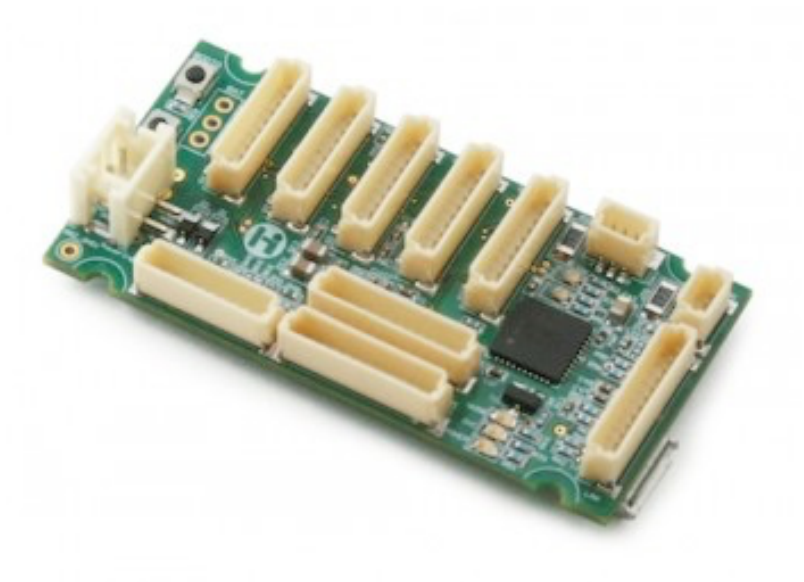
TITech M4 Controller

v.1.2

ユーザーマニュアル
User manual



HiBot

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はじめに/Introduction

This manual introduces the HiBot Titech M4 Controller® board.

HiBot Titech M4 Controller board is based on the STM32™ ARM Cortex M4 STM32F407IG. For detailed chip hardware manuals, user is requested to check the documentation available online on the chip maker STMicroeletronics.

製品概要

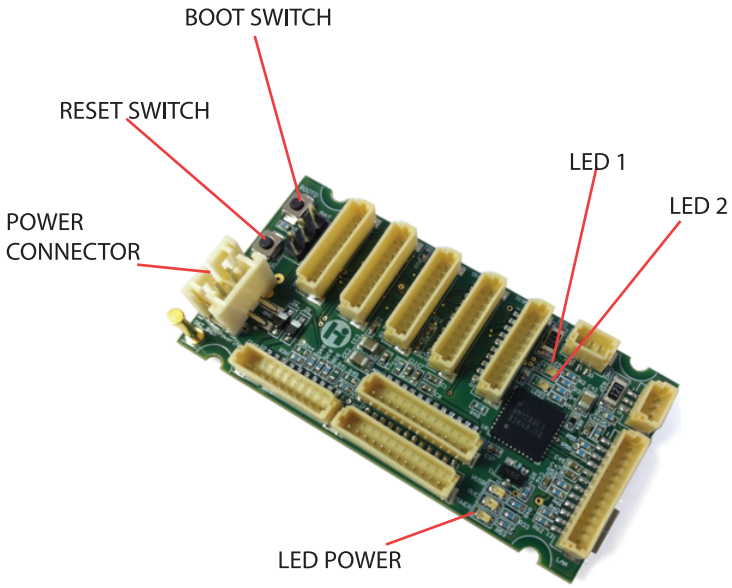
Supply voltage is of 5V and the board; digital input are 5V compliant, however all A/D inputs and the board functionalities are based on 3.3V voltage and logic levels. An input voltage higher than 3.3V on any analog channel would permanently damage the board. Thus digital output and D/A outputs will be delivering maximum 3.3V.

