

Erriez Oregon THN128 433MHz temperature sensor library for Arduino
1.1.0

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Chapter 1

Oregon THN128 433MHz temperature transmit/receive library for Arduino

This is a 433MHz wireless 3-channel Oregon THN128 temperature transmit/receive Arduino library for ATMega328, ESP8266 and ESP32 using the (reverse-engineered) Oregon THN128 v1 protocol:

Transmit / receive hardware

This Arduino library can be used with low-power ATMega328 microcontroller (AVR architectures like Arduino UNO and Pro Mini 3.3V 8MHz boards).

Temperature transmitter on the left breadboard:

- Pro-Mini 3V3 8MHz.
- Genuine DS18B20 temperature sensor.
- STX802 low-power 433MHz transmitter.

Receiver on the right breadboard:

- SRX882 low-power 433MHz receiver.
- SSD1306 I2C 128x64 OLED display.
- Pro-Mini 3V3 8MHz.

Supported microcontrollers

- ATMega328 AVR designed for low-power
- ESP8266
- ESP32
- Other microcontrollers are not tested and may or may not work

Arduino Examples

- Oregon THN128 Receive
- Oregon THN128 Receive SSD1306 OLED
- Oregon THN128 Transmit random temperature
- Oregon THN128 Transmit DS1820 1-wire temperature sensor
- Oregon THN128 ESP32 MQTT Homeassistant

ESP32 with MQTT and Homeassistant

The `Erriez_Oregon_THN128_ESP32_MQTT_Homeassistant.ino` sketch can be used with Homeassistant integration.

Example screenshot Homeassistant dasboard:

Follow the steps below:

1. Configure Homeassistant MQTT in `configuration.yaml`:

```
mqtt:  
  discovery_prefix: ha  
  # Enable when using SSL:  
  # certificate: /ssl/ca.crt  
  # client_cert: /ssl/client.crt  
  # client_key: /ssl/client.key
```

1. MQTT broker hostname, username and password should be configured in Homeassistant | Settings | Devices | MQTT.
2. Configure the listed macro's in the example, build and run from the Arduino IDE. The following Oregon THN128 entities are automatically registered after a succesful MQTT connection:

- `sensor.oregon_thn128_ch1`
- `sensor.oregon_thn128_ch2`
- `sensor.oregon_thn128_ch3`
- `sensor.oregon_thn128_battery`

1. Configure Homeassistant dashboard configuration file:

- `Homeassistant Dashboard YAML`

Hardware Design Notes

Supported hardware:

- AVR designed for low-power
- ESP8266
- ESP32
- For low-power transmitters, a Pro Mini 3V3 8MHz bare board with ATMega328 microcontroller is highly recommended. The board has no serial interface chip which reduces continuous power consumption. An external FTDI232 - USB serial interface should be connected for serial console / programming. (See red PCB on the picture) The SMD power LED should be desoldered from the Pro Mini to reduce continuous power consumption.
- A transmitter with (protected) 1500mA 18650 battery can operate for at least 6 months with `LowPower.h` functionality implemented. (By sending the temperature every 30 seconds)
- Changing the BOD (Brown Out Detection) fuse to 1.8V allows operation between 1.8 and 4.2V 18650 battery. (Explanation beyond the scope of this project)
- 1 to 3 temperature transmitters are supported, similar to the original Oregon THN128 temperature transmitters.
- Check [list of counterfeit DS18B20 chips](#), because this makes a huge difference in accuracy and read errors at 3.3V. Many DS18B20 chips from Aliexpress are counterfeit and won't work reliable at voltages below 3.3V.
- [NiceRF Wireless Technology Co., Ltd.](#) sells high quality 433MHz transmit (STX802) and receiver modules (STX882) with a good range.
- A 18650 battery (with protection circuit) should be connected directly to the VCC pin (not VIN).
- The voltage regulator can be desoldered from the pro-micro board when not used for more power reduction.

Oregon Protocol

A packet is sent twice:

Data (see header file [`ErriezOregonTHN128Receive.h`](#)):

- Byte 0:
 - Bit 0..3: Rolling address (Random value after power cycle)
 - Bit 6..7: Channel: (0 = channel 1 .. 2 = channel 3)
- Byte 1:
 - Bit 0..3: TH3
 - Bit 4..7: TH2
- Byte 2:
 - Bit 0..3: TH1
 - Bit 5: Sign
 - Bit 7: Low battery
- Byte 3:
 - Bit 0..7: CRC

Library Changes

v1.1.0

The callback function `void delay100ms()` has been removed as this was not compatible with ESP32. The application should change the code to:

```
++  
// Send temperature twice with 100ms delay between packets  
OregonTHN128_Transmit(&data);  
delay(100);  
OregonTHN128_Transmit(&data);
```

AVR targets can replace `delay(100)` with LowPower usage:

```
++  
LowPower.powerDown(SLEEP_15MS, ADC_OFF, BOD_OFF);  
LowPower.powerDown(SLEEP_60MS, ADC_OFF, BOD_OFF);  
LowPower.powerDown(SLEEP_15MS, ADC_OFF, BOD_OFF);
```

Saleae Logic Analyzer

`capture` from the Oregon THN128 can be opened with <https://www.saleae.com/downloads/>.

Generated Arduino Library Doxygen Documentation

- [Online Doxygen HTML](#)
- [Doxygen PDF](#)

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End User Agreement :ukraine:

End users shall accept the [End User Agreement](#) holding export restrictions to Russia to stop the WAR before using this project.

Chapter 2

Topic Index

2.1 Topics

Here is a list of all topics with brief descriptions:

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------------------------	----

Chapter 3

Class Index

3.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

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Data structure	

Chapter 4

File Index

4.1 File List

Here is a list of all documented files with brief descriptions:

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src/ErriezOregonTHN128Receive.c	Oregon THN128 433MHz temperature transmit/receive library for Arduino	22
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Chapter 5

Topic Documentation

5.1 data macro's

Macros

- #define SET_ROL_ADDR(x) (((x) & 0x07) << 0)
- #define GET_ROL_ADDR(x) (((x) & 0x07) << 0)
- #define SET_CHANNEL(x) (((x) - 1) & 0x03) << 6)
- #define GET_CHANNEL(x) (((x) >> 6) & 0x03) + 1)
- #define SET_TEMP(x)
- #define GET_TEMP(x)
- #define SIGN_BIT (1UL << 21)
- #define LOW_BAT_BIT (1UL << 23)
- #define SET_CRC(x) ((uint32_t)(x) << 24)
- #define GET_CRC(x) ((x) >> 24)

5.1.1 Detailed Description

5.1.2 Macro Definition Documentation

5.1.2.1 GET_CHANNEL

```
#define GET_CHANNEL(  
    x ) (((x) >> 6) & 0x03) + 1)
```

Get channel

Definition at line 49 of file [ErriezOregonTHN128.c](#).

5.1.2.2 GET_CRC

```
#define GET_CRC(  
    x ) ((x) >> 24)
```

Get CRC

Definition at line 69 of file [ErriezOregonTHN128.c](#).

5.1.2.3 GET_ROL_ADDR

```
#define GET_ROL_ADDR(  
    x ) (((x) & 0x07) << 0)
```

Get rolling address

Definition at line [44](#) of file [ErriezOregonTHN128.c](#).

