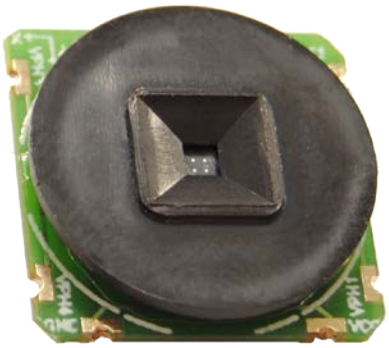
Solar MEMS Technologies S.L.

Sun Sensor NANO-ISSX/c

Technical Specifications



Features

Two orthogonal axes sun sensor
Different fields of view version: 60,25,15 and 5
Low power consumption: 5 mW
Wide operating voltage range: 3,3÷12 V
Industrial temperature range: - 40° to 85°C
Compact design: 18×18×3,85 mm (L×W×H)
Low weight: < 5 g
Surface mountable

Applications

Renewable energies
Automotive
Air conditioning systems
Domotic applications
Attitude control systems for vehicles
Sun tracking

NANO-ISSX sun sensor allows the measurement of the sun ray incident vector by providing its projection angles in orthogonal reference axes by means of a simple calculation procedure.

The field of view is achieved by the geometrical dimensions of the design. Its compact pattern, ease integration and low power consumption, makes it a suitable tool for renewable energies or low cost intelligent sensing applications.

NANO-ISSX is available in two formats: one designed for PCB surface mounting and one with a disconnectable type wire-to-board crimp style connector (NANO-ISSX-c).

1. Specifications

1.1. General Specifications

Parameter	NANO-60	NANO-25	NANO-15	NANO-5	Unit
Sensor type	2 axes	2 axes	2 axes	2 axes	Orthogonal
Field of view (FOV)	120x120	50x50	30x30	10x10	º
Average consumption	5	5	5	5	mW
Dimensions (L×W×H)	18×18×3,85	18×18×5,15	18×18×6,35	18×18×10,15	mm
Weight	<10	<10	<10	<10	g

Table 1. General Specifications

1.2. Absolute maximum ratings

Symbol	Parameter	Minimum value	Maximum value	Unit
V_{DD}	Supply voltage	0	14	V
T_{OP}	Operating temperature	-40	85	ºC

Table 2. Absolute maximum ratings

1.3. Recommended operating conditions

Symbol	Parameter	Minimum value	Maximum value	Unit
V_{DD}	Supply voltage	3	12	V
V_r	Supply voltage ripple	0	100	mVpp
T_{OP}	Operating temperature	-40	85	ºC

Table 3. Recommended operation conditions

2. Sun Sensor NANO-ISSX

NANO-ISSX measures the incidence angles of a sun ray based on a quadrant photodetector device. The sunlight is guided to the detector through a window above the sensor. Depending on the angle of incidence, the sunlight induces photocurrents in the four quadrants of the detector.

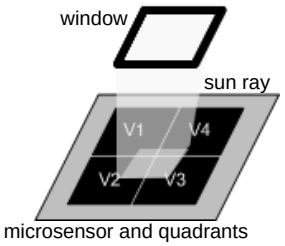


Fig 1. Microsensor of NANO-ISSX

2.1. NANO-ISSX parameters

2.1.1. Reference Axes

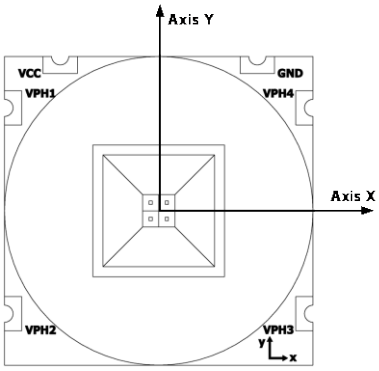


Fig 2. Front view NANO-ISS60 reference system

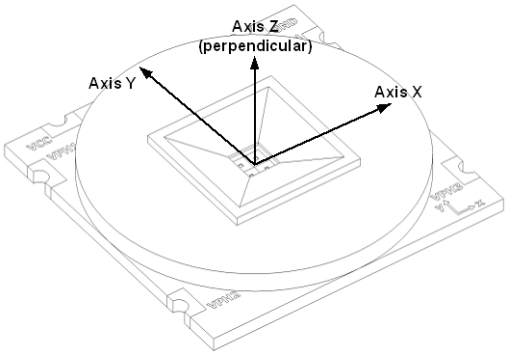


Fig 3. Isometric view NANO-ISS60 reference system

Z axis is perpendicular to the sensor base plane.

2.1.2. Incident angle calculation

The *angle x* and *angle y* specify the angular position of the incident sun ray inside the field of view of the NANO-ISSX sensor according to references given in Fig. 5.