定格/Electrical characteristics

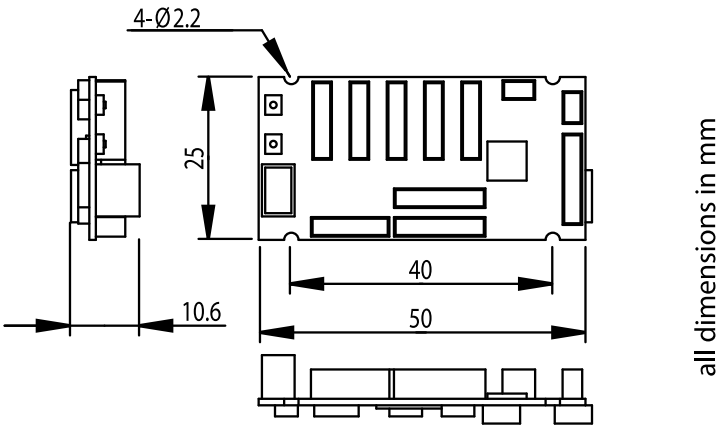
Parameter	Conditions
Supply voltage	5V
CPU Osc. Frequency	168MHz
Continuous current consumption	0.6A
Voltage logic level	3.3V

Table 1

外観/Board dimensions



図/Figure 1 **- Titech M4 Controllerの外観/Titech M4 Controller**



図/Figure 2 **– Titech M4 Controllerの寸法図/Titech M4 Controller dimensions**

コネクター覧/Connectors and housing

The board is supplied with JTAG cable, shown in Figure 3, it can be utilized in connection with any debugger programmer for STM32 cores. This documentation will refer to the debugger/programmer device ST-LINK/V2 which is also available from the HiBot e-shop.

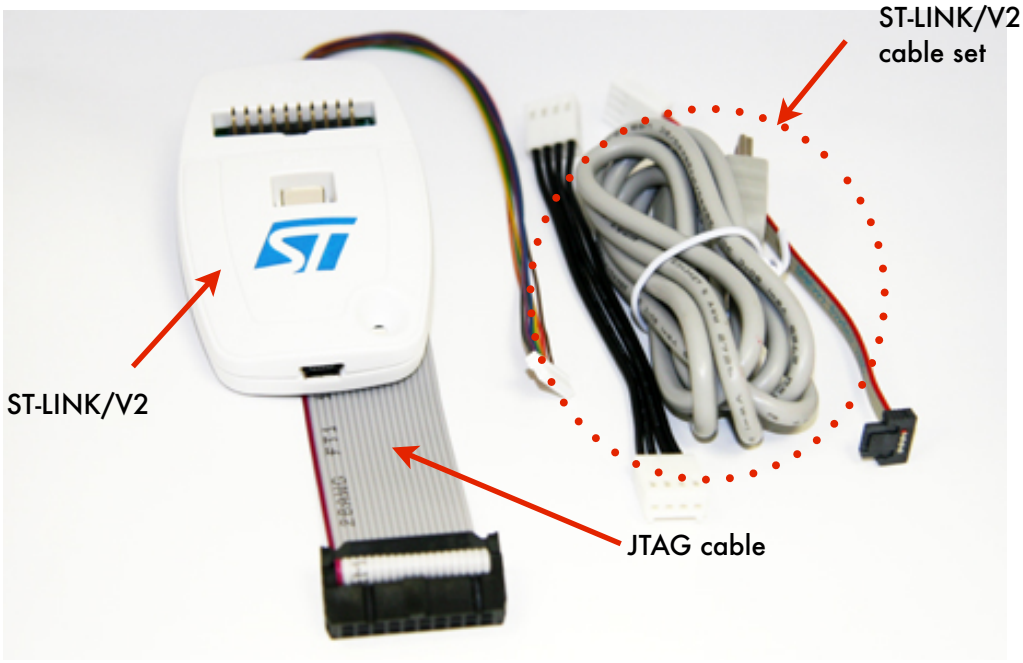


Figure 3 - JTAG cable and ST-LINK/V2 programmer

Optional cable, also available online, is the LAN transceiver RJ45 connector, shown in Figure 4

