

AN058: How to quickly build an IoT application with TMC2300-IoT-REF and BLYNK

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This application note describes how to control a stepper motor with the TMC2300-IOT-REF board, using the Blynk IoT platform to control the motor with a smartphone.

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1 Introduction

The TMC2300-LA is a low voltage driver for two-phase stepper motors. With it you can design compact, battery-powered applications. The TMC2300-IOT-REF board features a WiFi-capable ESP32 microcontroller, USB and serial connections, as well as battery charging circuitry, enabling easy implementations of IoT applications.

2 Architecture

For this application, we combine our TMC2300-IOT-REF board with Blynk, a platform for designing simple IoT applications. By using Blynk we can create an app to control a motor. In this Blynk app we can use various control elements to interact with the IoT board. The connection between the IoT board and the Blynk app is established via a Blynk server. Commands are sent from the app to the server, which passes them along to the IoT board. The connections to the Blynk server are done using WiFi for both the IoT board and the Blynk app.

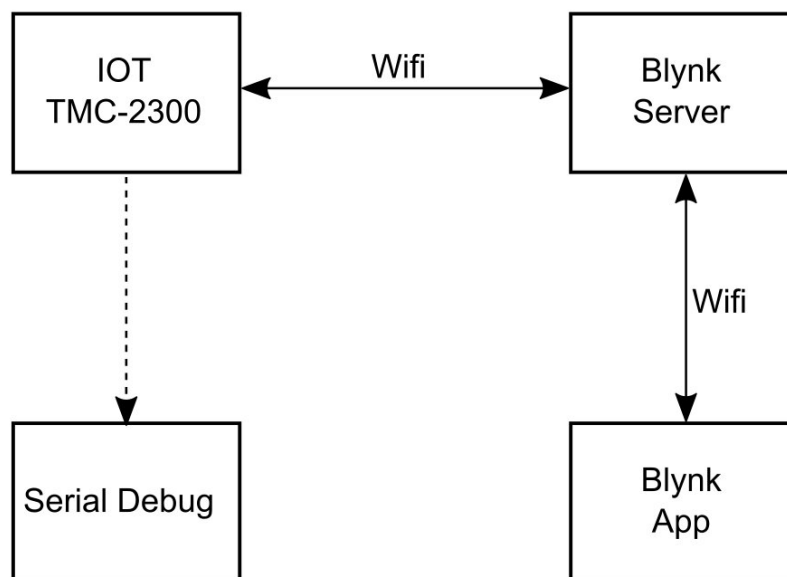


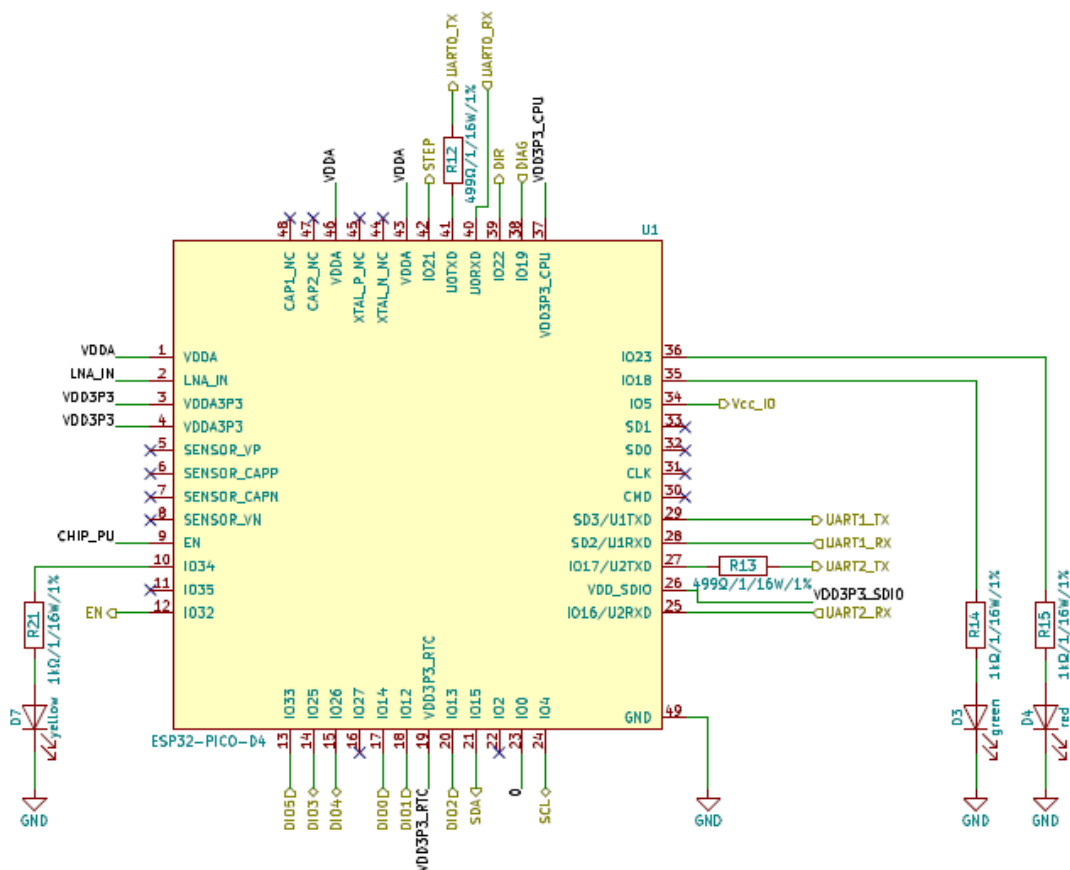
Figure 1: Simple communication architecture between the TMC2300-LA and Blynk



2.1 IoT Board

