for scanning A6 size (104 mm) documents with 23.62 dots per millimeter resolution. Applications include ticket, check and card scanners, variety of mark readers, and other automation equipment.

## Functional Description

The PI625MC-A6 imaging array consists of 13 sensors that are cascaded to provide 2496 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 PI625MC-A6 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 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.

The cross section of the PI625MC-A6 is shown in Figure 1 and its block diagram in Figure 2

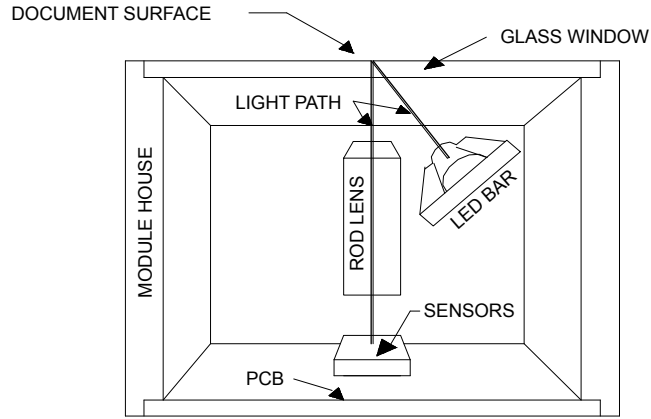


Figure 1. PI625MC-A6 Cross Section

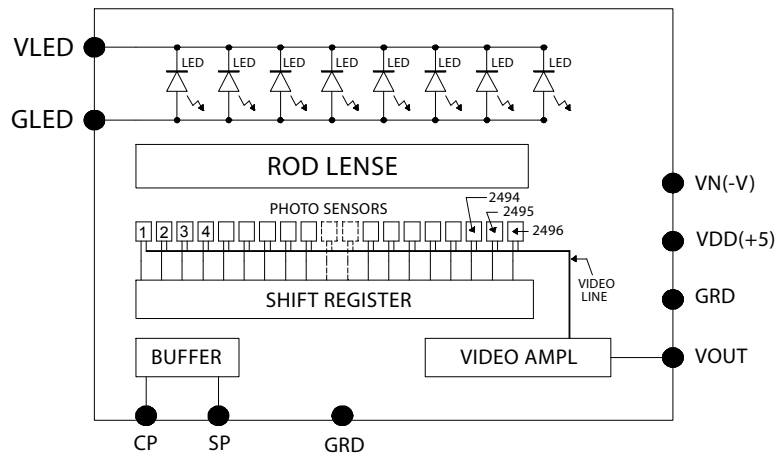


Figure 2. PI625MC-A6 Module Block Diagram.

## Connector Pinout Designation

Connector is JAE part number 1L-Z-10P-S125L3-E.

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. Pinout Configuration

## Maximum Ratings

Parameter	Symbols	Maximum Rating	Units
Power supply voltage	Vdd	7	V
	Idd	50	mA
	Vn	-15	V
	In	10	mA
	VLED	5.5	V
	ILED	500	mA
Input clock pulse (high level)	Vih	Vdd – 0.5	V
Input clock pulse (low level)	Vil	-0.5	V

Table 2. Maximum Rating

Note. These are the maximum values and are not to be used in a prolonged condition

## 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	%

Table 3. Operating Environment

## Electro-Optical Characteristics

The tabled values are measured at 25° C

Parameter	Symbol	Typical	Units	Note
Number of photo detectors		2496	elements	
Pixel to pixel spacing		42.3	µm	
Line scanning rate <sup>(1)</sup>	Tint	500	µsec	@ 5.0 MHz clock frequency
Clock frequency <sup>(2)</sup>	fclk	5.0	MHz	
Bright output voltage <sup>(3)</sup>	Vpavg	1.0 +/- 0.1	V	
Bright output nonuniformity <sup>(4)</sup>	Up	< +/- 30	%	
Adjacent pixel nonuniformity <sup>(5)</sup>	Uadj	<25	%	
Dark nonuniformity <sup>(6)</sup>	Ud	<100	mV	
Dark output voltage <sup>(6)</sup>	Vd	<450	mV	
Modulation transfer function <sup>(7)</sup>	MTF	>40	%	