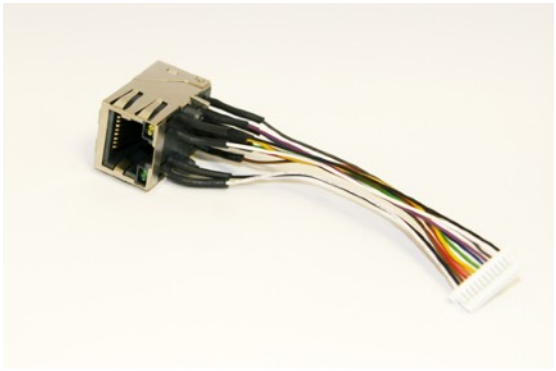


Figure 4 - LAN cable with RJ45 transceiver

The board utilizes JST housing and connectors as follows:

-Housing: PHR-2 (for power), SHR-xV-S-B or SHR-xV-S (where x is 10,12 or 3 according the port user wishes to use)

-Contact: SPH-002T-P0.5S; SSH-003T-P0.2

機能説明 / Features

ホールセンサ入力 / Schematic block

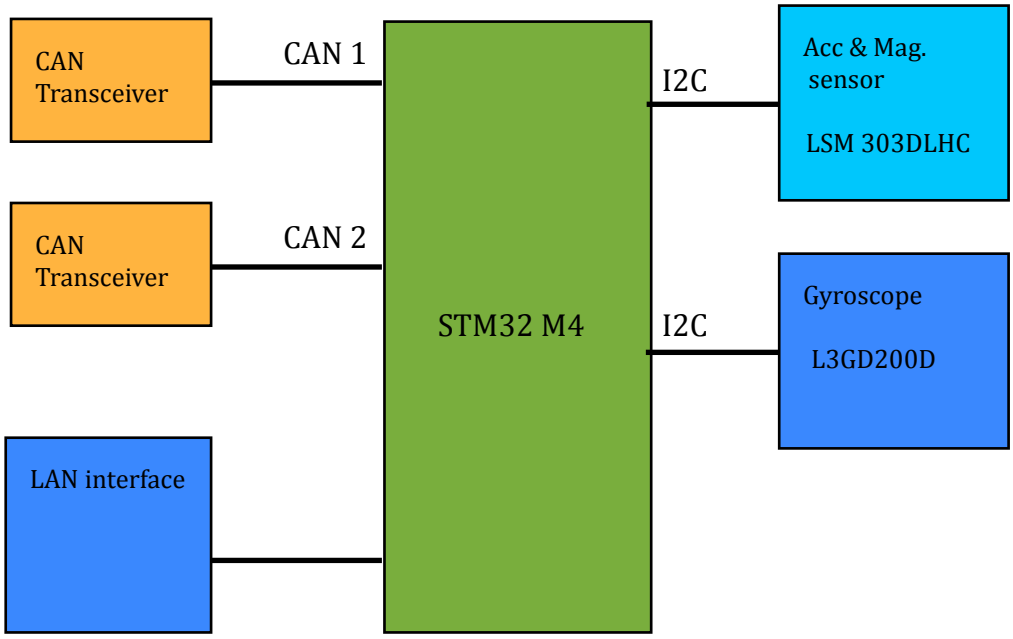


Figure 5 - Board schematic block

Titech M4 Controller is equipped with on board motion sensor unit consisting of a digital accelerometer and magnetometer LSM303DLHC and the Gyroscope L3GD20. Connectivity to other devices can be carried out not only by UART but also utilizing two CAN ports and/or LAN ethernet communication.