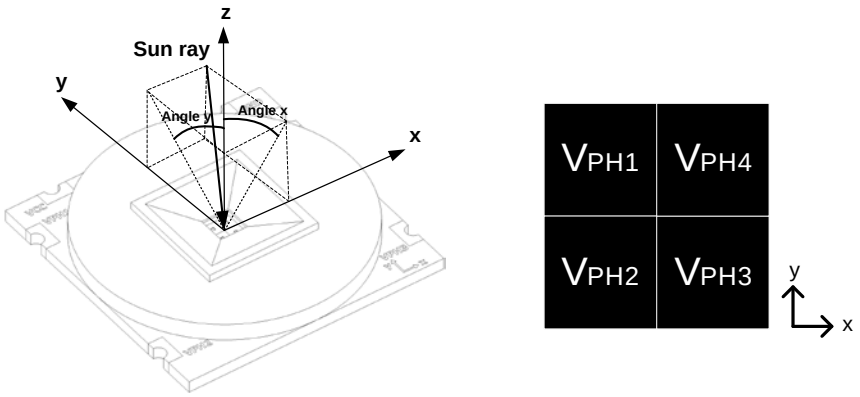


Fig 4. Reference for angles calculation

Angles X and Y of the incidence ray can be obtained with a simple set of equations involving the four photodiode voltages generated by the sensor (V_{PH1}, V_{PH2}, V_{PH3},V_{PH4}):

$$X_1 = V_{PH3} + V_{PH4} \qquad Y_1 = V_{PH1} + V_{PH4}$$

$$X_2 = V_{PH1} + V_{PH2} \qquad Y_2 = V_{PH2} + V_{PH3}$$

$$F_X = \frac{X_2 - X_1}{X_2 + X_1} \qquad F_Y = \frac{Y_2 - Y_1}{Y_2 + Y_1}$$

$$Angle\ X = arctg\left(C \cdot F_X\right) \qquad Angle\ Y = arctg\left(C \cdot F_Y\right)$$

Type	Value
NANO-ISS60	1,889
NANO-ISS25	0,477
NANO-ISS15	0,273
NANO-ISS5	0,125

Table 4. Values of the parameter C according to the type of sensor NANO-ISSX

The accuracy of the measurements depends on the integration and the calibration processes. The NANO-ISSX sun sensors are not calibrated.

3. Electrical interface

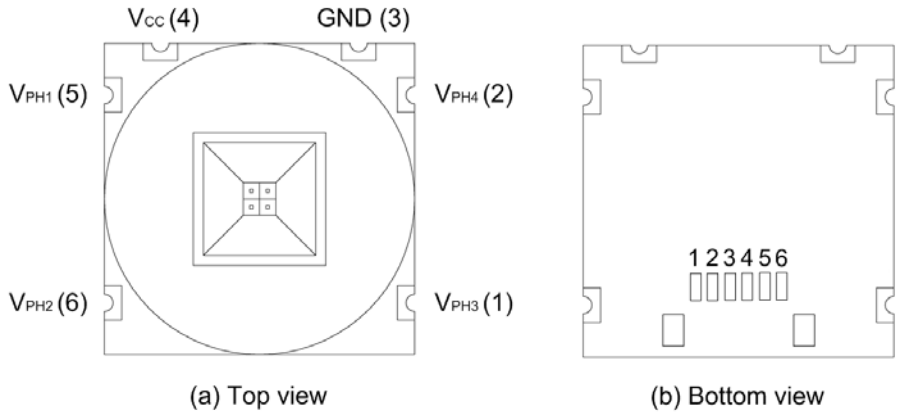


Fig 5. NANO-ISSX pin configuration

Pin	Symbol	Description
1	V_{PH3}	Lower-right photodiode voltage (3)
2	V_{PH4}	Upper-right photodiode voltage (4)
3	GND	Ground
4	V_{cc}	Power supply
5	V_{PH1}	Upper-left photodiode voltage (1)
6	V_{PH2}	Lower-left photodiode voltage (2)

