

## XYGStudy MLX90640-D55

# XYGStudy MLX90640-D55 IR Array Thermal Imaging Camera User Manual

## 1. INTRODUCTION

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The XYGStudy MLX90640-D55 is a 32x24 pixel IR array thermal imaging camera module designed for high-precision non-contact temperature measurements. It communicates via an I2C interface and is compatible with 3.3V/5V operating voltages, supporting various host platforms such as Raspberry Pi, Arduino (ESP32), and STM32.

This module utilizes the MLX90640 far-infrared thermal sensor array to detect the IR distribution of objects within its field of view. It processes this data to calculate surface temperatures and generate thermal images. Its compact form factor makes it suitable for integration into diverse industrial and intelligent control applications.



Figure 1: The MLX90640-D55 Thermal Camera Module.

## 2. KEY FEATURES

- Adopts MLX90640 far-infrared thermal sensor array with 32x24 pixels.
- Communicates via I2C interface, configurable to fast mode (up to 1MHz data rate).
- Noise Equivalent Temperature Difference (NETD) of 0.1K RMS @1Hz refresh rate.
- Onboard voltage translator ensures compatibility with 3.3V/5V operating voltage.
- Comes with development resources and manual, including examples for Raspberry Pi, Arduino (ESP32), and STM32.

## Specifications

- Operating voltage: 3.3V/5V
- Operating current: < 23mA
- Communication interface: I2C (address 0x33)
- Field of view (Horizontal×Vertical):
  - [MLX90640-D55 Thermal Camera](#): 55°×35° (narrow angle FOV, suit for long range measuring)
  - [MLX90640-D110 Thermal Camera](#): 110°×75° (wide angle FOV, suit for short range measuring)
- Operating temperature: -40°C ~ 85°C
- Target temperature: -40°C ~ 300°C
- Resolution: ±1°C
- Refresh rate: 0.5Hz~64Hz (programmable)
- Dimensions: 28mm×16 mm
- Mounting hole size: 2.0mm

## Applications

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- High precision non-contact temperature measurements
- IR thermal imaging devices, IR thermometers
- Smart home, intelligent building, intelligent lighting
- Industrial temperature control, security monitoring, intrude/movement detection

## Pinouts

In the case of working with MCU:

- VCC ↔ 3.3V / 5V
- GND ↔ GND
- SDA ↔ MCU.I2C data line
- SCL ↔ MCU.I2C clock line

Figure 2: Overview of MLX90640-D55 features and capabilities.

## 3. SPECIFICATIONS

Specification	Value
Operating Voltage	3.3V/5V
Operating Current	<23mA
Communication Interface	I2C (address 0x33)
Field of View (Horizontal×Vertical)	55°×35° (narrow angle FOV, suitable for long-range measuring)

Specification	Value
Operating Temperature	-40°C 85°C
Target Temperature	-40°C 300°C
Resolution	±1°C
Refresh Rate	0.5Hz~64Hz (programmable)
Dimensions	28mm×16 mm
Mounting Hole Size	2.0mm