Table 4. Electro-Optical Characteristics at 25° C

### Notes:

1. Tint: Tint is the line scanning rate or integration time. Tint is determined by the interval of two SP's; start pulses.
2. fclk: fclk is the main clock frequency.
3. Vpavg:  $V_{pavg} = \sum V_p(n)/2496$ ; where n=1, 2, 3..., 2496.
4. Up:  $U_p = [(V_{pmax} - V_{pavg}) / V_{pavg}] \times 100\%$  or  $[(V_{pavg} - V_{pmin}) / V_{pavg}] \times 100\%$ .  
where Vpmax = the maximum V(n) and Vpmin = the minimum V(n)
5. Uadj:  $U_{adj} = \text{MAX}[ | (V_p(n) - V_p(n+1)) | / V_p(n) ] \times 100\%$ .  
Uadj is the non-uniformity in percent between adjacent pixels, Where Vp(n) is the n<sup>th</sup> pixel in the line scan.
6. Ud:  $U_d = V_{dmax} - V_{dmin}$ .  
Vd = the average dark output level.  
Vdmin is the minimum output voltage on a black document (LED is turned off).  
Vdmax is the maximum output voltage on a black document (LED is turned off).
7. MTF:  $MTF = [(V_{pmax} - V_{pmin}) / (V_{pmax} + V_{pmin})] \times 100 [\%]$ ; tested on a 300 lp/inch target.  
Vmax: maximum output voltage at 50 lp/in and Vmin: minimum output voltage at 50 lp/in,  
where lp/in is the line pairs per inch.

## Recommended Operating Conditions

The tabled values are measured at 25° C

Parameter	Symbol	Min	Mean	Max	Units
Power supply	Vdd	4.5	5.0	5.5	V
	Vn	-4.5	-5	-12	V
	VLED		5		V
	Idd	26	30	34	mA
	Ivn		6.0	10.0	mA
	ILED		450	500	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 <sup>(1)</sup>	fclk			5.5	MHz
Clock pulse high duty cycle		25			%
Clock pulse high duration		50			ns
Integration time <sup>(1)</sup>	Tint	0.25		5.0	ms
Operating temperature	Top		25	50	°C

Table 5. Recommended Operating Conditions at 25° C

### Note:

1. Electrically, including the image sensors, the circuits will operate above 5.5 MHz with Tint at 455 µs. However the light power is fixed, hence with the shorter integration time, the exposure is reduced. This reduction limits the specification call out to integration time of 500 µs at 5.0MHz for 1.0 V output.

## Timing Characteristics

The Timing characteristics for the I/O clocks are shown in Figure 3. See timing symbol definitions in Table 6. The listed values are measured at  $\sim 25^{\circ}\text{C}$

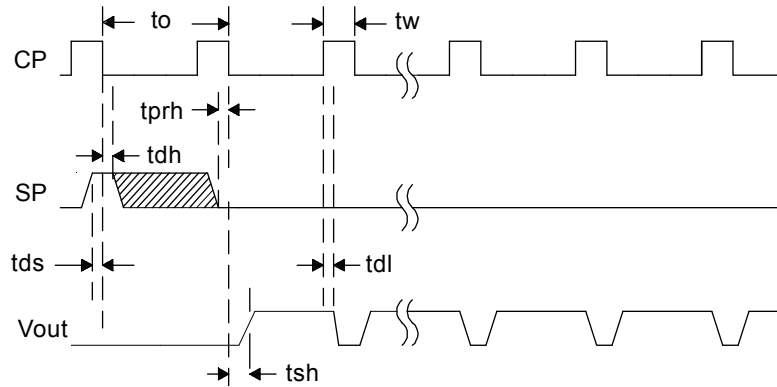


Figure 3. Timing Diagram

Parameters	Symbol	Min.	Typical	Max.	Units
Clock cycle time	$t_{to}$	0.182		10000	$\mu\text{s}$
Clock pulse width	$t_{tw}$	45			ns
Clock duty cycle		25		75	%
Prohibit crossing time of Start Pulse	$t_{tprh}$	84			ns
Data setup time	$t_{tds}$	86			ns
Data hold time	$t_{tdh}$	94			ns
Signal delay time	$t_{tdl}$	50			ns
Signal settling time	$t_{tsh}$	98			ns

Table 6. Timing Symbol Definitions for Figure 3 Timing Diagram

## PI625MC-A6 Module and Its Mechanical Dimensions

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

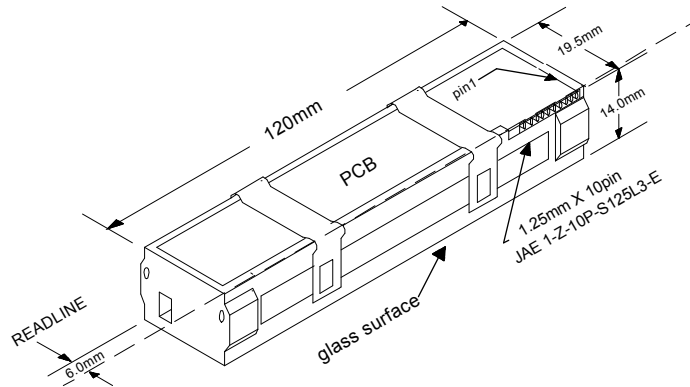


Figure 4. Overall View of the Module Housing

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