5.1.2.4 GET_TEMP

```
#define GET_TEMP(  
    x )
```

Value:

```
(((((x) >> 16) & 0x0f) * 100) + \  
 (((x) >> 12) & 0x0f) * 10) + \  
 (((x) >> 8) & 0x0f))
```

Get temperature

Definition at line [56](#) of file [ErriezOregonTHN128.c](#).

5.1.2.5 LOW_BAT_BIT

```
#define LOW_BAT_BIT (1UL << 23)
```

Low battery bit

Definition at line [64](#) of file [ErriezOregonTHN128.c](#).

5.1.2.6 SET_CHANNEL

```
#define SET_CHANNEL(  
    x ) (((x) - 1) & 0x03) << 6)
```

Set channel

Definition at line [47](#) of file [ErriezOregonTHN128.c](#).

5.1.2.7 SET_CRC

```
#define SET_CRC(  
    x ) ((uint32_t)(x) << 24)
```

Set CRC

Definition at line [67](#) of file [ErriezOregonTHN128.c](#).

5.1.2.8 SET_ROL_ADDR

```
#define SET_ROL_ADDR(  
    x ) (((x) & 0x07) << 0)
```

Set rolling address

Definition at line [42](#) of file [ErriezOregonTHN128.c](#).

5.1.2.9 SET_TEMP

```
#define SET_TEMP(  
    x )
```

Value:

```
(((((uint32_t)(x) / 100) % 10) << 16) | \  
 (((uint32_t)(x) / 10) % 10) << 12) | \  
 (((x) % 10) << 8))
```

Set temperature

Definition at line [52](#) of file [ErriezOregonTHN128.c](#).

5.1.2.10 SIGN_BIT

```
#define SIGN_BIT (1UL << 21)
```

Sign bit

Definition at line [61](#) of file [ErriezOregonTHN128.c](#).

Chapter 6

Class Documentation

6.1 OregonTHN128Data_t Struct Reference

Data structure.

```
#include <ErriezOregonTHN128.h>
```

Public Attributes

- `uint32_t rawData`
- `uint8_t rollingAddress`
- `uint8_t channel`
- `int16_t temperature`
- `bool lowBattery`

6.1.1 Detailed Description

Data structure.

Definition at line [63](#) of file [ErriezOregonTHN128.h](#).

6.1.2 Member Data Documentation

6.1.2.1 channel

```
uint8_t OregonTHN128Data_t::channel
```

Channel

Definition at line [66](#) of file [ErriezOregonTHN128.h](#).

6.1.2.2 lowBattery

```
bool OregonTHN128Data_t::lowBattery
```

Low battery indication

Definition at line [68](#) of file [ErriezOregonTHN128.h](#).

6.1.2.3 rawData

```
uint32_t OregonTHN128Data_t::rawData
```

Raw data

Definition at line [64](#) of file [ErriezOregonTHN128.h](#).

6.1.2.4 rollingAddress

```
uint8_t OregonTHN128Data_t::rollingAddress
```

Rolling address

Definition at line [65](#) of file [ErriezOregonTHN128.h](#).

6.1.2.5 temperature

```
int16_t OregonTHN128Data_t::temperature
```

Temperature

Definition at line [67](#) of file [ErriezOregonTHN128.h](#).

The documentation for this struct was generated from the following file:

- [src/ErriezOregonTHN128.h](#)

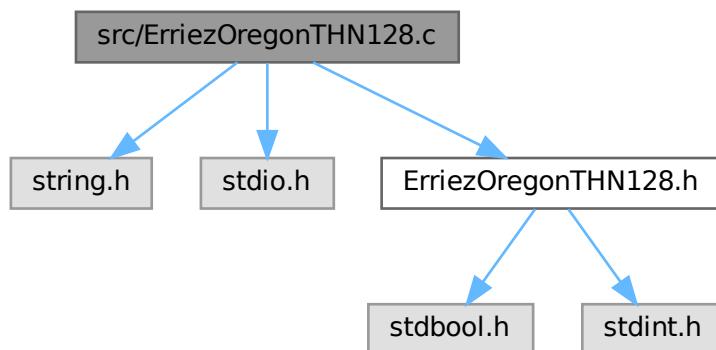
Chapter 7

File Documentation

7.1 src/ErriezOregonTHN128.c File Reference

Oregon THN128 433MHz temperature transmit/receive library for Arduino.

```
#include <string.h>
#include <stdio.h>
#include "ErriezOregonTHN128.h"
Include dependency graph for ErriezOregonTHN128.c:
```



Macros

- #define SET_ROL_ADDR(x) (((x) & 0x07) << 0)
- #define GET_ROL_ADDR(x) (((x) & 0x07) << 0)
- #define SET_CHANNEL(x) (((((x) - 1) & 0x03) << 6)
- #define GET_CHANNEL(x) (((((x) >> 6) & 0x03) + 1)
- #define SET_TEMP(x)
- #define GET_TEMP(x)
- #define SIGN_BIT (1UL << 21)
- #define LOW_BAT_BIT (1UL << 23)
- #define SET_CRC(x) ((uint32_t)(x) << 24)
- #define GET_CRC(x) ((x) >> 24)

Functions

- bool `OregonTHN128_CheckCRC` (`uint32_t rawData`)

Verify checksum.
- void `OregonTHN128_TempToString` (`char *temperatureStr, uint8_t temperatureStrLen, int16_t temperature`)

Convert temperature to string.
- `uint32_t OregonTHN128_DataToRaw` (`OregonTHN128Data_t *data`)

Convert data structure to 32-bit raw data.
- bool `OregonTHN128_RawToData` (`uint32_t rawData, OregonTHN128Data_t *data`)

Convert 32-bit raw data to `OregonTHN128Data_t` structure.

7.1.1 Detailed Description

Oregon THN128 433MHz temperature transmit/receive library for Arduino.

Source: <https://github.com/Erriez/OregonTHN128> Documentation: <https://erriez.github.io/OregonTHN128>

Definition in file `ErriezOregonTHN128.c`.

7.1.2 Function Documentation

7.1.2.1 `OregonTHN128_CheckCRC()`

```
bool OregonTHN128_CheckCRC (
    uint32_t rawData )
```

Verify checksum.

Parameters

<code>rawData</code>	32-bit raw data input
----------------------	-----------------------

Returns

true: Success, false: error

Definition at line 101 of file `ErriezOregonTHN128.c`.

7.1.2.2 `OregonTHN128_DataToRaw()`

```
uint32_t OregonTHN128_DataToRaw (
    OregonTHN128Data_t * data )
```

Convert data structure to 32-bit raw data.

Parameters

<i>data</i>	Input
-------------	-------

Returns

Output

Definition at line 141 of file [ErriezOregonTHN128.c](#).

7.1.2.3 OregonTHN128_RawToData()

```
bool OregonTHN128_RawToData (
    uint32_t rawData,
    OregonTHN128Data_t * data )
```

Convert 32-bit raw data to [OregonTHN128Data_t](#) structure.

Parameters

<i>rawData</i>	32-bit input
<i>data</i>	output

Returns

CRC true: Success, false: error

Definition at line 180 of file [ErriezOregonTHN128.c](#).

7.1.2.4 OregonTHN128_TempToString()

```
void OregonTHN128_TempToString (
    char * temperatureStr,
    uint8_t temperatureStrLen,
    int16_t temperature )
```

Convert temperature to string.

Parameters

<i>temperatureStr</i>	Character buffer
<i>temperatureStrLen</i>	Size of character buffer
<i>temperature</i>	Input temperature

Definition at line 118 of file [ErriezOregonTHN128.c](#).