Table 5. Pin description

4. Mechanical drawings

4.1. NANO-ISS60

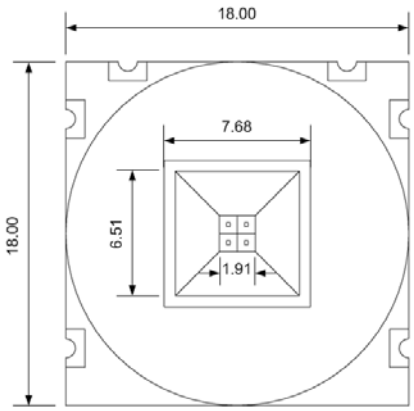


Fig 6. Top view

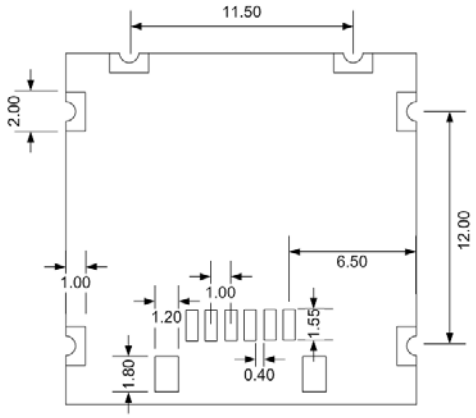


Fig 7. Bottom view

Fig 8. Side view

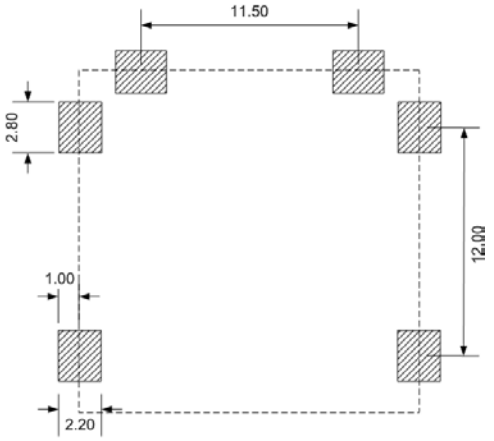


Fig 9. Recommended land pattern

Notes: (a) Dimensions are in millimetres.
(b) Tolerances are non-cumulative: ±0.05 mm for all centers.
(c) The dimensions above should serve as a guideline. Contact Solar MEMS Technologies for details.

Dimensions of NANO-ISS25, NANO-ISS15 and NANO-ISS5 versions are the same as NANO-ISS60 except height. See table 1.

4.2. NANO-ISS60-c

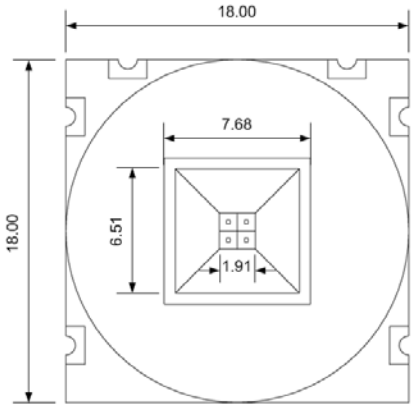


Fig 10. Top view

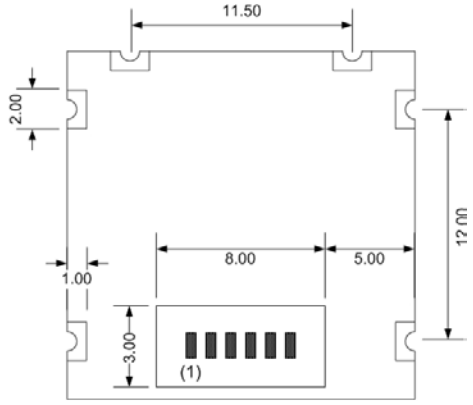


Fig 11. Bottom view

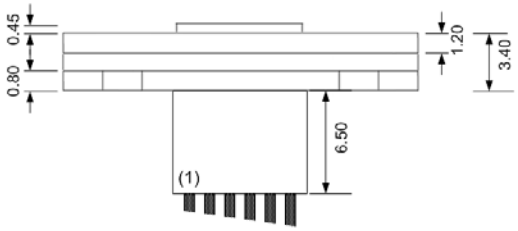


Fig 12. Side view

Notes: (a) Dimensions are in millimetres.
(b) Tolerances are non-cumulative: ±0.05 mm for all centers.
(c) The dimensions above should serve as a guideline. Contact Solar MEMS Technologies for details.
(d) SH connector supplied is wire-to-board 1 mm pinch crimp style.

Dimensions of NANO-ISS25, NANO-ISS15 and NANO-ISS5 versions are the same as NANO-ISS60 except height. See table 1.

5. Warranty

Solar MEMS Technologies S.L. warrants the NANO-ISSX sun sensor to the original consumer purchaser any product that is determined to be defective for the following terms will be repaired, or replaced.

The warranty is one year from date of purchase.

The product in question must be sent to Solar MEMS Technologies S.L. (address is shown below) within the warranty period and the original consumer purchaser must comply with the following conditions, to be eligible for repair or replacement under this warranty:

- The product must not have been modified or altered in any way by an unauthorized source.
- The product must have been installed in accordance with the installation instructions and the technical specifications.

This limited warranty does not cover:

- Damage due to improper installation;
- Accidental or intentional damages;
- Misuse, abuse, corrosion, or neglect;
- Product impaired by severe conditions, such as excessive wind, ice, storms, lightning strikes or other natural occurrences;
- Damage due to improper packaging on return shipment.

Any and all labor charges for troubleshooting, removal or replacement of the product are not covered by this warranty and will not be honored by Solar MEMS Technologies S.L.

Return shipping to Solar MEMS Technologies S.L. must be pre-paid by the original consumer purchaser. Solar MEMS Technologies S.L. will pay the normal return shipping charges to original consumer purchaser within the European Union countries only.

Address of Solar MEMS Technologies S.L.
Solar MEMS Technologies S.L.
Parque Científico Tecnológico Cartuja 93.
Tecnoincubadora Marie Curie.
C/ Leonardo da Vinci 18, Planta 1, Módulo 2.
C.P. 41092, Seville, Spain.
E-mail: smt@solar-mems.com
Phone: (+34) 954 460 113

Solar MEMS has a system of quality and environment according to the ISO 9001 and ISO 14001 standards, provided by the certification company Applus CTC.