LamaPLC: D6T Omron Non-Contact Thermal Sensors with I²C communication

The Omron D6T series consists of highly sensitive MEMS thermal sensors that measure surface temperature non-contact via infrared detection. Unlike conventional motion sensors, they can detect stationary humans based on their body heat, making them suitable for energy conservation and security applications.

- **Non-Contact Measurement:** Uses thermopile elements to absorb radiant energy from objects and convert it into a temperature reading.
- **Presence Detection:** A key strength is the ability to detect both moving and stationary humans and objects, unlike typical pyroelectric sensors that rely solely on motion.
- **High Signal-to-Noise Ratio (SNR):** Omron's unique MEMS and ASIC technology delivers a high SNR, ensuring stable, accurate temperature measurements.
- **Digital Output:** Provides a direct digital temperature value via an I²C interface, simplifying software design and enhancing noise immunity.
- **Compact Size:** The sensors integrate all components (silicon lens, thermopile, ASIC) into a compact, space-saving package suitable for embedded applications.
- **Various Array Options:** Available in different configurations, including single-element (1×1), strip (1×8), and array (4×4, 32×32) formats, to suit various field-of-view (FoV) requirements.

Operation

The sensor directs far-infrared (radiant heat) onto a thermopile, producing an electromotive force proportional to temperature. An internal ASIC then converts this into a digital temperature reading, which is sent through the I²C bus, easing software development. Unlike pyroelectric sensors that only detect motion, the D6T can detect stationary objects and humans based on their body heat.

Type of measurement	Model	Power voltage	Measurement, range, accuracy	Communication	Note
T Non-Contact Thermal Sensor	Omron **D6T-32L** 	**5V**	Number of elements: 1024 (32 × 32) Current consumption: 19 mA Object temperature detection: D6T-32L-01A: 0 to 200°C	I²C	Response time: 200 msec Arduino lib
T Non-Contact Thermal Sensor	Omron **D6T-44L** 	**5V**	Number of elements: 16 (4 × 4) Current consumption: 5 mA Object temperature detection: D6T-44L-06: 5 .. 50°C D6T-44L-06H: 5 .. 200°C	I²C	Response time: 300 msec Arduino lib

Type of measurement	Model	Power voltage	Measurement, range, accuracy	Communication	Note
T Non-Contact Thermal Sensor	Omron **D6T-8L** 	**5V**	Number of elements: 8 (1 × 8) Current consumption: 5 mA Object temperature detection: D6T-8L-09: 5 .. 50°C D6T-8L-09H: 5 .. 200°C	I²C	Response time: 250 msec Arduino lib
T Non-Contact Thermal Sensor	Omron **D6T-1A** 	**5V**	Number of elements: 1 (1 × 1) Current consumption: 3.5 mA Object temperature detection: D6T-1A-01: 5 .. 50°C D6T-1A-02: -40 .. 80°C	I²C	Response time: 100 msec Arduino lib

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Arduino & D6T-1A

To read the Omron D6T-1A (D6T-1A-01 or D6T-1A-02) with an Arduino, you use the I²C interface. The sensor has a fixed 7-bit address of **0x0A**.

Wiring (5V Logic)

The D6T-1A requires a 4.5V to 5.5V supply.

- **VCC:** Arduino 5V
- **GND:** Arduino GND
- **SDA:** Arduino Pin A4 (on Uno)
- **SCL:** Arduino Pin A5 (on Uno)
- **Pull-up Resistors:** Many breakout boards include these, but if yours does not, use 10kΩ resistors from SDA and SCL to 5V.

Arduino Example Code

This code uses the standard *Wire.h* library to request a 5-byte data packet (1 byte for ambient temperature PTAT, 2 bytes for the object temperature, and a PEC error check byte).

```
#include <Wire.h>

#define D6T_ADDR 0x0A  // I2C 7-bit address
#define D6T_CMD  0x4C  // Read command

void setup() {
  Wire.begin();
  Serial.begin(115200);
  Serial.println("Omron D6T-1A Initialized");
}

void loop() {
  uint8_t rbuf[5]; // D6T-1A returns 5 bytes (2 for PTAT, 2 for Object, 1 for PEC)

  // Step 1: Send command to sensor
  Wire.beginTransmission(D6T_ADDR);
  Wire.write(D6T_CMD);
  Wire.endTransmission();

  // Step 2: Request 5 bytes
  Wire.requestFrom(D6T_ADDR, 5);

  int i = 0;
  while (Wire.available() && i < 5) {
    rbuf[i++] = Wire.read();
  }

  // Step 3: Convert data (Little Endian: Lower byte + Higher byte << 8)
  // Temperature = raw_value * 0.1
  float t_ptat = (rbuf[0] + (rbuf[1] << 8)) * 0.1;
  float t_obj  = (rbuf[2] + (rbuf[3] << 8)) * 0.1;

  Serial.print("Ambient (PTAT): "); Serial.print(t_ptat, 1); Serial.print(" C | ");
  Serial.print("Object: "); Serial.print(t_obj, 1); Serial.println(" C");

  delay(500);
}
```

Key Technical Details

- **Data Format:** The sensor returns data in 0.1°C increments. For example, a value of 255 equals 25.5°C.
- **PTAT:** This refers to *"Proportional To Absolute Temperature,"* which is the internal ambient temperature of the sensor unit.
- **PEC (Packet Error Check):** The 5th byte is a CRC-8 checksum to ensure data integrity.
- **Stationary Detection:** Unlike PIR sensors, the D6T can detect a stationary human presence by reading radiant heat rather than motion.