7.2 ErriezOregonTHN128.c

[Go to the documentation of this file.](#)

```

00001 /*
00002 * MIT License
00003 *
00004 * Copyright (c) 2020-2026 Erriez
00005 *
00006 * Permission is hereby granted, free of charge, to any person obtaining a copy
00007 * of this software and associated documentation files (the "Software"), to deal
00008 * in the Software without restriction, including without limitation the rights
00009 * to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00010 * copies of the Software, and to permit persons to whom the Software is
00011 * furnished to do so, subject to the following conditions:
00012 *
00013 * The above copyright notice and this permission notice shall be included in all
00014 * copies or substantial portions of the Software.
00015 *
00016 * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
00017 * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
00018 * FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE
00019 * AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
00020 * LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00021 * OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00022 * SOFTWARE.
00023 */
00024
00033 #include <string.h>
00034 #include <stdio.h>
00035 #include "ErriezOregonTHN128.h"
00036
00042 #define SET_ROL_ADDR(x)      (((x) & 0x07) << 0)
00044 #define GET_ROL_ADDR(x)      (((x) & 0x07) << 0)
00045
00047 #define SET_CHANNEL(x)      (((((x) - 1) & 0x03) << 6)
00049 #define GET_CHANNEL(x)      (((((x) >> 6) & 0x03) + 1)
00050
00052 #define SET_TEMP(x)          ((((((uint32_t)(x) / 100) % 10) << 16) | \
00053                                (((uint32_t)(x) / 10) % 10) << 12) | \
00054                                (((x) % 10) << 8))
00056 #define GET_TEMP(x)          (((((x) >> 16) & 0x0f) * 100) + \
00057                                (((x) >> 12) & 0x0f) * 10) + \
00058                                (((x) >> 8) & 0x0f))
00059
00061 #define SIGN_BIT              (1UL << 21)
00062
00064 #define LOW_BAT_BIT           (1UL << 23)
00065
00067 #define SET_CRC(x)            ((uint32_t)(x) << 24)
00069 #define GET_CRC(x)             ((x) >> 24)
00070
00081 static uint8_t calcCrc(uint32_t rawData)
00082 {
00083     uint16_t crc;
00084
00085     /* Add Bytes 0, 1 and 2 */
00086     crc = ((rawData >> 16) & 0xff) + ((rawData >> 8) & 0xff) + ((rawData >> 0) & 0xff);
00087     /* Add most significant Byte of the CRC to the final CRC */
00088     crc = (crc >> 8) + (crc & 0xff);
00089
00090     /* Return 8-bit CRC */
00091     return (uint8_t)crc;
00092 }
00093
00101 bool OregonTHN128_CheckCRC(uint32_t rawData)
00102 {
00103     return calcCrc(rawData) == GET_CRC(rawData);
00104 }
00105
00106 /***** Public functions ****/
00107 /*
00108 */
00118 void OregonTHN128_TempToString(char *temperatureStr, uint8_t temperatureStrLen, int16_t temperature)
00119 {
00120     bool tempNegative = false;
00121     int tempAbs;
00122
00123     /* Convert temperature without using float to string */
00124     tempAbs = temperature;
00125     if (temperature < 0) {
00126         tempNegative = true;
00127         tempAbs *= -1;
00128     }
00129     sprintf(temperatureStr, temperatureStrLen, "%s%d.%d",

```

```

00131         tempNegative ? "-" : "", (tempAbs / 10), tempAbs % 10);
00132     }
00133
00141 uint32_t OregonTHN128_DataToRaw(OregonTHN128Data_t *data)
00142 {
00143     uint32_t rawData;
00144
00145     /* Rolling address 0..7 */
00146     rawData = SET_ROL_ADDR(data->rollingAddress);
00147
00148     /* Set channel 1..3 */
00149     rawData |= SET_CHANNEL(data->channel);
00150
00151     /* Set temperature -999..999 */
00152     if (data->temperature < 0) {
00153         rawData |= SIGN_BIT;
00154         rawData |= SET_TEMP(data->temperature * -1);
00155     } else {
00156         rawData |= SET_TEMP(data->temperature);
00157     }
00158
00159     /* Low battery bit */
00160     if (data->lowBattery) {
00161         rawData |= LOW_BAT_BIT;
00162     }
00163
00164     /* Calculate CRC */
00165     rawData |= SET_CRC(calcCrc(rawData));
00166
00167     /* Return 32-bit raw data */
00168     return rawData;
00169 }
00170
00180 bool OregonTHN128_RawToData(uint32_t rawData, OregonTHN128Data_t *data)
00181 {
00182     memset(data, 0, sizeof(OregonTHN128Data_t));
00183
00184     /* Set data structure */
00185     data->rawData = rawData;
00186     data->rollingAddress = GET_ROL_ADDR(rawData);
00187     data->channel = GET_CHANNEL(rawData);
00188     data->temperature = GET_TEMP(rawData);
00189     if (rawData & SIGN_BIT) {
00190         data->temperature *= -1;
00191     }
00192     data->lowBattery = (rawData & LOW_BAT_BIT) ? true : false;
00193
00194     /* Return CRC success or failure */
00195     return calcCrc(rawData) == GET_CRC(rawData);
00196 }
```

7.3 ErriezOregonTHN128.h

```

00001 /*
00002  * MIT License
00003  *
00004  * Copyright (c) 2020-2026 Erriez
00005  *
00006  * Permission is hereby granted, free of charge, to any person obtaining a copy
00007  * of this software and associated documentation files (the "Software"), to deal
00008  * in the Software without restriction, including without limitation the rights
00009  * to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00010  * copies of the Software, and to permit persons to whom the Software is
00011  * furnished to do so, subject to the following conditions:
00012  *
00013  * The above copyright notice and this permission notice shall be included in all
00014  * copies or substantial portions of the Software.
00015  *
00016  * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
00017  * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
00018  * FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE
00019  * AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
00020  * LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00021  * OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00022  * SOFTWARE.
00023 */
00024
00025 #ifndef ERRIEZ_OREGON_THN128_H_
00026 #define ERRIEZ_OREGON_THN128_H_
00027
00028 /* Check platform */
00029 #if !defined(ARDUINO_ARCH_AVR) && !defined(ARDUINO_ARCH_ESP8266) && !defined(ARDUINO_ARCH_ESP32)
00030 #error "Platform not supported."