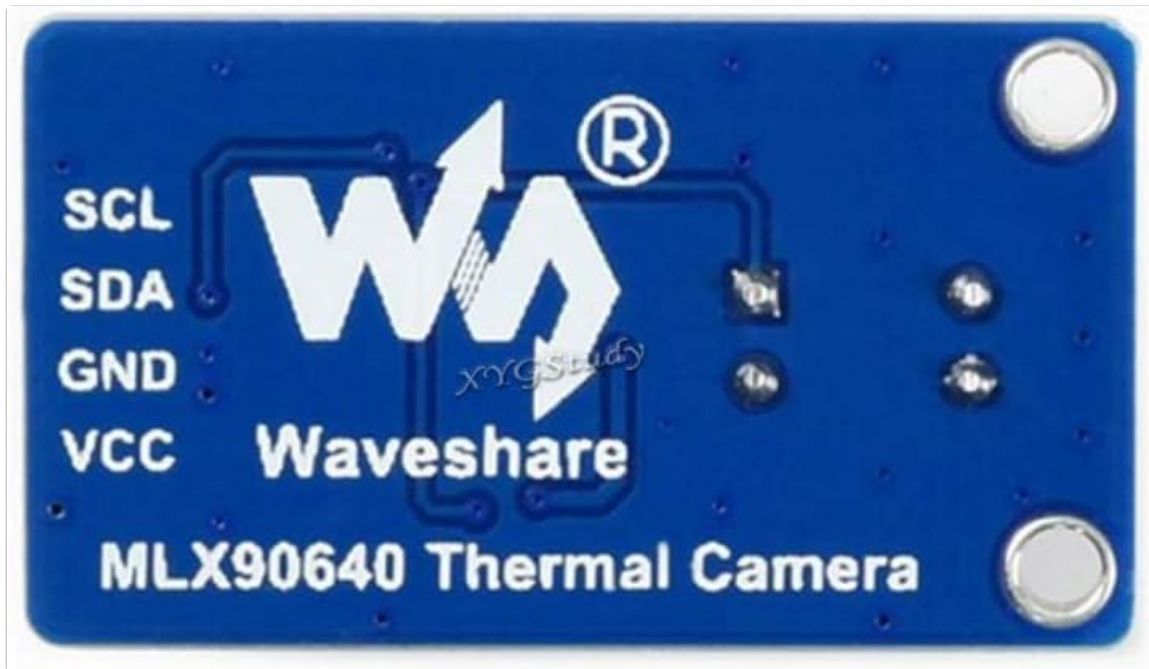


Figure 3: Detailed specifications of the MLX90640-D55 module.

## 4. PINOUTS

The MLX90640-D55 module features a standard pinout for easy integration with microcontrollers (MCUs). The connections are as follows:

- **VCC** ↔ 3.3V / 5V (Power Supply)
- **GND** ↔ GND (Ground)
- **SDA** ↔ MCU.I2C data line
- **SCL** ↔ MCU.I2C clock line



Figure 4: Pinout diagram for connecting the MLX90640-D55 to a microcontroller.

## 5. SETUP AND CONNECTIONS

To begin using your MLX90640-D55 thermal camera, follow these general setup guidelines:

### 5.1 Physical Connection

Connect the module to your chosen microcontroller (e.g., Raspberry Pi, ESP32, STM32) using the provided PH2.0 4PIN wire. Ensure correct polarity and pin assignments as detailed in the Pinouts section.



Figure 5: The MLX90640-D55 module connected with its 4-pin wire.

## 5.2 Module Orientation

Observe the module's orientation for proper integration into your project. The thermal sensor lens should face the area you intend to measure.



Figure 6: Top view of the module.

### Example

Generating IR thermal images of the Raspberry Pi:

