

General Description

The AnyLeaf RTD module is circuit board containing the [Maxim Integrated MAX31865](#) integrated circuit (IC), and an electrical isolator. This circuit outputs measured resistance over its digital SPI connection. It's used to measure temperature, and is compatible with Pt100 and Pt1000 RTDs, as well as thermistors. Its specifications are determined by this IC.

This module allows for easy connection to an embedded device, where it sends temperature data over SPI, via 6 pins (SCK, MOSI, and MISO standard SPI pins, a chip-select (CS) pin, 3.3V power, and ground). The connected microcontroller must support SPI, have an available GPIO pin for CS, and support 3.3V power.

Specifications

- **Processing chip:** Max31865
- **Module dimensions:** 45×35×15(height) mm
- **Module weight:** 15 grams
- **Temperature precision:** 0.03°C
- **Temperature accuracy:** 0.5°C and better
- **Temperature Range:** -200 to 550°C
- **Digital precision:** 15 bit
- **Input voltage:** 3.3V
- **Mounting screws:** 4 × M3, 6mm len (included)
- **Sensor interface:** 2, 3, or 4-wire screw terminal
- **Power consumption:** 375µA

Selecting RTD type

The module contains 4 labeled jumper pin headers used to select between 2, 3, and 4-wire RTD connections, and between Pt100 and Pt1000 RTDs. These are labeled on the top side of the module. The 3-pin headers are used to select jumper connections between middle/left, and middle/right. The 2-pin header is used by adding or removing a jumper between its pins.

RTD connection

The RTD is connected using 2, 3, or 4 of the available screw terminals on the module. These support bare wires, spade (forked) connectors, or single connectors. Connection labels are displayed near the

edge of the circuit board, next to the terminals. *R* indicates a red RTD lead, and *B* indicates a blue one, as they're commonly color-coded. Labels also indicate which terminals to use for 2 and 3-wire connections.

Reference resistance

The Max31865 uses a precision reference resistor, used to compare the RTDs resistance with. This module includes a 300Ω , $\pm 0.1\%$ tolerance resistor for use with a Pt100, and a $3,000\Omega \pm 0.1\%$ tolerance resistor for use with a Pt1000. This limits the maximum measured temperature to 550°C , leaving a total operating range of 0 to 550°C .

Electric isolation

This module include an Analog Devices ADUM5401 electrical isolator between its power, ground, and 4 data pins. This prevents electrical interference from others parts of the circuit, and blocks the flow of current between the measurement device, and the module's pins.

Software

This module is designed to be used with AnyLeaf's drivers, available in C++/Arduino, Python3, and Rust. It can also be used with all drivers that support the MAX31865 chip. The AnyLeaf drivers provide a simple interface, and are shared with other AnyLeaf modules. They do not currently support continuous measurement mode, or fault detection, which the hardware supports.

Ready pin

The MAX31865's *Ready* pin is connected to this module's pin header, but this pin is not isolated, and is not currently supported by the AnyLeaf drivers. When used in continuous measurement mode, this pin is pulled low whenever a new measurement is available, allowing for rapid measurements. For more information, reference the MAX31865's datasheet.