```

```

00031 #endif
00032
00033 #ifdef __cplusplus
00034 extern "C" {
00035 #endif
00036
00037 #include <stdbool.h>
00038 #include <stdint.h>
00039
00040 /* Timing micro's in micro seconds */
00041 #define T_RX_TOLERANCE_US      400
00042 #define T_PREAMBLE_SPACE_US    3000
00043 #define T_SYNC_US              5500
00044 #define T_BIT_US               1450
00045 #define T_SPACE_FRAMES_MS     100
00046
00047 #define T_SYNC_H_MIN          (T_SYNC_US - T_RX_TOLERANCE_US)
00048 #define T_SYNC_H_MAX          (T_SYNC_US + T_RX_TOLERANCE_US)
00049
00050 #define T_SYNC_L_MIN_0         (T_SYNC_US + T_BIT_US - T_RX_TOLERANCE_US)
00051 #define T_SYNC_L_MAX_0         (T_SYNC_US + T_BIT_US + T_RX_TOLERANCE_US)
00052 #define T_SYNC_L_MIN_1         (T_SYNC_US - T_RX_TOLERANCE_US)
00053 #define T_SYNC_L_MAX_1         (T_SYNC_US + T_RX_TOLERANCE_US)
00054
00055 #define T_BIT_SHORT_MIN        (T_BIT_US - T_RX_TOLERANCE_US)
00056 #define T_BIT_SHORT_MAX        (T_BIT_US + T_RX_TOLERANCE_US)
00057 #define T_BIT_LONG_MIN          ((T_BIT_US * 2) - T_RX_TOLERANCE_US)
00058 #define T_BIT_LONG_MAX          ((T_BIT_US * 2) + T_RX_TOLERANCE_US)
00059
00063 typedef struct {
00064     uint32_t rawData;
00065     uint8_t rollingAddress;
00066     uint8_t channel;
00067     int16_t temperature;
00068     bool lowBattery;
00069 } OregonTHN128Data_t;
00070
00071 /* Public functions */
00072 bool OregonTHN128_CheckCRC(uint32_t rawData);
00073 void OregonTHN128_TempToString(char *temperatureStr, uint8_t temperatureStrLen, int16_t temperature);
00074 uint32_t OregonTHN128_DataToRaw(OregonTHN128Data_t *data);
00075 bool OregonTHN128_RawToData(uint32_t rawData, OregonTHN128Data_t *data);
00076
00077 #ifdef __cplusplus
00078 }
00079#endif
00080
00081#endif /* ERRIEZ_OREGON_THN128_H */

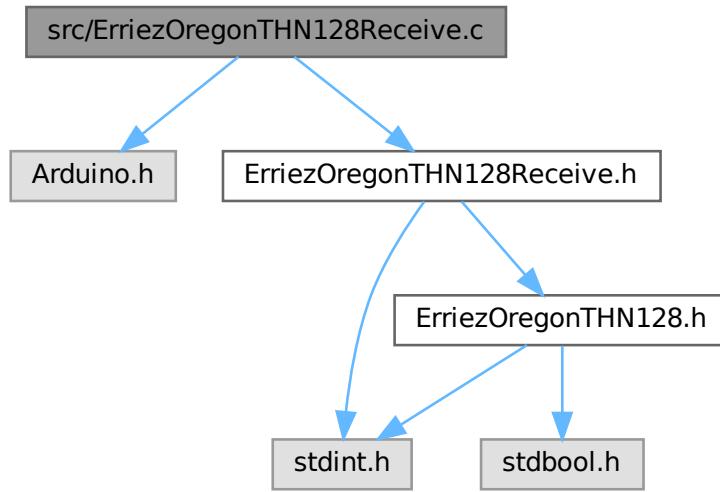
```

7.4 src/ErriezOregonTHN128Receive.c File Reference

Oregon THN128 433MHz temperature transmit/receive library for Arduino.

```
#include <Arduino.h>
#include "ErriezOregonTHN128Receive.h"
```

Include dependency graph for ErriezOregonTHN128Receive.c:



Enumerations

- enum `RxState_t` {
 `StateSearchSync = 0` , `StateMid0 = 1` , `StateMid1 = 2` , `StateEnd = 3` ,
 `StateRxComplete = 4` }

Receive state.

Functions

- void `rfPinChange` (void)
RF pin level change.
- void `OregonTHN128_RxBegin` (uint8_t extIntPin)
Initialize receiver pin.
- void `OregonTHN128_RxEnable` ()
Receive enable.
- void `OregonTHN128_RxDisable` ()
Receive disable.
- bool `OregonTHN128_Available` ()
Check if data received.
- bool `OregonTHN128_Read` (OregonTHN128Data_t *data)
Read data.

7.4.1 Detailed Description

Oregon THN128 433MHz temperature transmit/receive library for Arduino.

Source: <https://github.com/Erriez/ErriezOregonTHN128> Documentation: <https://erriez.github.io/ErriezOregonTHN128>

Definition in file [ErriezOregonTHN128Receive.c](#).

7.4.2 Enumeration Type Documentation

7.4.2.1 RxState_t

enum `RxState_t`

Receive state.

Enumerator

<code>StateSearchSync</code>	Search for sync
<code>StateMid0</code>	Sample at the middle of a pulse part 1
<code>StateMid1</code>	Sample at the middle of a pulse part 2
<code>StateEnd</code>	Sample at the end of a pulse to store bit
<code>StateRxComplete</code>	Receive complete

Definition at line 44 of file [ErriezOregonTHN128Receive.c](#).

7.4.3 Function Documentation

7.4.3.1 OregonTHN128_Available()

```
bool OregonTHN128_Available (
    void )
```

Check if data received.

Return values

<code>true</code>	Data received
<code>false</code>	No data available

Definition at line 358 of file [ErriezOregonTHN128Receive.c](#).

7.4.3.2 OregonTHN128_Read()

```
bool OregonTHN128_Read (
    OregonTHN128Data_t * data )
```

Read data.

Parameters

<code>data</code>	Structure <code>OregonTHN128Data_t</code> output
-------------------	--

Return values

<code>true</code>	Data received
-------------------	---------------

Return values

<i>false</i>	No data available
--------------	-------------------

Definition at line 373 of file [ErriezOregonTHN128Receive.c](#).

7.4.3.3 OregonTHN128_RxBegin()

```
void OregonTHN128_RxBegin (
    uint8_t extIntPin )
```

Initialize receiver pin.

Connect RX pin to an external interrupt pin such as INT0 (D2) or INT1 (D3)

Parameters

<i>extIntPin</i>	<input type="button" value=""/>
------------------	---------------------------------

Definition at line 324 of file [ErriezOregonTHN128Receive.c](#).

7.4.3.4 OregonTHN128_RxDisable()

```
void OregonTHN128_RxDisable ( )
```

Receive disable.

Definition at line 345 of file [ErriezOregonTHN128Receive.c](#).

7.4.3.5 OregonTHN128_RxEnable()

```
void OregonTHN128_RxEnable ( )
```

Receive enable.

Definition at line 336 of file [ErriezOregonTHN128Receive.c](#).

7.4.3.6 rfPinChange()

```
void IRAM_ATTR rfPinChange (
    void )
```

RF pin level change.

Definition at line 265 of file [ErriezOregonTHN128Receive.c](#).

