PixArt Imaging Inc.

PAJ7025R3: Multiple Objects Tracking Sensor Module

Ordering Information

Part Number	Package Type
PAJ7025R3	Module-14pins

RoHS compliant

For any additional inquiries, please contact us at http://www.pixart.com/contact.asp

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1.0 General Description

1.1 Introduction

PAJ7025 is a multiple objects tracking (MOT) sensor which integrates a high quality CMOS image sensor, image processing DSP and SPI^{TM} protocol.

As the figure below depicts, PAJ7025 captures grey image by built-in sensor and analyzes objects with PixArt image processing DSP. Object features including object area, object center coordinate, 4-way object boundary, average/maximum object brightness, object radius, object range, and aspect ratio are accessible through SPI^{TM} interface.

In the application environment the moving object(s) could have active IR light source or passive IR reflector.
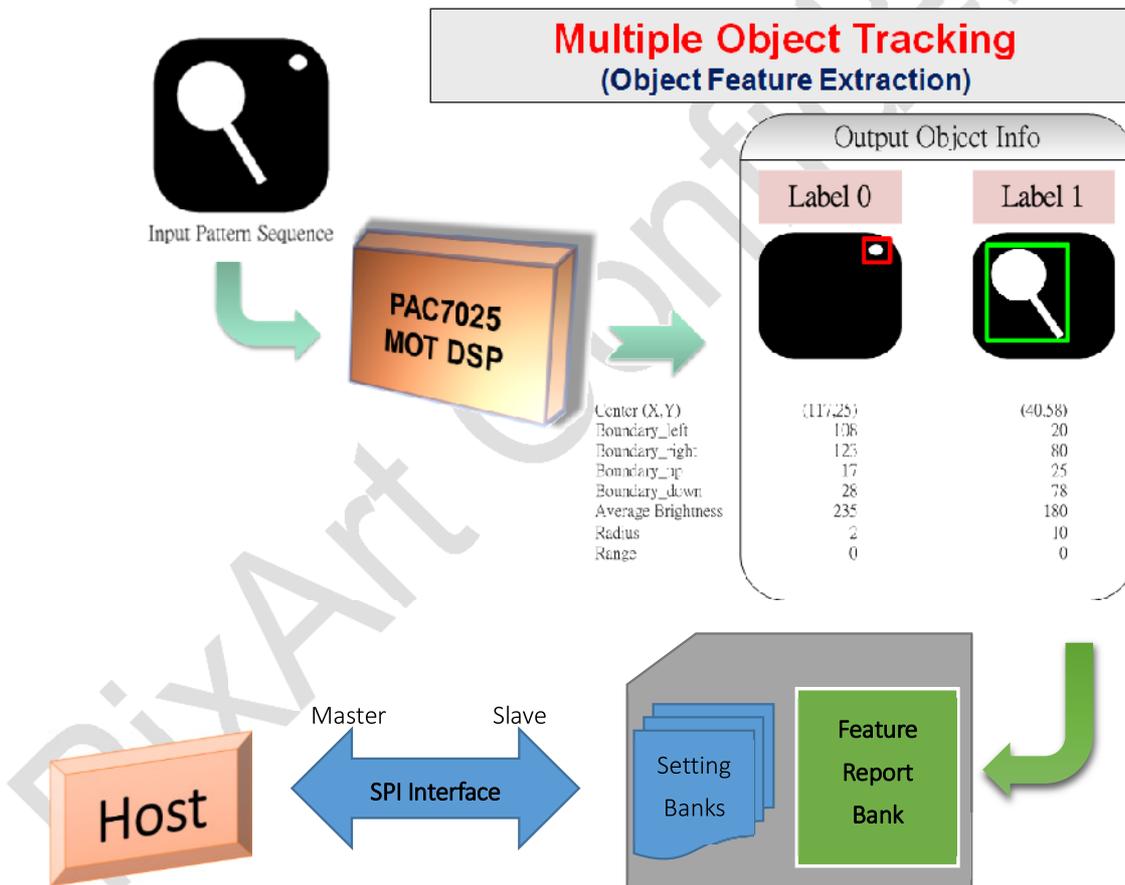
Figure 1. System Blocks