CAN ports

Two CAN ports are available, CAN port 1 is set on-board with its termination thus it can be utilized when the board is set as a termination as shown in Figure 6. CAN2 port should be instead used when the board will be utilized as a network node, the cable will have to be split in order to serialize the board in the network as shown in Figure 7

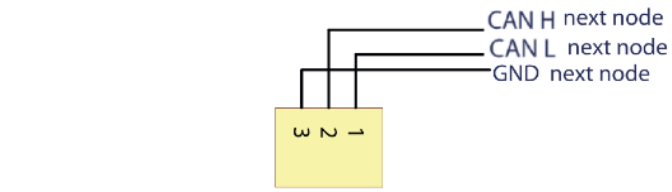


Figure 6 - CAN port 1 utilized as a termination

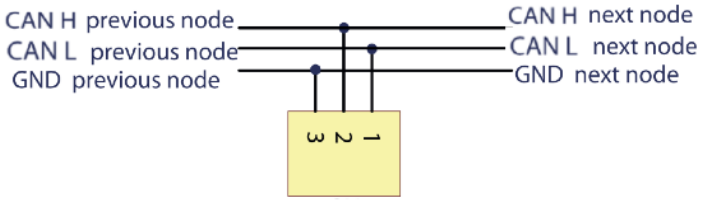


Figure 7 - CAN port 2 utilized as a network node

Titech M4 Controller can be utilized as a master or as a node together with other HiBot micro controller based boards

Accelerometer and Magnetometer

For more details on the accelerometer and magnetometer user should refer to the documentation available online on the LSM303DLHC chip maker.

Figure 8 shows the orientation of the chip installed on the bottom side of the board with the direction of the detectable magnetic field and accelerations.

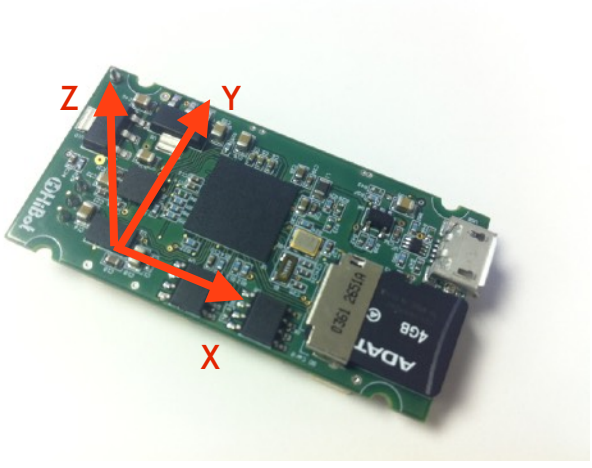


Figure 8 - Directions of the detectable acceleration and magnetic fields

The chip can be accessed through the I2C port connected to PB9 and PB8 pins of the micro-controller as shown in Figure 9

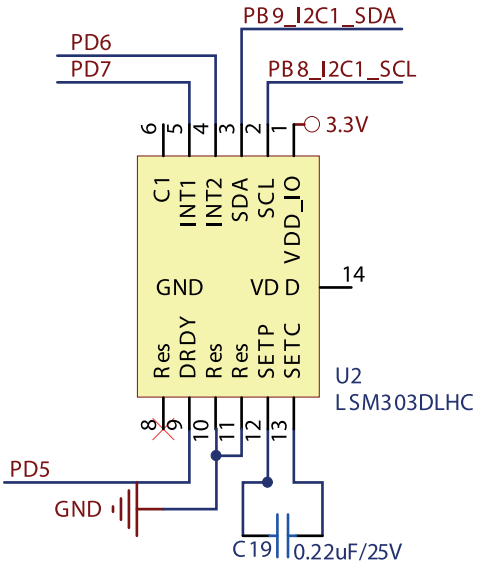


Figure 9 - Accelerometer and Magnetometer on board.

Gyroscope

Figure 10 shows the orientation of the gyroscope which is installed in the bottom layer of the board. The chip supplies also temperature measurements that might be utilized for precise adjustments due to the environment temperature. For more details on the chip characteristics user is requested to access the documentation online available on the L3G4200D maker.

