MLX90621

16x4 IR array

Datasheet

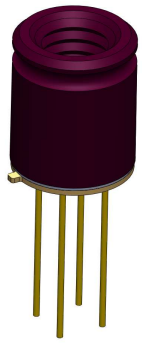
Features and Benefits

- Small size, low cost 16x4 pixels IR array
- Easy to integrate
- Industry standard four lead TO39 package
- Factory calibrated infrared temperature measurement.
  Calibration parameters stored in EEPROM.
- Noise Equivalent Temperature Difference (NETD) 0.20K RMS @4Hz refresh rate
- I^2C compatible digital interface
- Programmable frame rate 0.5Hz…512Hz
- 2.6V supply voltage
- Current consumption less than 9mA
- Sleep mode consumption less than 7µA
- Measurement start trigger for synchronization with external control unit
- 3 FOV - 40°x10°, 60°x16° and 120°x25°
- Ta -40°C to 85°C
- To -20°C to 300°C
- Complies with RoHS regulations

Applications Examples

- High precision non-contact temperature measurements;
- Temperature sensing element for residential, commercial and industrial building air conditioning;
- Microwave ovens
- Home appliances with temperature control;
- Thermal Comfort sensor in automotive Air Conditioning control system;
- Passenger classification
- Automotive blind angle detection;
- Industrial temperature control of moving parts;
- Identifying thermal leaks in homes
- Thermal scanners
- Security / safety gates
- Intrusion / Movement detection;
- Presence detection / Person localization

Ordering Information



Part No.	Temperature Code	Package Code	Option Code - X X X (1) (2) (3)	Standard part	Packing form
MLX90621	E (-40°C to 85°C)	SF (TO-39)		-000	-TU

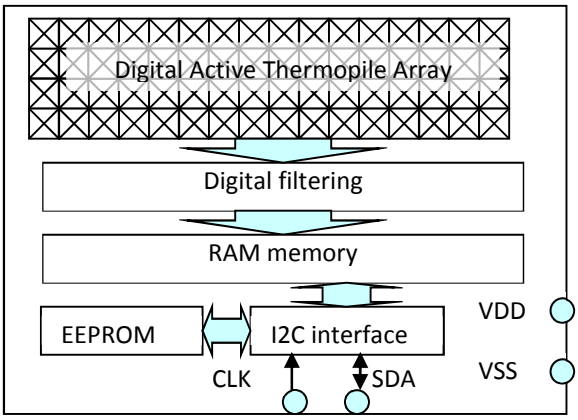
(1) Supply Voltage
B = 2.6V

(2) Number of thermopiles:
A = 16X4

(3) Package options:
A = 120°x25° FOV
B = 60°x16° FOV
C = reserved
D = 40°x10° FOV

Example:
MLX90621ESF-BAB-000-TU

Functional diagram



General Description

The MLX90621 is a fully calibrated 16x4 pixels IR array in an industry standard 4-lead TO-39 package. It contains 2 chips in one package: the MLX90670 (IR array with signal conditioning electronics) and the 24AA02 (256x8 EEPROM) chip.

The MLX90621 contains 64 IR pixels with dedicated low noise chopper stabilized amplifier and fast ADC integrated. A PTAT (Proportional To Absolute Temperature) sensor is integrated to measure the ambient temperature of the chip. The outputs of both IR and PTAT sensors are stored in internal RAM and are accessible through I^2C.

General Description (continued)

The results of the infrared sensor measurements are stored in RAM:

- 15...18-bit result of IR measurement for each individual sensor (64 words)
- 15…18-bit result of PTAT sensor

Depending on the application, the external microcontroller can read the different RAM data and, based on the calibration data stored in the EEPROM memory, compensate for difference between sensors to build up a thermal image, or calculate the temperature at each spot of the imaged scene.
These constants are accessible by the user microcontroller through the I2C bus and have to be used for external post processing of the thermal data. This post processing includes:

- Ta calculation
- Pixel offset cancelling
- Pixel to pixel sensitivity difference compensation
- Object emissivity compensation
- Object temperature calculation

The result is an image with NETD better than 0.1K RMS at 1Hz refresh rate.
The refresh rate of the array is programmable by means of register settings or directly via I2C command. Changes of the refresh rate have a direct impact on the integration time and noise bandwidth (faster refresh rate means higher noise level). The frame rate is programmable in the range 0.5Hz…512Hz and can be changed to achieve the desired trade-off between speed and accuracy.
The MLX90621 requires a single 2.6V…3.2V although the device is calibrated and performs best at VDD=2.6V.

The MLX90621 is factory calibrated in following temperature ranges:

- -40˚C…85˚C for the ambient temperature sensor
- -50˚C…300˚C for the object temperature.

NOTE: The sensor can detect higher temperatures, but is not calibrated for temperatures above 300°C.
See Table 21 for configuration specific properties.

Each pixel of the array measures the average temperature of all objects in its own Field Of View (called nFOV).

It is very important for the application designer to understand that the accuracy of the temperature measurement is very sensitive to the thermal equilibrium isothermal conditions (there are no temperature differences across the sensor package). The accuracy of the thermometer can be influenced by temperature differences in the package induced by causes like (among others): Hot electronics behind the sensor, heaters/coolers behind or beside the sensor or by a hot/cold object very close to the sensor that not only heats the sensing element in the thermometer but also the thermometer package.