RTC LIBRARY

Chapter 1

TMP102 Library Integration Guide

This guide provides instructions on how to integrate the TMP102 temperature sensor library into your STM32 project using STM32Cube IDE or any other compatible IDE.

1.1 Step 1: Download the library files

Download the following TMP102 library files:

1. `tmp102.h` - The header file containing the function prototypes and necessary definitions.
2. `tmp102.c` - The source file containing the function implementations.

1.2 Step 2: Add the library files to your project

Follow these steps to add the TMP102 library files to your project:

1.2.1 STM32Cube IDE

1. In STM32Cube IDE, open your STM32 project.
2. Navigate to the project tree in the "Project Explorer" tab.
3. Place the `tmp102.h` file into the "Inc" folder (or the folder where header files are stored in your project).
4. Place the `tmp102.c` file into the "Src" folder (or the folder where source files are stored in your project).

1.2.2 Other IDEs

1. Open your STM32 project in the IDE you are using.
2. Place the `tmp102.h` file in the folder where header files are stored in your project (usually an "include" or "inc" folder).
3. Place the `tmp102.c` file in the folder where source files are stored in your project (usually a "source" or "src" folder).

1.3 Step 3: Include the library header in main.c

In the `main.c` file of your project, add the following include statement at the beginning of the file, along with other include statements:

```
#include "tmp102.h"
```

1.4 Step 4: Initialize the I2C interface

Before using the TMP102 sensor, you need to initialize the I2C interface. This can be done using the `HAL_I2C↩_Init()` function provided by the STM32 HAL library. Here's an example:

```c
I2C_HandleTypeDef hi2c1;

void SystemClock_Config(void);

int main(void) {
  // Initialize HAL and system clock
  HAL_Init();
  SystemClock_Config();

  // Initialize I2C1
  hi2c1.Instance = I2C1;
  hi2c1.Init.Timing = 0x00707CBB;
  hi2c1.Init.OwnAddress1 = 0;
  hi2c1.Init.AddressingMode = I2C_ADDRESSINGMODE_7BIT;
  hi2c1.Init.DualAddressMode = I2C_DUALADDRESS_DISABLE;
  hi2c1.Init.OwnAddress2 = 0;
  hi2c1.Init.GeneralCallMode = I2C_GENERALCALL_DISABLE;
  hi2c1.Init.NoStretchMode = I2C_NOSTRETCH_DISABLE;
  if (HAL_I2C_Init(&hi2c1) != HAL_OK) {
    Error_Handler();
  }
}
```

1.5 Step 5: Initialize the TMP102 sensor and read Temperature Value

After initializing the I2C interface, you can now initialize the TMP102 sensor. This can be done using the TMP102_Init() function provided by the library. Here's an example:

```c
#include "tmp102.h"

I2C_HandleTypeDef hi2c1;

int main(void)
{
  HAL_Init();
  MX_I2C1_Init();

  // Initialize TMP102 sensor
  TMP102_Init(&hi2c1);//Use the I2C handle intiliased
  while (1)
  {
    // Read temperature value
    float temperature = TMP102_ReadTemperature(&hi2c1);

    // Do something with temperature value
  }
}
```

Chapter 2

File Index

2.1 File List

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

Chapter 3

File Documentation

3.1 tmp102.c File Reference

TMP102 Temperature Sensor Library.

```
#include "tmp102.h"
```

Functions

- HAL_StatusTypeDef TMP102_Init (I2C_HandleTypeDef ∗hi2c)

  Initialize the TMP102 temperature sensor.
- float TMP102_ReadTemperature (I2C_HandleTypeDef ∗hi2c)

  Read temperature from the TMP102 sensor.

3.1.1 Detailed Description

TMP102 Temperature Sensor Library.

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Date

6th of May 2023

3.1.2 Function Documentation

3.1.2.1 TMP102_Init()

```
HAL_StatusTypeDef TMP102_Init (
            I2C_HandleTypeDef * hi2c )
```

Initialize the TMP102 temperature sensor.

Parameters

hi2c	Pointer to an I2C_HandleTypeDef structure that contains the configuration information for the specified I2C peripheral.

Return values

HAL	status

3.1.2.2 TMP102_ReadTemperature()

```
float TMP102_ReadTemperature (
            I2C_HandleTypeDef * hi2c )
```

Read temperature from the TMP102 sensor.

Parameters

hi2c	Pointer to an I2C_HandleTypeDef structure that contains the configuration information for the specified I2C peripheral.

Returns

Temperature in degrees Celsius as a float.

3.2 tmp102.h

```
00001 /*
00002  * TMP102 Temperature Sensor Library
00003  * Author: Travimadox Webb
00004  * Postion: Embedded Software Engineer
00005  * Company: Imperium LLC
00006  * Date: 6th of May 2023
00007  */
00008
00009 #ifndef TMP102_H
00010 #define TMP102_H
00011
00012 #include "stm32f0xx_hal.h"
00013
00014 // TMP102 I2C address (default: 0x48)
00015 #define TMP102_I2C_ADDRESS 0x48
00016
00017 // TMP102 register addresses
00018 #define TMP102_REG_TEMPERATURE 0x00
00019 #define TMP102_REG_CONFIG 0x01
00020
00021 // TMP102 configuration settings
00022 #define TMP102_CONFIG_CONTINUOUS_CONVERSION 0x0000
00023 #define TMP102_CONFIG_SHUTDOWN_MODE 0x0100
00024
00025 // Initialize the TMP102 sensor
00026 HAL_StatusTypeDef TMP102_Init(I2C_HandleTypeDef *hi2c);
00027
00028 // Read temperature from the TMP102 sensor
00029 float TMP102_ReadTemperature(I2C_HandleTypeDef *hi2c);
00030
00031 #endif // TMP102_H
```

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