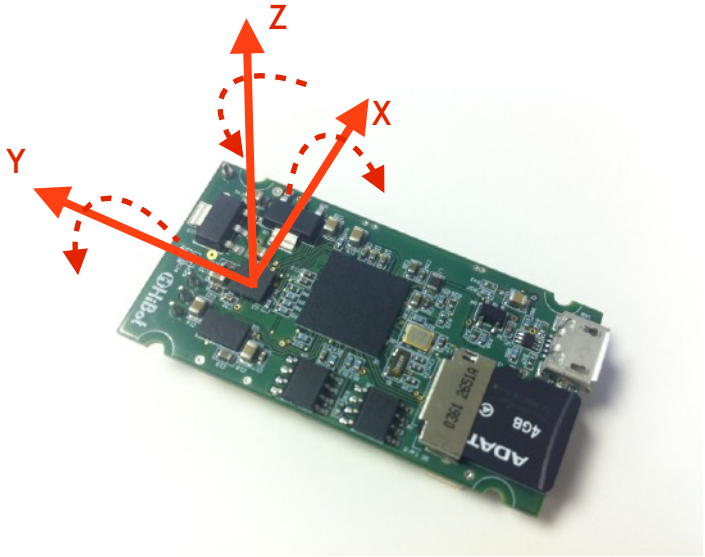


Figure 10 - Directions of the detectable angular rates

The chip can be accessed by the I2C connected to PB8 and PB9 pins of the micro controller as shown in the following Figure 11.

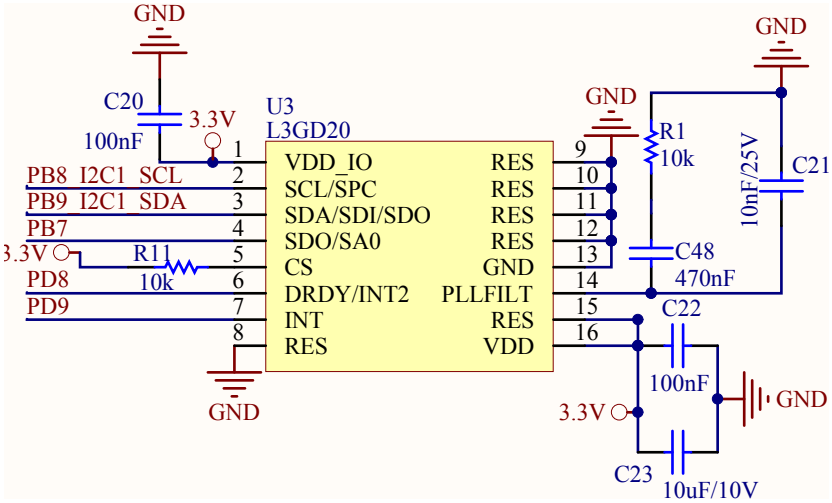


Figure 11 - Gyroscope on board.

LAN port

The board offers the possibility to utilize Ethernet LAN communication through the LAN port. Figure 12 shows the LAN interface and the pin assignment to the micro-controller.