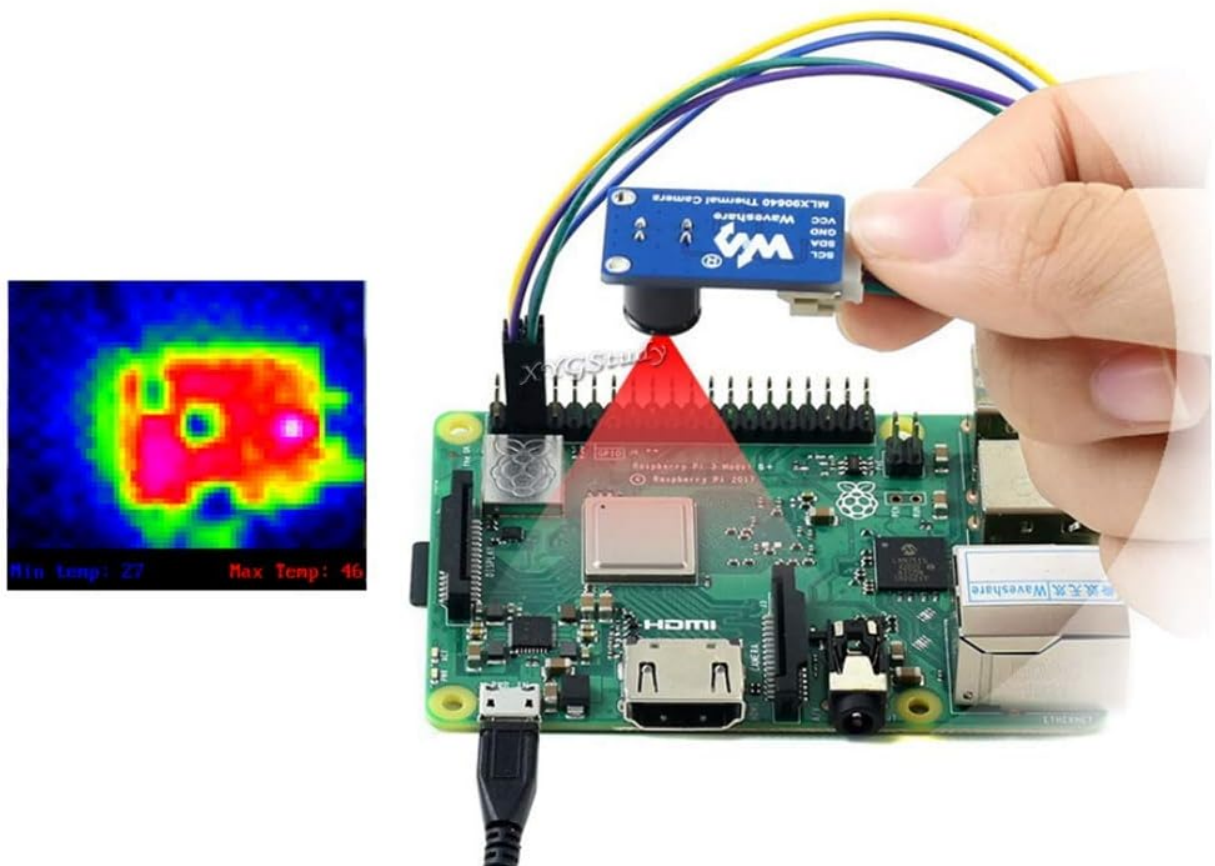


Figure 7: Bottom view of the module.

## 6. OPERATING INSTRUCTIONS

## 6.1 Powering the Device

The module operates on 3.3V or 5V. Ensure your power supply matches the module's requirements. The onboard 3.7V MX1.25 lithium battery charging and discharging interface supports flexible power supply solutions, extending the device's operational time.

## 6.2 Communication

Communication with the host MCU is established via the I2C interface. The I2C address is 0x33. The interface can be configured to fast mode, supporting data rates up to 1MHz.

## 6.3 Thermal Imaging

The module captures thermal data within a 55°×35° field of view, suitable for long-range measurements. It can detect target temperatures from -40°C to 300°C with a resolution of ±1°C. The refresh rate is programmable from 0.5Hz to 64Hz.