The ESP32 communicates with the TMC2300-LA via UART. For debugging purposes the serial USB is used to communicate with the PC. The ESP32 Board connects to the Blynk server via WiFi.

Wireless interface



2.2 Blynk

The connection from the IoT Board and the Blynk app to the Blynk server is established over the internet via the WiFi connection. For linking the IoT Board with the Blynk app, the Blynk server uses an authentication token. This authentication token is stored in the IoT Board and in the Blynk app.

To facilitate communication between the IoT board and the app, Blynk uses a mechanism called virtual pins. These virtual pins are abstract values that can be written and read. To control these values, the Blynk app uses buttons, sliders, value input fields etc.



3 The Application

The TMC2300-IOT-REF board is used to control the stepper motor. Commands are sent via the Blynk app. In this section you can find out how to setup your hardware, how to program the IoT board and configure the Blynk App.

3.1 Hardware Setup

The hardware setup consists of the following components:

- TMC2300-IOT-REF board
- Stepper-Motor (QSH2818-32-07-006)
- Power Supply (2,5 - 6 Volt)
- USB-C cable
- Smartphone (for using the Blynk App)
- (opt.) 3.0V Battery (rechargeable)

Connect the USB-C cable, the power supply and the stepper motor to the TMC2300-IOT-REF board. Connect the smartphone to a WiFi access point with internet access. Optionally add the battery pack to the TMC2300-IOT-REF board.