1.2   Block Diagram

PAJ7025 Block Diagram
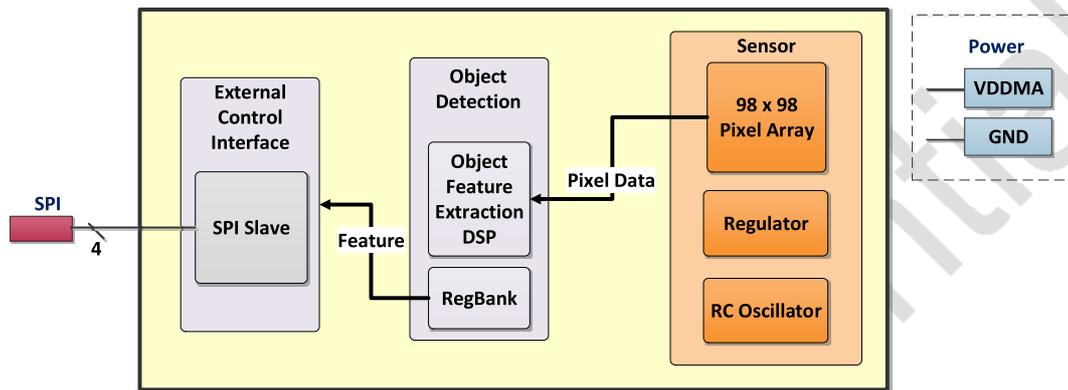
Figure 2. Sensor Architecture Blocks Diagram

1.3   Features

- Sensor color type: black and white

- Pixel size: 11um * 11um

- Number of array elements: 98 * 98

- Pixel depth: 8 bits

- Scan mode: progressive

- Shutter Type: Global Shutter

- Programmable object center coordinate resolution: up to 4095*4095

- Object number: up to 16

- System clock: 10MHz±3% @25°C (internal clock)

- Interface: SPI^{TM} with speed: up to 14Mhz (bits/sec)

- Programmable frame rate control: 10fps~200fps.

- Programmable Gain setting: 1X~8X

- Programmable exposure time.

- Object features: Object center coordinate, object area, object boundary, object brightness etc

- Two modes for power management

- Normal mode and Power down mode.

- Main Power supply and IO voltage: VDDMA&VDDIO: 2.0~3.6V

- Package Module-14pins

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1.4   Pin Description
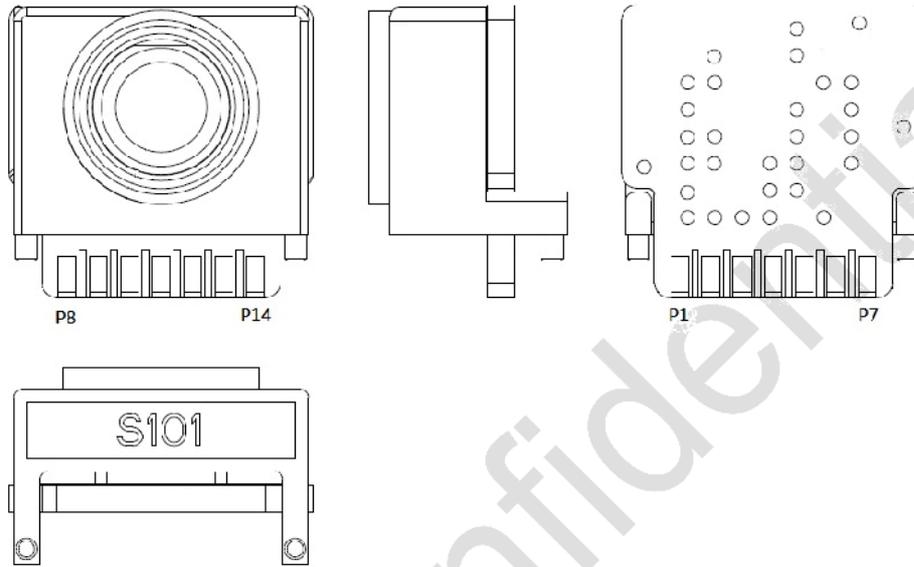
Figure 3. Module Pinout Configuration

Table 1. Pin Signal Description

Pin No.	Name	Type	Definition
1	G5	I/O	Please leave it as floating.
2	G6	I/O	Please leave it as floating.
3	G7	I/O	Please leave it as floating.
4	G8	OUT	Please leave it as floating.
5	G9/CSB	I/O	SPI Chip Select pin, active low.
6	G10/SCK	I/O	SCK: Serial Communications Clock for SPI.
7	G11/MISO	I/O	MISO: Serial Data Output.
8	G12/MOSI	I/O	MOSI: Serial Data Input pin.
9	VSSD	GND	This pin must be connected to ground.
10	G13/LED_SIDE	I/O	Reserved pin for IR LED Control
11	G14/LED_FRT	I/O	Reserved pin for IR LED Control
12	CP_1	I/O	Reserved pin. Please leave it as floating.
13	CP_2	I	Reserved pin. Please leave it as floating.
14	VDDMA	PWR	Power supply (+2.0 Vdc~ +3.6 Vdc).