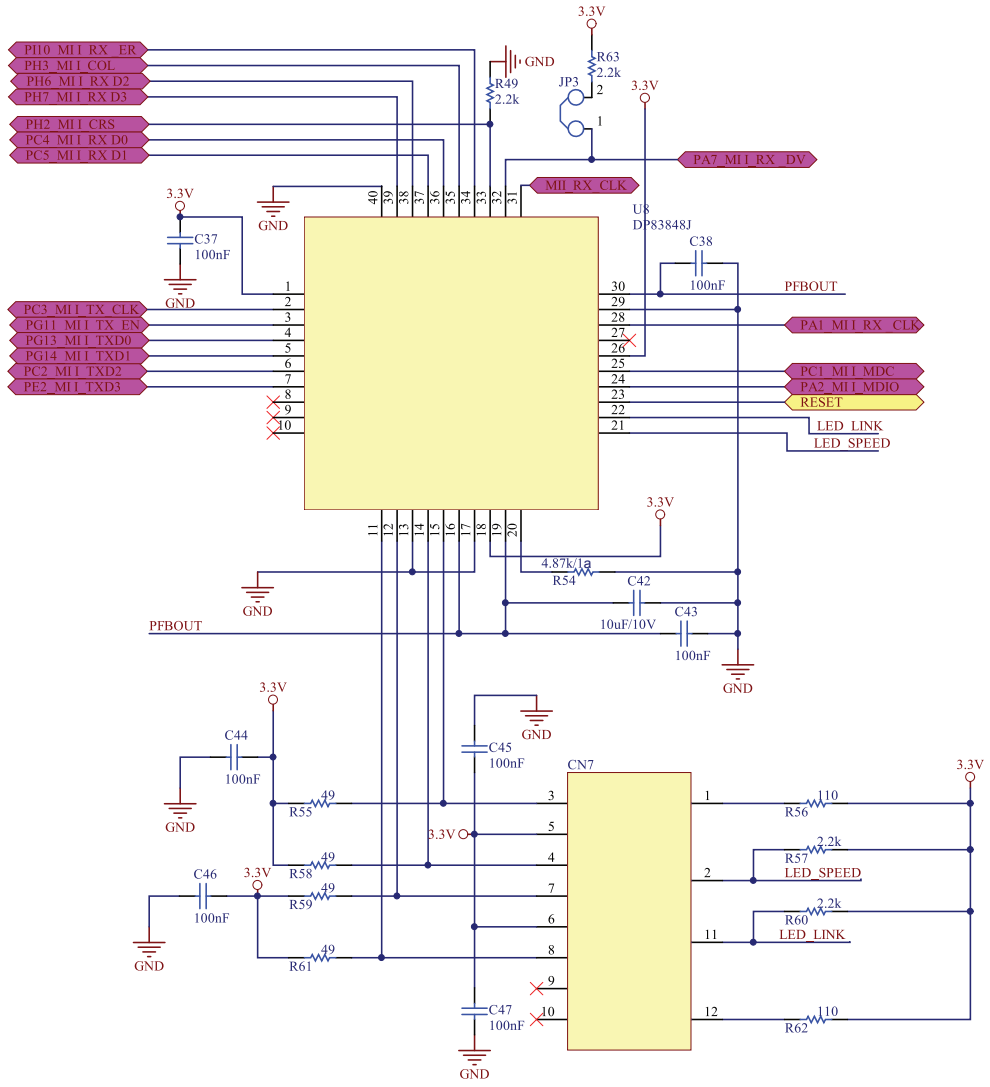
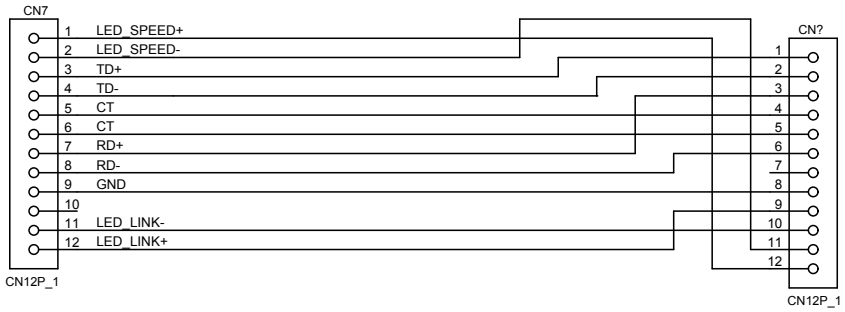


Figure 12 - LAN interface

User can make use of the cable offered on HiBot homepage depicted in Figure 4 or can assemble a cable with transceiver following the schematics available in Figure 13



M4 board CN7

JST SHR-12V-S-B
(HiBot HB-SHR12-001)

RJ45 with transformer

TAIMAG RJLD-260TC1

Figure 13 - Connection between LAN port and RJ45 transceiver

MicroSD port

Figure 14 shows the connection to the microcontroller pins of the microSD card reader.