3.2 Blynk App

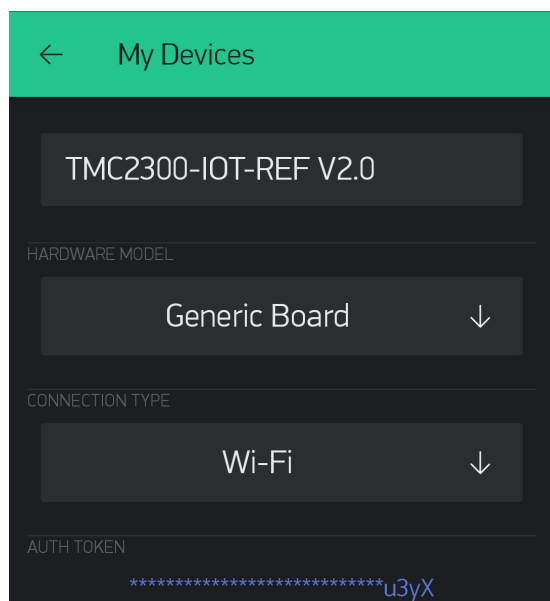


Figure 2: Device selection

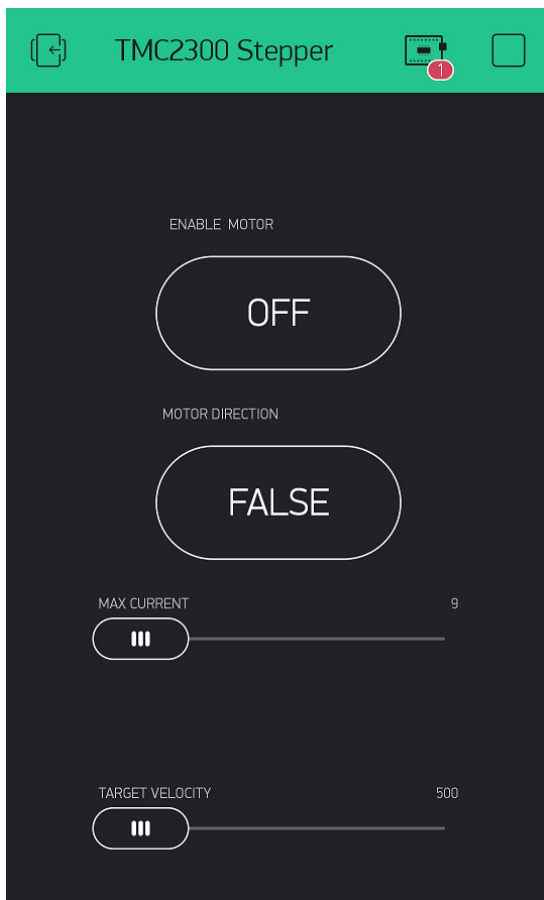
First install the Blynk app to your smartphone. Once the Blynk app is installed, you have to create a new project. Pick a name for the project and select the following settings:

- Hardware model: Generic board
- Connection type: WiFi

Press the "Create" Button to create the project with these settings. You will then receive an authentication token via Email. Add the authentication token to the project in the app.

You can also check out the getting started instructions on the Blynk website for these steps: <https://blynk.io/en/getting-started>





To start controlling the example project for the TMC2300 IOT board you have to add the following control elements:

Virtual pin	Name	Input type
V1	Motor Current	Slider (9-31)
V2	Velocity	Slider (500-9000)
V3	Motor direction	Button (Switch)
V4	Motor enable	Button (Switch)

Figure 3: The fully configured TMC2300 stepper app



3.5 Troubleshooting

In case you run into any issues setting up this TMC2300-IoT-Board, here are some common issues and how to resolve them:

Issue	Solution
The program does not compile	Verify that you have installed the Blynk library and the ESP32 board library. Check that correct board has been selected (ESP32 Pico Kit)
The program cannot be uploaded	Verify that you have properly connected the board. Check that the correct connection port has been selected in the Arduino IDE.
The IoT Board does not connect to WiFi	Verify that you have entered correct credentials into the uploaded IoT board program.
The IoT Board is not connecting to the Blynk server	Verify that the WiFi access point has internet access. Verify that you have entered the correct auth token into the uploaded IoT board program.
The Blynk app controls are not controlling the IoT Board	Verify that you have selected the correct virtual pin numbers in the Blynk app.
The connection drops as soon as the motor is moved	Ensure that you have a sufficient power supply. Try reducing the motor run current.



4 Revision History

Version	Date	Author	Description
V1.0	16.07.2020	JM	Initial version
V1.1	31.08.2020	LH	Added Arduino library installation instructions. Added more troubleshooting hints. Updated Board image. Updated Appnote title

Table 1: Document Revision