2.0 Mechanical Specifications

2.1 Mechanical Dimension

Figure 4. Module Outline Drawing

3.0 Operating Specifications

3.1 Absolute Maximum Ratings

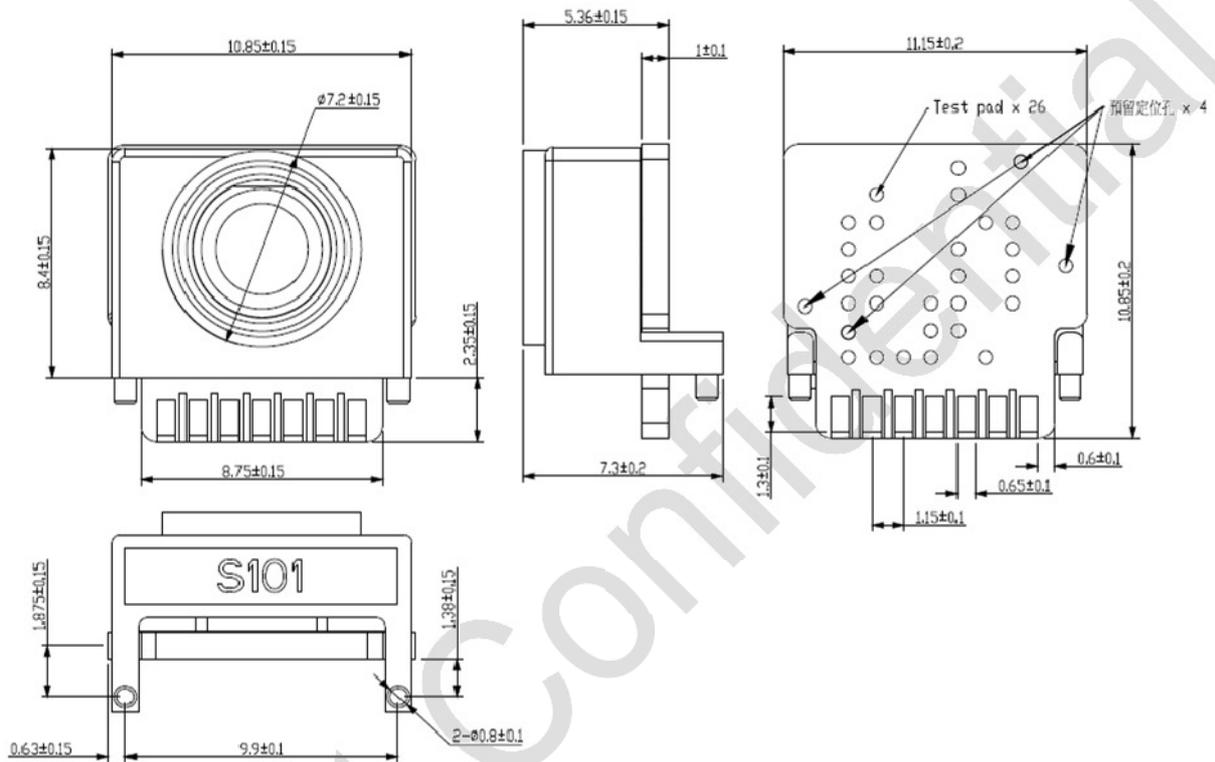| Symbol	Parameter	Min.	Max.	Unit	Notes
T_{STG}	Storage temperature	-25	125	℃	
T_A	Operating Temperature	0	40	°C	
T_{solder}	Lead Solder Temp	-	250	°C	Lead free
ESD	HBM (Human Body mode)	-	2000	V	
	MM (Machine mode)	-	200		
VDDMA	I/O power & Analog power DC External Power Input	-0.3	3.96	V	
V_{IN}	DC input voltage	-0.3	VDDMA+0.3	V	All I/O pin

Notes:

1. Maximum Ratings are those values beyond which damage to the device may occur.

2. Exposure to these conditions or beyond those indicated may adversely affect device reliability.

3. Functional operation under absolute maximum-rated conditions is not implied. Functional operation should be restricted to the Recommended Operating Conditions.