7.5 ErriezOregonTHN128Receive.c

[Go to the documentation of this file.](#)

```

00001 /*
00002  * MIT License
00003  *
00004  * Copyright (c) 2020-2026 Erriez
00005  *
00006  * Permission is hereby granted, free of charge, to any person obtaining a copy
00007  * of this software and associated documentation files (the "Software"), to deal
00008  * in the Software without restriction, including without limitation the rights
00009  * to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00010  * copies of the Software, and to permit persons to whom the Software is
00011  * furnished to do so, subject to the following conditions:
00012  *
00013  * The above copyright notice and this permission notice shall be included in all
00014  * copies or substantial portions of the Software.
00015  *
00016  * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
00017  * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
00018  * FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE
00019  * AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
00020  * LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00021  * OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00022  * SOFTWARE.
00023 */
00024
00033 #include <Arduino.h>
00034
00035 #if defined(ARDUINO_ARCH_AVR)
00036 #include <avr/interrupt.h>
00037 #endif
00038
00039 #include "ErriezOregonTHN128Receive.h"
00040
00044 typedef enum {
00045     StateSearchSync = 0,
00046     StateMid0 = 1,
00047     StateMid1 = 2,
00048     StateEnd = 3,
00049     StateRxComplete = 4
00050 } RxState_t;
00051
00052 /* Static variables */
00053 static uint8_t _rxPin;
00054 static uint32_t _tPulseBegin;
00055 static uint16_t _tPinHigh;
00056 static uint16_t _tPinLow;
00057 static int8_t _rxBit;
00058 static volatile uint32_t _rxData;
00059 static volatile RxState_t _rxState = StateSearchSync;
00060
00061 /* Pin functions */
00062 #if defined(ARDUINO_ARCH_AVR)
00063 static uint8_t _rxPinPort;
00064 static uint8_t _rxPinBit;
00065
00072 #define RF_RX_PIN_INIT(rfRxPin) {
00073     /* Save interrupt number of the RF pin */ \
00074     _rxPin = digitalPinToInterrupt(extIntPin); \
00075     /* Save pin port and bit */ \
00076     _rxPinPort = digitalPinToPort(extIntPin); \
00077     _rxPinBit = digitalPinToBitMask(extIntPin); \
00078 }
00079
00085 #define RF_RX_PIN_READ() (*portInputRegister(_rxPinPort) & _rxPinBit)
00086
00087 #elif defined(ARDUINO_ARCH_ESP8266) || defined(ARDUINO_ARCH_ESP32)
00088
00095 #define RF_RX_PIN_INIT(rfRxPin) { _rxPin = rfRxPin; }
00096
00102 #define RF_RX_PIN_READ() (digitalRead(_rxPin) ? HIGH : LOW)
00103
00104 #else
00105 #error "May work, but not tested on this target"
00106 #endif
00107
00108 /* Forward declaration */
00109 void rfPinChange(void);
00110
00111
00115 static void rxEnable()
00116 {
00117     /* Enable INTx change interrupt */
00118     attachInterrupt(_rxPin, rfPinChange, CHANGE);

```

```

00119
00120     /* Initialize with search for sync state */
00121     _rxState = StateSearchSync;
00122 }
00123
00127 static void rxDisable()
00128 {
00129     /* Disable INTx change interrupt */
00130     detachInterrupt(_rxPin);
00131 }
00132
00146 static bool isPulseInRange(uint16_t tPulse, uint16_t tMin, uint16_t tMax)
00147 {
00148     /* Check is pulse length between min and max time */
00149     if ((tPulse >= tMin) && (tPulse <= tMax)) {
00150         return true;
00151     } else {
00152         return false;
00153     }
00154 }
00155
00163 static bool findSync()
00164 {
00165     /* Read sync pulse */
00166     if (isPulseInRange(_tPinHigh, T_SYNC_H_MIN, T_SYNC_H_MAX)) {
00167         if (isPulseInRange(_tPinLow, T_SYNC_L_MIN_0, T_SYNC_L_MAX_0)) {
00168             _rxData = 0;
00169             _rxState = StateMid1;
00170             _rxBit = 1;
00171             return true;
00172         } else if (isPulseInRange(_tPinLow, T_SYNC_L_MIN_1, T_SYNC_L_MAX_1)) {
00173             _rxData = 0;
00174             _rxState = StateEnd;
00175             _rxBit = 0;
00176             return true;
00177         }
00178     }
00179
00180     return false;
00181 }
00182
00189 static void storeBit(bool one)
00190 {
00191     /* Store received bit */
00192     if (one) {
00193         _rxData |= (1UL << _rxBit);
00194     }
00195
00196     /* Check if all 32 data bits are received */
00197     _rxBit++;
00198     if (_rxBit >= 32) {
00199         if (OregonTHN128_CheckCRC(_rxData)) {
00200             _rxState = StateRxComplete;
00201             /* Disable receive */
00202             rxDisable();
00203         } else {
00204             _rxState = StateSearchSync;
00205         }
00206     }
00207 }
00208
00212 static void handlePulse()
00213 {
00214     if (isPulseInRange(_tPinHigh, T_BIT_SHORT_MIN, T_BIT_SHORT_MAX)) {
00215         if (_rxState == StateEnd) {
00216             _rxState = StateMid0;
00217             storeBit(1);
00218         } else if (_rxState == StateMid1) {
00219             _rxState = StateEnd;
00220         } else {
00221             _rxState = StateSearchSync;
00222         }
00223     } else if (isPulseInRange(_tPinHigh, T_BIT_LONG_MIN, T_BIT_LONG_MAX)) {
00224         if (_rxState == StateMid1) {
00225             _rxState = StateMid0;
00226             storeBit(1);
00227         } else {
00228             _rxState = StateSearchSync;
00229         }
00230     } else {
00231         _rxState = StateSearchSync;
00232     }
00233 }
00234
00238 static void handleSpace()
00239 {
00240     /* State machine */

```

```

00241     if (isPulseInRange(_tPinLow, T_BIT_SHORT_MIN, T_BIT_SHORT_MAX)) {
00242         if (_rxState == StateEnd) {
00243             _rxState = StateMid1;
00244             storeBit(0);
00245         } else if (_rxState == StateMid0) {
00246             _rxState = StateEnd;
00247         } else {
00248             _rxState = StateSearchSync;
00249         }
00250     } else if (isPulseInRange(_tPinLow, T_BIT_LONG_MIN, T_BIT_LONG_MAX)) {
00251         if (_rxState == StateMid0) {
00252             _rxState = StateMid1;
00253             storeBit(0);
00254         } else {
00255             _rxState = StateSearchSync;
00256         }
00257     } else {
00258         _rxState = StateSearchSync;
00259     }
00260 }
00261
00265 void IRAM_ATTR rfPinChange(void)
00266 {
00267     uint32_t tNow;
00268     uint16_t _tPulseLength;
00269     uint8_t rfPinHigh;
00270
00271     /* Return when previous completed receive is not read */
00272     if (_rxState == StateRxComplete) {
00273         return;
00274     }
00275
00276     /* Read absolute pulse time in us for sync */
00277     tNow = micros();
00278     if (tNow > _tPulseBegin) {
00279         _tPulseLength = tNow - _tPulseBegin;
00280     } else {
00281         _tPulseLength = _tPulseBegin - tNow;
00282     }
00283
00284     /* Ignore short pulses */
00285     if (_tPulseLength < T_RX_TOLERANCE_US) {
00286         return;
00287     }
00288     _tPulseBegin = tNow;
00289
00290     /* Get RF pin state */
00291     rfPinHigh = RF_RX_PIN_READ();
00292
00293     /* Store pulse (high) or space (low) length */
00294     if (rfPinHigh) {
00295         _tPinLow = _tPulseLength;
00296     } else {
00297         _tPinHigh = _tPulseLength;
00298     }
00299
00300     /* Always search for sync */
00301     if (findSync()) {
00302         return;
00303     }
00304
00305     /* Handle received pulse */
00306     if (_rxState != StateSearchSync) {
00307         if (rfPinHigh) {
00308             handleSpace();
00309         } else {
00310             handlePulse();
00311         }
00312     }
00313 }
00314
00315 /***** Public functions ****/
00316 /*
00317 */
00318
00324 void OregonTHN128_RxBegin(uint8_t extIntPin)
00325 {
00326     /* Initialize RF RX pin */
00327     RF_RX_PIN_INIT(extIntPin);
00328
00329     /* Enable receive */
00330     rxEnable();
00331 }
00332
00336 void OregonTHN128_RxEnable()
00337 {
00338     /* Enable receive */
00339     rxEnable();

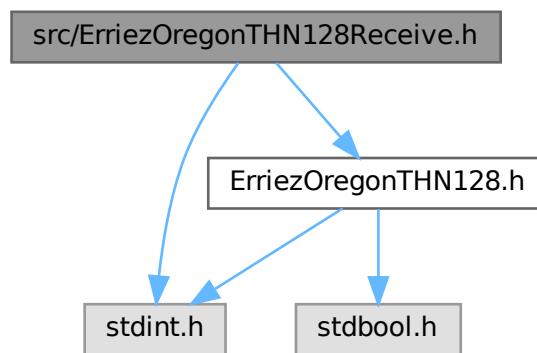
```

```
00340 }
00341
00345 void OregonTHN128_RxDisable()
00346 {
00347     /* Disable receive */
00348     rxDisable();
00349 }
00350
00358 bool OregonTHN128_Available()
00359 {
00360     /* Return receive complete */
00361     return (_rxState == StateRxComplete) ? true : false;
00362 }
00363
00373 bool OregonTHN128_Read(OregonTHN128Data_t *data)
00374 {
00375     if (OregonTHN128_Available()) {
00376         /* Convert raw 32-bit data to data structure */
00377         OregonTHN128_RawToData(_rxData, data);
00378         return true;
00379     } else {
00380         return false;
00381     }
00382 }
```