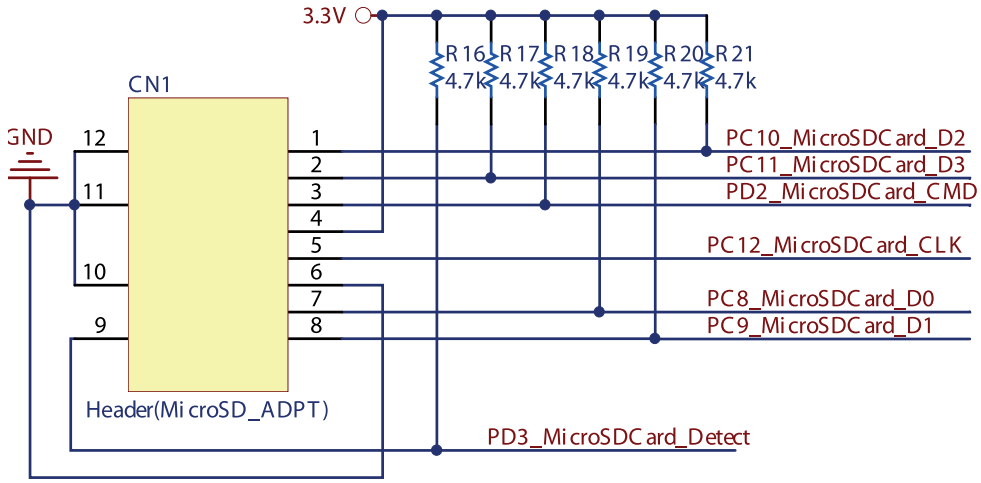


Figure 14 - MicroSD adapter pin connetions

LEDs

A total of four LEDs are available on board. User can access them by setting as digital output pins PE0, PE1, PE3 and PE4 as shown in Figure 15.

When the correspondent digital out pin is set as low level, the respective LED will be switched on.

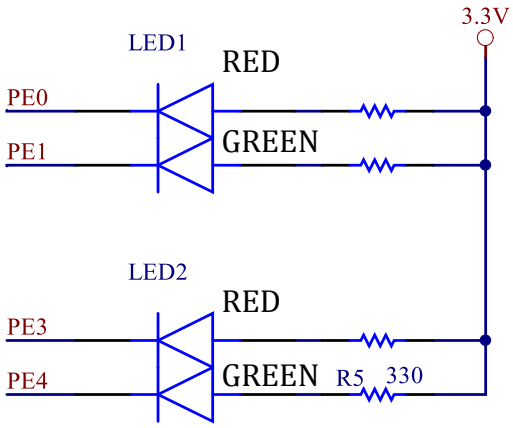


Figure 15 - Pin assignment for the LEDs

A/D and D/A Ports

All A/D channels are maximum 3.3V tolerant. An input voltage higher than 3.3V on any analog channel would permanently damage the board. When using potentiometers, user should make use of the available VREF+ (3.3V) for power and of VSSA (GND) for ground signal that are shown in the pin assignment section of this manual. All channels are with 12 bit resolution.

Two Digital to Analog converter pins are also available at the AD1 pin 4 (PA4) and pin 5 (PA5); both lines will be outputting a signal between 0 to 3.3V.

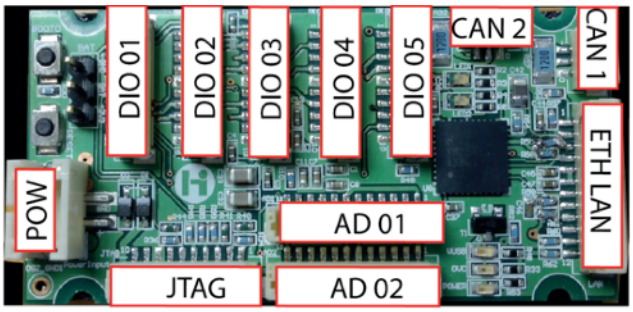
Digital Input/Output and timer ports

All digital Input/Output pins available are depicted in the pin assignment section at the end of this manual. Each pin can be configured according to its possible functions (please refer to the STM32F407IG user manual for more information).