3.2 Recommend Operating Condition

Symbol	Parameter	Min.	Typ.	Max.	Unit	Notes
T_A	Operating Temperature	0	-	40	°C	
VDDMA	I/O power & Analog power DC External Power Input	2.0	2.8	3.6	V	

3.3 Electrical Specifications

Symbol	Parameter	Min.	Typ.	Max.	Unit	Notes
IDD	Supply Current	2	6	10	mA	Sensor on measurement @25°C, VDDMA=3.6V, 200 ±3% fps
	Power-down current	5	14	60	µA	@25°C, VDDMA=3.6V
VIH	Input High Voltage	0.7*VDDMA	-	-	V	
VIL	Input Low Voltage	-	-	0.3* VDDMA	V	
VOL	Output Low Voltage	-	-	0.1* VDDMA	V	Note2
VOH	Output High Voltage	0.9* VDDMA			V	Note2

Notes:

1. VDDMA= VDDI/O = 2.0~3.6V

2. All the GPIO maximum output current is 4mA, Capacitance load spec. =100pF @ maximum Frequency = 14Mhz±1.5%

3.4 Optical Specifications

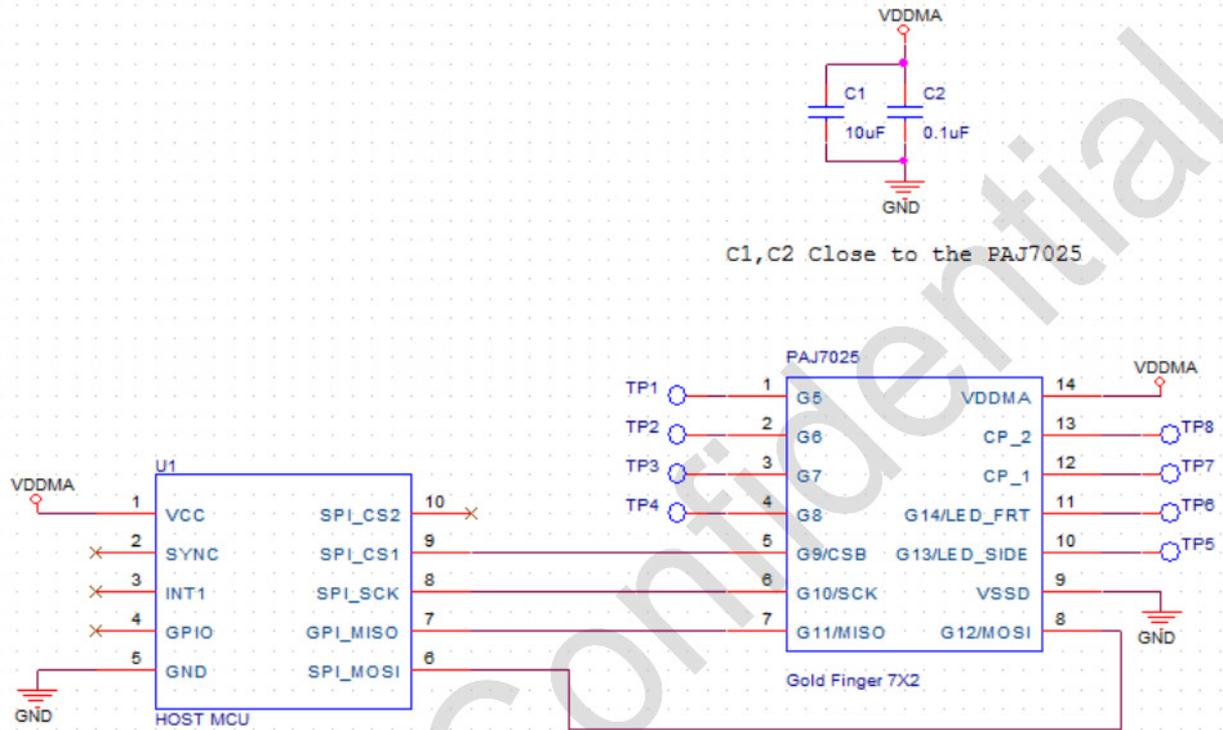| Parameter		Specification	
LENS	Effective Focal Length	0.378mm ±5%	
	Fno	2.93 ±5%	
	Image Circle	1.6mm	
	Flange back length	0.76mm ±5%	
	Distortion	-30%	
	Relative Illumination	38.5%	
	Component	2P+IR	
SENSOR	Image Area	1.524 mm	
	Sensor Pixel Size	11µm*11µm	
	Sensor Pixel Resolution	98*98	
	Angle Field of View (2w)		
	Diagonal	Y=0.762mm	142° ±5%
	Vertical	Y=0.535mm	113° ±5%
	Horizontal	Y=0.535mm	113° ±5%
IR FILTER SPEC	400nm-780nm	Tavg<3%	
	835nm-870nm	Tmin>85%	
	840nm-850nm	T>90%	

4.0   Reference Schematics

Figure 5. Application Circuit