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# Quadcopter controller IC

## User Guide

Rev 0

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## 1. Product overview

Quadcopter controlling IC build on base of ATMEGA328P-PU, 5V, 16MHz (Figure 1). IC pre-programmed with the base quadcopter control application. Programming is not required by the end user.

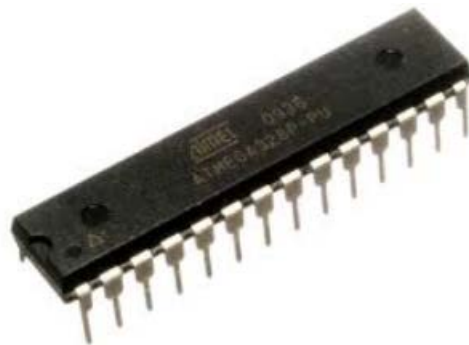


Figure 1. ATMEGA328P-PU

## 2. IC Pin Out and Signal Description

IC pinout provided on Figure 2, and pinout signals description provided in the Table 1.

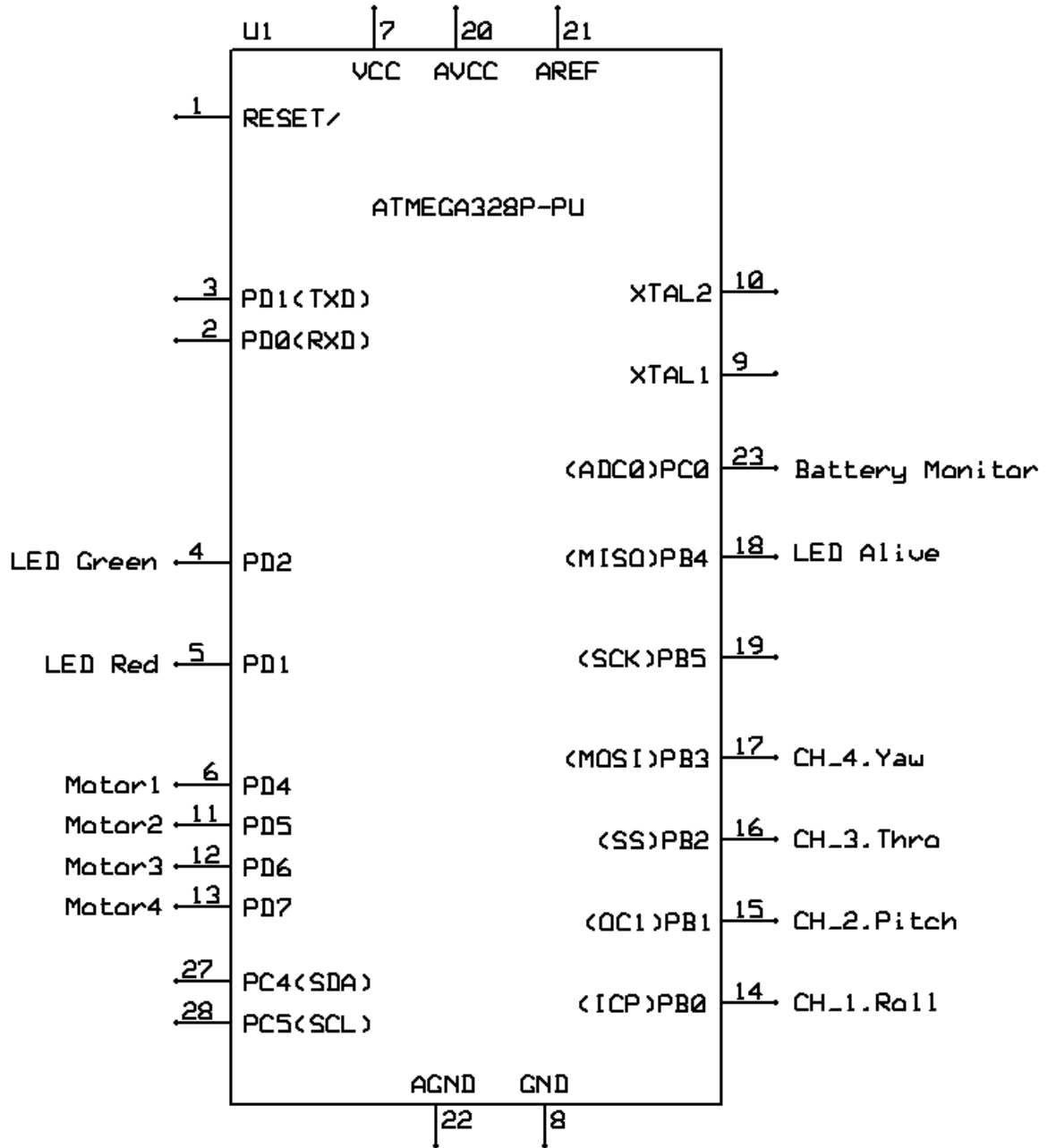


Figure 2. IC pinout (top view)