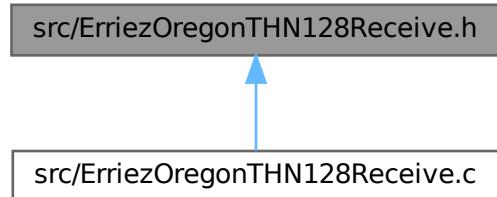
7.6 src/ErriezOregonTHN128Receive.h File Reference

Oregon THN128 433MHz temperature receive library for Arduino.

```
#include <stdint.h>
#include "ErriezOregonTHN128.h"
Include dependency graph for ErriezOregonTHN128Receive.h:
```



This graph shows which files directly or indirectly include this file:



Functions

- void [OregonTHN128_RxBegin](#) (uint8_t extIntPin)
Initialize receiver pin.
- void [OregonTHN128_RxEnable](#) ()
Receive enable.
- void [OregonTHN128_RxDisable](#) ()
Receive disable.
- bool [OregonTHN128_Available](#) (void)
Check if data received.
- bool [OregonTHN128_Read](#) (OregonTHN128Data_t *data)
Read data.

7.6.1 Detailed Description

Oregon THN128 433MHz temperature receive library for Arduino.

Source: <https://github.com/Erriez/ErriezOregonTHN128> Documentation: <https://erriez.github.io/ErriezOregonTHN128>

Protocol:

Transmit temperature twice every 30 seconds:

Bit: 0 7 0 7 0 7 0 7 +---+---+---+---+---+ |PREA|SYNC|Byte 0|Byte 1|Byte 2|Byte 3|
|PREA|SYNC|Byte 0| ... +---+---+---+---+---+ /-----|<----- 144ms -----
-->|<- 100ms ->| 30 sec

Logic '0': Logic '1': +---+ +---+ | | +---+ +---+ 1400 1500 1500 1400 (us)

PREA: Preamble 12x logic '1', 3000us low

SYNC: +-----+ | |

- +-----+ 5500us 5500us

Byte 0:

- Bit 0..3: Rolling address (Random value after power cycle)
- Bit 6..7: Channel: (0 = channel 1 .. 2 = channel 3)

Byte 1:

- Bit 0..3: TH3
- Bit 4..7: TH2

Byte 2:

- Bit 0..3: TH1
- Bit 5: Sign
- Bit 7: Low battery

Byte 3:

- Bit 0..7: CRC

Example: Rolling address = 5, channel = 1, temperature = 27.8 °C, low battery = false TH1 = 2, TH2 = 7, TH3 = 8:
Byte 0: 0x05 Byte 1: 0x78 Byte 2: 0x02 Byte 3: 0x7f

Bits in time: PRE=1 S B0=0x05 B1=0x78 B2=0x02 B3=0x7f 111111111111 S 10100000 00011110 01000000
11111110

Definition in file [ErriezOregonTHN128Receive.h](#).

7.6.2 Macro Definition Documentation

7.6.2.1 IRAM_ATTR

```
#define IRAM_ATTR
```

Definition at line 94 of file [ErriezOregonTHN128Receive.h](#).

7.6.3 Function Documentation

7.6.3.1 OregonTHN128_Available()

```
bool OregonTHN128_Available (
    void )
```

Check if data received.

Return values

<i>true</i>	Data received
<i>false</i>	No data available

Definition at line 358 of file [ErriezOregonTHN128Receive.c](#).

7.6.3.2 OregonTHN128_Read()

```
bool OregonTHN128_Read (
    OregonTHN128Data_t * data )
```

Read data.

Parameters

<i>data</i>	Structure OregonTHN128Data_t output
-------------	---

Return values

<i>true</i>	Data received
<i>false</i>	No data available

Definition at line 373 of file [ErriezOregonTHN128Receive.c](#).

7.6.3.3 OregonTHN128_RxBegin()

```
void OregonTHN128_RxBegin (
    uint8_t extIntPin )
```

Initialize receiver pin.

Connect RX pin to an external interrupt pin such as INT0 (D2) or INT1 (D3)

Parameters

<i>extIntPin</i>	
------------------	--

Definition at line 324 of file [ErriezOregonTHN128Receive.c](#).

7.6.3.4 OregonTHN128_RxDisable()

```
void OregonTHN128_RxDisable ( )
```

Receive disable.

Definition at line 345 of file [ErriezOregonTHN128Receive.c](#).

7.6.3.5 OregonTHN128_RxEnable()

```
void OregonTHN128_RxEnable( )
```

Receive enable.

Definition at line 336 of file [ErriezOregonTHN128Receive.c](#).

7.7 ErriezOregonTHN128Receive.h

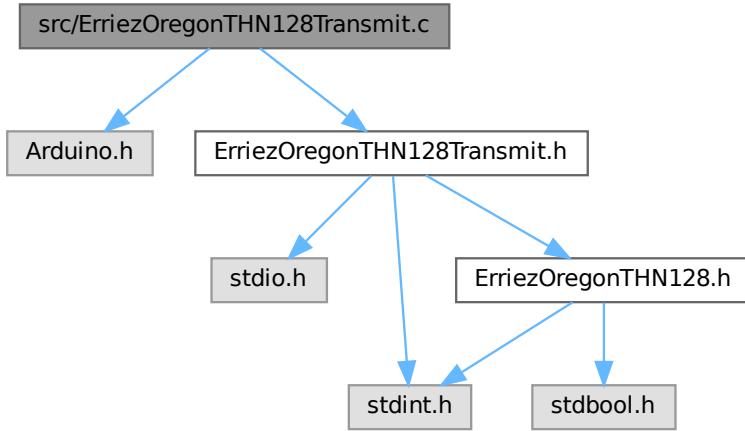
[Go to the documentation of this file.](#)

```
00001 /*
00002  * MIT License
00003  *
00004  * Copyright (c) 2020-2026 Erriez
00005  *
00006  * Permission is hereby granted, free of charge, to any person obtaining a copy
00007  * of this software and associated documentation files (the "Software"), to deal
00008  * in the Software without restriction, including without limitation the rights
00009  * to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00010  * copies of the Software, and to permit persons to whom the Software is
00011  * furnished to do so, subject to the following conditions:
00012  *
00013  * The above copyright notice and this permission notice shall be included in all
00014  * copies or substantial portions of the Software.
00015  *
00016  * THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR
00017  * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
00018  * FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE
00019  * AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
00020  * LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00021  * OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00022  * SOFTWARE.
00023 */
00024
00086 #ifndef ERRIEZ_OREGON_THN128_RECEIVER_H_
00087 #define ERRIEZ_OREGON_THN128_RECEIVER_H_
00088
00089 #include <stdint.h>
00090 #include "ErriezOregonTHN128.h"
00091
00092 // Macro IRAM_ATTR is defined for ESP pin interrupts
00093 #ifndef IRAM_ATTR
00094 #define IRAM_ATTR
00095 #endif
00096
00097 #ifdef __cplusplus
00098 extern "C" {
00099 #endif
00100
00101 /* Public functions */
00102 void OregonTHN128_RxBegin(uint8_t extIntPin);
00103 void OregonTHN128_RxEnable();
00104 void OregonTHN128_RxDisable();
00105 bool OregonTHN128_Available(void);
00106 bool OregonTHN128_Read(OregonTHN128Data_t *data);
00107
00108 #ifdef __cplusplus
00109 }
00110 #endif
00111
00112 #endif /* ERRIEZ_OREGON_THN128_RECEIVER_H_ */
```