放熱 / Installation of the board and dissipation

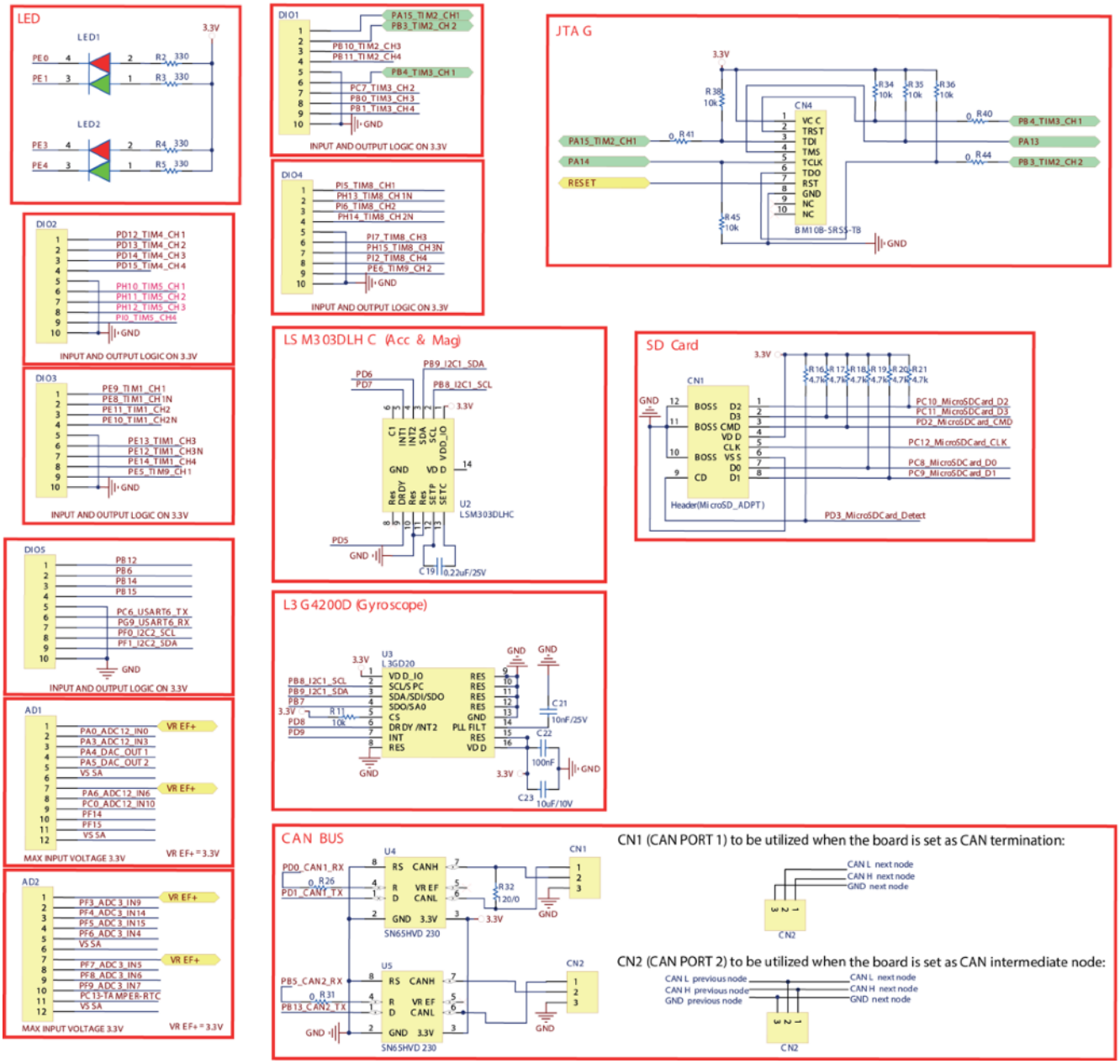
When installing the board for applications, the holes available on the board should be utilized taking care of avoiding any contact of the board surfaces with conductive materials.

コネクタのピン／Pin assignment



POW
1. +5V
2. GND

All logic for DIO ports and levels for A/D converters are based on 3.3V logic.



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Last Revision: August 16th 2017 (updated CAN pin order)

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