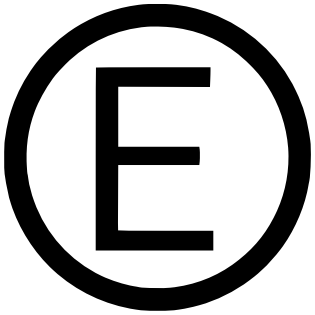
Barsotion AHY:
Terms of reference



Barsotion KOy, 2025

Table of contents

Abstract

This document is purposed to describe terms of reference of the perspective Barsotion development board AH4.

The AH4 (herein *the board*) is a project of development board for the TDK InvenSense ICM-45686, IMU (i.e. gyroscope & accelerometer) that has the best parameters in the world today, also allowing to measure linear accelerations up to 32g and angle velocities up to 4000 degrees per second.

The board is creating to develop ICM-45686 capabilities. It should contain the IMU & the microcontroller to research sensor features within one PCB.

Main points

The board should contain

- ICM-45686 IMU (gyroscope & accelerometer);
- Quartz oscillator 32-40 kHz for IMU ODR frequency stabilization;
- A modern 32-bit microcontroller at frequency not less than 100 MHz, having hardware floating-point unit (FPU) and USB 2.0 High-speed interface (supposedly CH32V305xxx);
- 2x USB-C connector;
- “Tag-connect” connector for microcontroller flashing;
- USB-UART converter to link microcontroller even if USB-HS topology is failed;
- DIP-switch, 2 switches to lay 4 scenarios of working;
- 2 signal leds, yellow color, connected to DIP-switch;
- Power led, yellow color, to indicate powering;
- 3 signal leds, red color, connected to microcontroller;
- Signal led, yellow color, connected to microcontroller;
- Low-dropout (LDO) voltage regulator, 3.3V (supposedly AP2112-3.3).

IMU connection

The ICM-45686 has three external interfaces:

- Host interface (SPI, I2C, I3C) to link with the microcontroller (host);
- Optical Image Stabilization Controller (OISC) interface (SPI);
- I2C master interface (I2CM).

The board should allow user to test all the ICM-45686 interfaces. According the datasheet, only one of OIS & I2CM interfaces can be used in moment. Supposedly the board schematic should link host & OIS interfaces directly to two hardware SPI ports of the microcontroller. Also, the host I2C interface should be connected to

microcontroller’s I2C pins. Host interface (supporting SPI & I2C) should be routed to PLS connector. OIS and I2CM interfaces should be routed to individual PLS connectors.

The interrupt channels should be routed to the microcontroller.

The ODR syncronizing signal should be routed to the IMU pin via transistor controlled by microcontroller.

PCB requirements

- The PCB should have at less 4 mounting holes;
- Should include designations for all the board connectors;
- The board silkscreen should contain warning that only one of OIS & I2CM interfaces can be activated at moment;
- Signal leds should indicate enabling microcontroller’s working with IMU host, OIS & I2CM interfaces.

Revision history

Date	Modification
Aug 19, 2025	Document’s first release.