7.8 src/ErriezOregonTHN128Transmit.c File Reference

Oregon THN128 433MHz temperature transmit library for Arduino.

```
#include <Arduino.h>
#include "ErriezOregonTHN128Transmit.h"
Include dependency graph for ErriezOregonTHN128Transmit.c:
```



Functions

- void [OregonTHN128_TxBegin](#) (uint8_t rfTxPin)
Transmit begin.
- void [OregonTHN128_TxEnd](#) (void)
Disable transmit.
- void [OregonTHN128_TxRawData](#) (uint32_t rawData)
Transmit data.
- void [OregonTHN128_Transmit](#) (OregonTHN128Data_t *data)
Transmit Transmit data.

7.8.1 Detailed Description

Oregon THN128 433MHz temperature transmit library for Arduino.

Source: <https://github.com/Erriez/ErriezOregonTHN128> Documentation: <https://erriez.github.io/ErriezOregonTHN128>

Definition in file [ErriezOregonTHN128Transmit.c](#).

7.8.2 Function Documentation

7.8.2.1 [OregonTHN128_Transmit\(\)](#)

```
void OregonTHN128_Transmit (
    OregonTHN128Data_t * data )
```

Transmit Transmit data.

The application should call [OregonTHN128_TxRawData\(\)](#) twice at 100ms interval.

Parameters

<i>data</i>	Oregon THN128 input structure
-------------	-------------------------------

Definition at line 292 of file [ErriezOregonTHN128Transmit.c](#).

7.8.2.2 OregonTHN128_TxBegin()

```
void OregonTHN128_TxBegin (
    uint8_t rftxPin )
```

Transmit begin.

Connect rfTxPin to any DIGITAL pin

Parameters

<i>rftxPin</i>	Arduino transmit pin
----------------	----------------------

Definition at line 248 of file [ErriezOregonTHN128Transmit.c](#).

7.8.2.3 OregonTHN128_TxEnd()

```
void OregonTHN128_TxEnd (
    void )
```

Disable transmit.

Set transmit pin to input

Definition at line 259 of file [ErriezOregonTHN128Transmit.c](#).

7.8.2.4 OregonTHN128_TxRawData()

```
void OregonTHN128_TxRawData (
    uint32_t rawData )
```

Transmit data.

Parameters

<i>rawData</i>	32-bit raw data input
----------------	-----------------------

Definition at line 270 of file [ErriezOregonTHN128Transmit.c](#).

7.9 ErriezOregonTHN128Transmit.c

[Go to the documentation of this file.](#)

```

00001 /*
00002  * MIT License
00003 *
00004  * Copyright (c) 2020-2026 Erriez
00005 *
00006  * Permission is hereby granted, free of charge, to any person obtaining a copy
00007  * of this software and associated documentation files (the "Software"), to deal
00008  * in the Software without restriction, including without limitation the rights
00009  * to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
00010  * copies of the Software, and to permit persons to whom the Software is
00011  * furnished to do so, subject to the following conditions:
00012 *
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00015 *
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00017  * IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,
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00019  * AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER
00020  * LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00021  * OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00022  * SOFTWARE.
00023 */
00024
00033 #include <Arduino.h>
00034 #include "ErriezOregonTHN128Transmit.h"
00035
00036 /* Function prototypes */
00037 void delay100ms(void) __attribute__((weak));
00038 extern void delay100ms(void);
00039
00040 /* Static variables */
00041 #if defined(ARDUINO_ARCH_AVR)
00042 #include <util/delay.h>
00043
00044 static int8_t _rfTxPort = -1;
00045 static int8_t _rfTxBit = -1;
00046
00060 #define RF_TX_PIN_INIT(rfTxPin) \
00061     _rfTxPort = digitalPinToPort(rfTxPin); \
00062     _rfTxBit = digitalPinToBitMask(rfTxPin); \
00063     *portModeRegister(_rfTxPort) |= _rfTxBit; \
00064 }
00065
00070 #define RF_TX_PIN_DISABLE() \
00071     if (_rfTxPort >= 0) && (_rfTxBit >= 0)) { \
00072         *portModeRegister(_rfTxPort) &= ~_rfTxBit; \
00073     } \
00074 }
00075
00081 #define IS_RF_TX_PIN_INITIALIZED()  (_rfTxPort >= 0) && (_rfTxBit >= 0))
00082
00087 #define RF_TX_PIN_HIGH()           { *portOutputRegister(_rfTxPort) |= _rfTxBit; }
00088
00093 #define RF_TX_PIN_LOW()           { *portOutputRegister(_rfTxPort) &= ~_rfTxBit; }
00094
00099 #define RF_TX_DELAY_US(us)        _delay_us(us)
00100
00105 #define RF_TX_DELAY_MS(ms)        _delay_ms(ms)
00106
00107 #elif defined(ARDUINO_ARCH_ESP8266) || defined(ARDUINO_ARCH_ESP32)
00108 static int8_t _rfTxPin = -1;
00109
00116 #define RF_TX_PIN_INIT(rfTxPin) \
00117     _rfTxPin= rfTxPin; \
00118     pinMode(_rfTxPin, OUTPUT); \
00119 }
00120
00125 #define RF_TX_PIN_DISABLE() \
00126     if (_rfTxPin >= 0) { \
00127         pinMode(_rfTxPin, INPUT); \
00128     } \
00129 }
00130
00136 #define IS_RF_TX_PIN_INITIALIZED()  (_rfTxPin >= 0)
00137
00142 #define RF_TX_PIN_HIGH()           { digitalWrite(_rfTxPin, HIGH); }
00143
00148 #define RF_TX_PIN_LOW()           { digitalWrite(_rfTxPin, LOW); }
00149
00154 #define RF_TX_DELAY_US(us)        delayMicroseconds(us)
00155