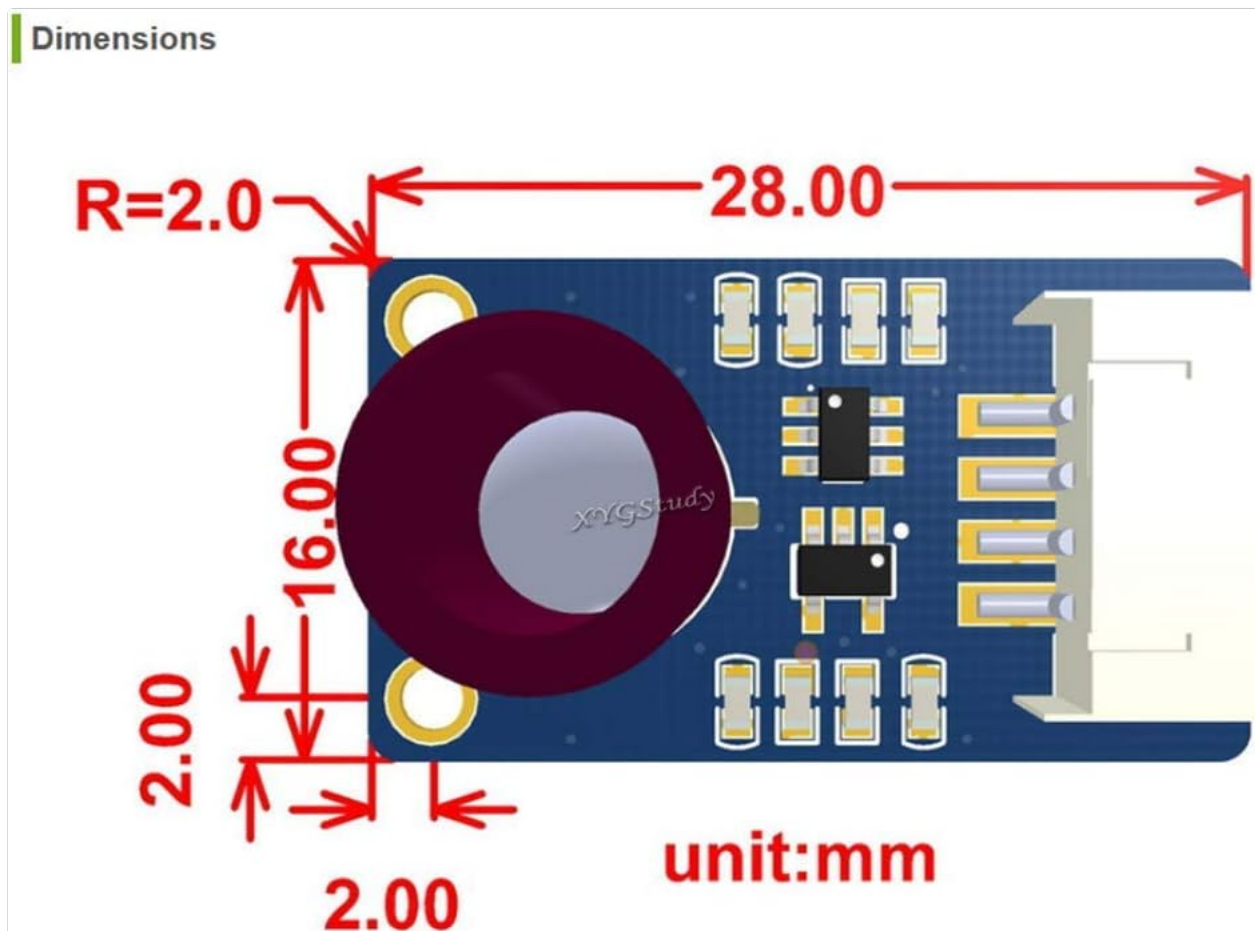


Figure 8: An example of thermal imaging data displayed on a screen.

## 6.4 Real-time Temperature Measurement Workstation

The device supports TCP/IP wired transmission, allowing for the establishment of a real-time temperature measurement workstation by connecting directly via USB to a Windows system. This enables detailed analysis and monitoring of thermal data.

Your browser does not support the video tag.

Video 1: Demonstration of the Thermal 45 or 90 Camera ESP32 Module, showcasing its features and real-time thermal imaging capabilities.

## 7. APPLICATIONS

The MLX90640-D55 thermal camera module is versatile and can be used in a wide range of applications, including:

- High-precision non-contact temperature measurements.
- IR thermal imaging devices and IR thermometers.
- Smart home systems, intelligent building management, and intelligent lighting.
- Industrial temperature control and security monitoring.
- Intruder and movement detection systems.

## 8. DIMENSIONS

The compact design of the MLX90640-D55 module allows for easy integration into various projects. The module's dimensions are 28mm x 16mm, with a mounting hole size of 2.0mm.

**MLX90640 IR Array Thermal Imaging Camera, 32×24 Pixels, 55° Field of View, I2C Interface**

### Overview

This is a 32×24 pixels, 55° field of view, IR array thermal imaging camera, communicating via I2C interface. It is compatible with 3.3V/5V operating voltage, supports host platforms such as Raspberry Pi/Arduino(ESP32)/STM32, etc.

By utilizing the MLX90640 far-infrared thermal sensor array, this module can detect the IR distribution of objects in the field of view, turn the data into surface temperature of the objects by calculation, and then generate thermal images. Due to the small form factor, it can be easily integrated into miscellaneous industrial or intelligent control applications.

### Features

- Adopts MLX90640 far-infrared thermal sensor array, 32×24 pixels
- Communicating via I2C interface, configurable to fast mode (up to 1MHz data rate)
- Noise Equivalent Temperature Difference (NETD) 0.1K RMS @1Hz refresh rate
- Onboard voltage translator, compatible with 3.3V/5V operating voltage
- Comes with development resources and manual (examples for Raspberry Pi/Arduino(ESP32)/STM32)

Figure 9: Detailed dimensions of the MLX90640-D55 module in millimeters.

## 9. MAINTENANCE

The onboard RGB LED indicator provides real-time operational status of the module, facilitating equipment monitoring and maintenance. Regularly check the indicator for any unusual patterns that might suggest a malfunction.

Keep the thermal sensor lens clean and free from dust or debris to ensure accurate temperature readings. Use a soft, lint-free cloth for cleaning.

## 10. TROUBLESHOOTING

If you encounter issues with the MLX90640-D55 module, consider the following basic troubleshooting steps:

- **Power Supply:** Verify that the module is receiving the correct operating voltage (3.3V or 5V) and that the current supply is stable.
- **Connections:** Double-check all wiring, especially the I2C data and clock lines, for secure and correct

connections.

- **I2C Communication:** Ensure your microcontroller's I2C bus is properly configured and that the module's address (0x33) is correctly used in your code.
- **Software/Firmware:** Confirm that the correct drivers and libraries are installed and that your code is compatible with the module. Refer to the development resources for examples.
- **Environmental Factors:** Extreme temperatures or strong electromagnetic interference can affect performance. Operate the module within its specified operating temperature range.

## 11. SUPPORT AND RESOURCES

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For additional resources, development examples, datasheets, or further assistance, please contact XYGStudy via Amazon message. They will provide the necessary attachments and support to help you get started and resolve any issues.