I²C topics on lamaPLC

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• LamaPLC: APDS - Avago ALS and proximity detection sensors with I²C communication	2026/04/23 21:52	avago, apds-9900, apds-9930, apds-9960, als, proximity, detection, gesture recognition, gesture, i2c, communication, sensor, arduino, code
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• LamaPLC: BMP/BME Bosch Temperature/Humidity/Pressure sensors with I²C communication	2026/04/23 21:52	bme280, bme680, bmp180, bmp280, hw-611, hw611, bosch, temperature, humidity, pressure, sensor, arduino, i2c, communication, cjmcu
• LamaPLC: CJMCU-219/INA-219 breakout board/IC with I²C communication	2026/04/23 21:52	cjmcu-219, ina-219, ina219, breakout board, i2c, communication, sensor, voltage, current, arduino, code, cjmcu
• LamaPLC: CJMCU-3216 / AP-3216 integrated digital ambient light and proximity sensor module/IC with I²C communication	2026/04/23 21:52	cjmcu-3216, cjmcu, ap-3216, ap3216, ambient light, proximity, sensor, arduino, code, i2c, communication
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• LamaPLC: D6T Omron Non-Contact Thermal Sensors with I²C communication	2026/04/23 21:52	d6t, d6t-32l, d6t-44l, d6t-8l, d6t-1a, omron, non-contact, thermal, sensor, i2c, arduino, code
• LamaPLC: DPS Infineon Temperature/Pressure sensors with I2C communication	2026/04/23 21:52	dps310, infineon, temperature, pressure, sensor, arduino, i2c, communication, code
• lamaPLC: Energy, power, current, and voltage	2025/05/31 23:32	i2c, i c, communication, arduino, energy, power, current, sensor, ina226
• LamaPLC: ENS ScioSense Multi-gas sensors with I²C communication	2026/04/23 21:52	ens160, sciosense, gas-quality, i2c, communication, sensor, arduino, code, eco₂, tvoc, aqi, indoor air quality, iaq, co₂, voc

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• LamaPLC: Gas sensors	2023/07/01 17:29	gas, sensor, i2c, onewire, communication, mq-3, mq-4, mq-5, mq-6, mq-7, mq-8, mq-9, mq-135, gm-102b, gm-302b, gm-502b, gm-702b, alcohol, ch4, natural gas, smoke, lng, co, co2, lpg, h2, iso-butane, nox, nh3, benzene, town gas, formaldehyde, propane, humidity, temperature, voc, grv gas sens v2
• lamaPLC: GY-511 6DOF sensor module	2026/03/22 01:44	stmicroelectronics, lsm303dlhc, i2c, lsm303, sensor, gy-511, 6dof, pololu, module, arduino
• LamaPLC: GY-9250 MPU-9250/6500 9-axis Attitude Sensor Board	2026/04/23 21:52	ak8963, gy-9250, mpu-9250, 9-axis, motion detection, magnetometer, communication, i c, i2c, spi
• LamaPLC: HDC Texas Instruments Temperature/humidity sensors with I²C communication	2026/04/23 21:52	sht21, htu21, si7021, gy-21, gy-213v, hdc1080, gy-213v-hdc1080, cjmcu, cjmcu-1080, texas instruments, temperature, humidity, sensor, i2c, communication, arduino, code
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• LamaPLC: HTU TE Connectivity temperature/humidity sensors with I²C communication	2026/04/23 21:52	htu, htu31d, htu21d, htu20d, sht20, htu20, sht21, htu21, si7021, gy-21, gy-213v, hdc1080, si702, gy-20, sht31, htu31, si7031, gy-31, te connectivity, temperature, humidity, i2c, communication, sensor, arduino, code
• lamaPLC: INA modules with Arduino libraries	2026/04/11 19:54	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina219, gy-219, ina226, gy-216, ina228, gy-228, ina237, ina238, ina260, ina3221, ina
• lamaPLC: INA226 - current/voltage/power monitor with I²C communication	2026/04/23 21:52	i2c, i c, communication, arduino, energy, power, current, monitor, sensor, ina226, ina219, ina
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• lamaPLC: MCP23017 / MCP23S17 16-Bit I/O Expander with Serial Interface I²C / SPI	2026/04/23 21:52	communication, i2c, mcp23017, mcp23s17, spi, i o expander, serial, cjmcu-2317, cjmcu

• LamaPLC: Pixart PAJ7620U2 Gesture recognition sensors/module with I²C communication	2026/04/23 21:52	paj7620u2, gy-paj7620, pixart, gesture recognition, i2c, communication, sensor, arduino, code
• LamaPLC: SC16IS750 / SC16IS752: One or two serial (UART) ports from microcontroller via I²C or SPI communication	2026/04/23 21:52	cjmcu-750, cjmcu-752, cjmcu, nxp, sc16is750, sc16is752, uart, serial, i2c, spi, modul, converter, arduino, code
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• LamaPLC: SHT Sensirion Temperature/humidity sensor with I²C communication	2026/04/23 21:52	sht20, sht21, sht25, sht30, sht31, sht35, sht40, gy21, temperature, humidity, i2c, communication, sensor, arduino, code
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• LamaPLC: VL6180X STMicroelectronics Time-of-Flight (ToF) sensor with I²C communication	2026/04/23 21:52	vl6180x, stmicroelectronics, time-of-flight, tof, i2c, communication, sensor, arduino, code
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