```

```

00160 #define RF_TX_DELAY_MS(ms)           delay(ms)
00161 #else
00162 #error "May work, but not tested on this target"
00163 #endif
00164
00171 static void txSync()
00172 {
00173     /* Transmit sync pulse */
00174     RF_TX_PIN_HIGH();
00175     RF_TX_DELAY_US(T_SYNC_US);
00176     RF_TX_PIN_LOW();
00177     RF_TX_DELAY_US(T_SYNC_US);
00178 }
00179
00183 static void txBit0()
00184 {
00185     /* Transmit data bit 0 pulse */
00186     RF_TX_PIN_LOW();
00187     RF_TX_DELAY_US(T_BIT_US);
00188     RF_TX_PIN_HIGH();
00189     RF_TX_DELAY_US(T_BIT_US);
00190 }
00191
00195 static void txBit1()
00196 {
00197     /* Transmit data bit 1 pulse */
00198     RF_TX_PIN_HIGH();
00199     RF_TX_DELAY_US(T_BIT_US);
00200     RF_TX_PIN_LOW();
00201     RF_TX_DELAY_US(T_BIT_US);
00202 }
00203
00207 static void txDisable()
00208 {
00209     /* Transmit pin low */
00210     RF_TX_PIN_LOW();
00211 }
00212
00216 static void txPreamble()
00217 {
00218     /* Transmit 12 preamble bits 1 */
00219     for (uint8_t i = 0; i < 12; i++) {
00220         txBit1();
00221     }
00222     RF_TX_DELAY_US(T_PREAMBLE_SPACE_US);
00223 }
00224
00225 /* Transmit 32-bit data */
00226 static void txData(uint32_t data)
00227 {
00228     /* Transmit 32 data bits */
00229     for (uint8_t i = 0; i < 32; i++) {
00230         if (data & (1UL << i)) {
00231             txBit1();
00232         } else {
00233             txBit0();
00234         }
00235     }
00236 }
00237
00238 /-----*/
00239 /*                               Public functions
00240 /-----*/
00241
00248 void OregonTHN128_TxBegin(uint8_t rftxPin)
00249 {
00250     /* Set RF transmit pin output */
00251     RF_TX_PIN_INIT(rftxPin);
00252 }
00253
00259 void OregonTHN128_TxEnd(void)
00260 {
00261     /* Set RF transmit pin input */
00262     RF_TX_PIN_DISABLE();
00263 }
00264
00270 void OregonTHN128_TxRawData(uint32_t rawData)
00271 {
00272     /* Check RF transmit pin initialized */
00273     if (!IS_RF_TX_PIN_INITIALIZED()) {
00274         return;
00275     }
00276
00277     /* Transmit */
00278     txPreamble();
00279     txSync();
00280     txData(rawData);
00281     txDisable();

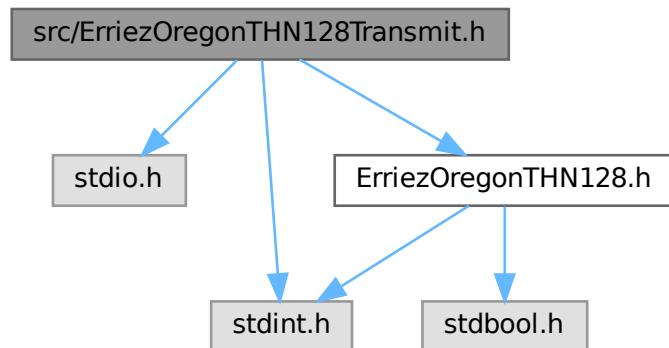
```

```
00282 }
00283
00292 void OregonTHN128_Transmit(OregonTHN128Data_t *data)
00293 {
00294     // Convert data structure to 32-bit raw data;
00295     data->rawData = OregonTHN128_DataToRaw(data);
00296
00297     // Send raw data
00298     OregonTHN128_TxRawData(data->rawData);
00299 }
```

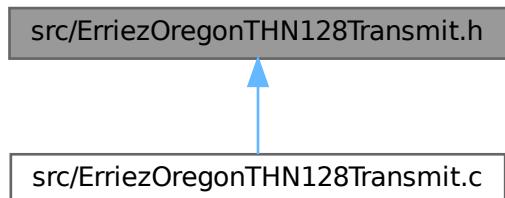
7.10 src/ErriezOregonTHN128Transmit.h File Reference

Oregon THN128 433MHz temperature transmit library for Arduino.

```
#include <stdio.h>
#include <stdint.h>
#include "ErriezOregonTHN128.h"
Include dependency graph for ErriezOregonTHN128Transmit.h:
```



This graph shows which files directly or indirectly include this file:



Functions

- void [OregonTHN128_TxBegin](#) (uint8_t rfTxPin)
Transmit begin.
- void [OregonTHN128_TxRawData](#) (uint32_t rawData)
Transmit data.
- void [OregonTHN128_Transmit](#) (OregonTHN128Data_t *data)
Transmit Transmit data.

7.10.1 Detailed Description

Oregon THN128 433MHz temperature transmit library for Arduino.

Source: <https://github.com/Erriez/ErriezOregonTHN128> Documentation: <https://erriez.github.io/ErriezOregonTHN128>

Definition in file [ErriezOregonTHN128Transmit.h](#).

7.10.2 Function Documentation

7.10.2.1 OregonTHN128_Transmit()

```
void OregonTHN128_Transmit (
    OregonTHN128Data_t * data )
```

Transmit Transmit data.

The application should call [OregonTHN128_TxRawData\(\)](#) twice at 100ms interval.

Parameters

<i>data</i>	Oregon THN128 input structure
-------------	-------------------------------

Definition at line 292 of file [ErriezOregonTHN128Transmit.c](#).

7.10.2.2 OregonTHN128_TxBegin()

```
void OregonTHN128_TxBegin (
    uint8_t rfTxPin )
```

Transmit begin.

Connect rfTxPin to any DIGITAL pin

Parameters

<i>rfTxPin</i>	Arduino transmit pin
----------------	----------------------

Definition at line 248 of file [ErriezOregonTHN128Transmit.c](#).

7.10.2.3 OregonTHN128_TxRawData()

```
void OregonTHN128_TxRawData (
    uint32_t rawData )
```

Transmit data.

Parameters

<i>rawData</i>	32-bit raw data input
----------------	-----------------------

Definition at line 270 of file [ErriezOregonTHN128Transmit.c](#).

7.11 ErriezOregonTHN128Transmit.h

[Go to the documentation of this file.](#)

```
00001 /*
00002  * MIT License
00003  *
00004  * Copyright (c) 2020-2026 Erriez
00005  *
00006  * Permission is hereby granted, free of charge, to any person obtaining a copy
00007  * of this software and associated documentation files (the "Software"), to deal
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00020  * LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,
00021  * OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE
00022  * SOFTWARE.
00023 */
00024
00033 #ifndef ERRIEZ_OREGON_THN128_TRANSMIT_H_
00034 #define ERRIEZ_OREGON_THN128_TRANSMIT_H_
00035
00036 #ifdef __cplusplus
00037 extern "C" {
00038 #endif
00039
00040 #include <stdio.h>
00041 #include <stdint.h>
00042 #include "ErriezOregonTHN128.h"
00043
00044 void OregonTHN128_TxBegin(uint8_t rfTxPin);
00045 void OregonTHN128_TxRawData(uint32_t rawData);
00046 void OregonTHN128_Transmit(OregonTHN128Data_t *data);
00047
00048 #ifdef __cplusplus
00049 }
00050 #endif
00051
00052 #endif // ERRIEZ_OREGON_THN128_TRANSMIT_H_
```

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