**Table 1. IC pinout signals description**

<b>Pin#</b>	<b>Signal Name</b>	<b>Signal Description</b>	<b>Signal Direction</b>
1	<b>Reset /</b>	Active low reset input.	in
2	<b>RXD</b>	RS232 receiver input.	in
3	<b>TXD</b>	RS232 transmitter output.	out
4	<b>LED Green</b>	Indication of correct functioning. Could be other color as well.	out
5	<b>LED Red</b>	Indication of error, warnings. Could be other color as well.	out
6	<b>Motor1</b>	PWM signal to ESC of Motor #1.	out
11	<b>Motor2</b>	PWM signal to ESC of Motor #2.	out
12	<b>Motor3</b>	PWM signal to ESC of Motor #3.	out
13	<b>Motor4</b>	PWM signal to ESC of Motor #4.	out
27	<b>SDA</b>	I2C data signal to/from IMU sensor.	in/out
28	<b>SCL</b>	I2C clock signal to IMU sensor.	out
9	<b>XTAL1</b>	Crystal 16MHz 20pF.	in/out
10	<b>XTAL2</b>	Crystal 16MHz 20pF.	out/in
23	<b>Battery Monitor</b>	Battery voltage monitoring input.	in
18	<b>LED Alive</b>	Signal indication the controller is working.	out
14	<b>CH_1.Roll</b>	Roll signal from Remote controller Receiver.	in
15	<b>CH_2.Pitch</b>	Pitch signal from Remote controller Receiver.	in
16	<b>CH_3.Thro</b>	Throttle signal from Remote controller Receiver.	in
17	<b>CH_4.Yaw</b>	Yaw signal from Remote controller Receiver.	in
22	<b>AGND</b>	Analog Ground. Connect to common.	-
8	<b>GND</b>	Digital Ground. Connect to common.	-
7	<b>VCC</b>	5V power supply input. Connect to common through 0.1uF ceramic capacitor.	-
20	<b>AVCC</b>	5V analog power supply input. Connect to common through 0.1uF ceramic capacitor.	-
21	<b>AREF</b>	Reference voltage output. Connect to common through 0.1uF ceramic capacitor.	-
<b>others</b>	<b>NC</b>	Other, not specified pins, are not connecting.	-

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### 3. Implementation

Figure 3 shows a connection diagram of the IC.

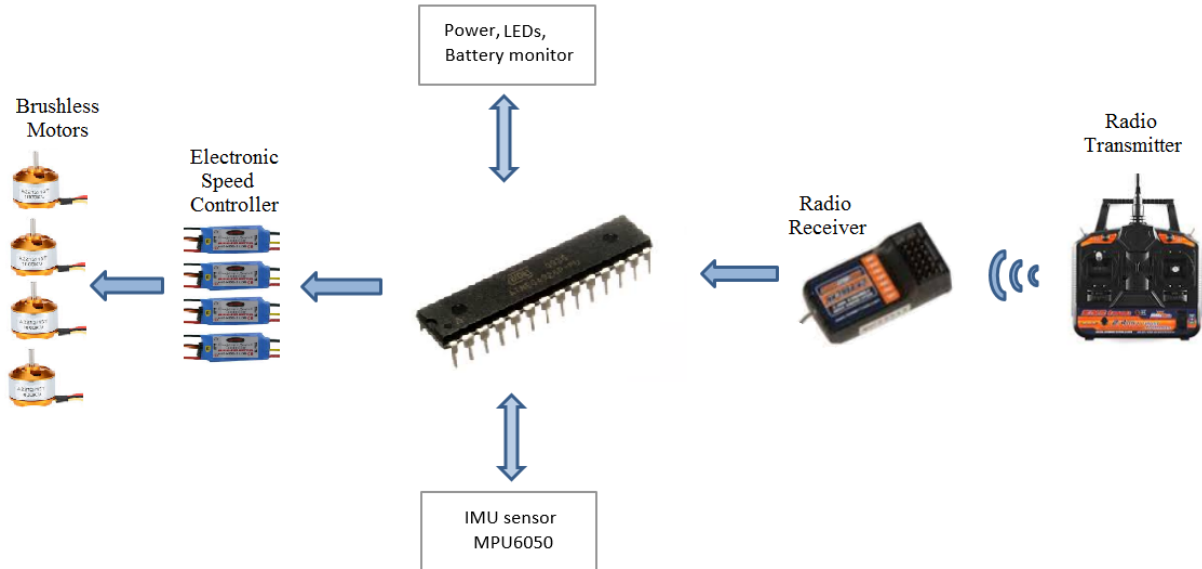


Figure 3. Connection diagram of quadcopter controller IC

#### 3.1. RC receiver interface

Follow Figure 2.

#### 3.2. ESC calibration

ESCs need to be calibrated before connecting to controller. For calibration could be used an Youtube video on <https://www.youtube.com/watch?v=HKJ2WKXbEEw> .

#### 3.3. ESC interface

Follow Table 1.

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### 3.4. IMU interface

Device designed to work with IMU sensor MPU6050 only.  
Figure 4 shows a connection diagram of the IC to the MPU6050.

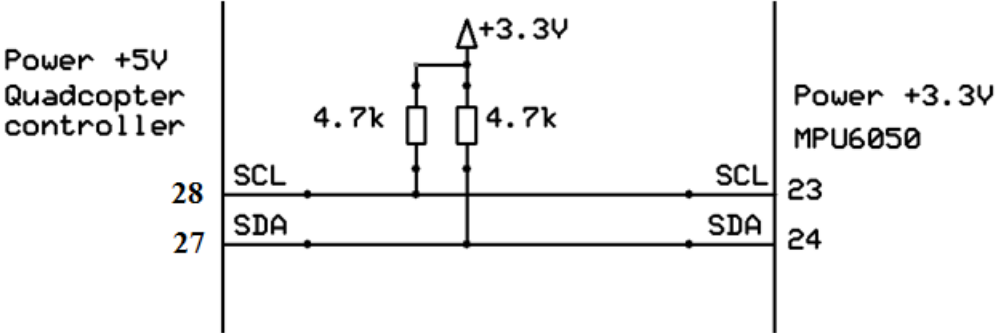


Figure 4. MPU6050 connection

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### 3.5. Motors and MPU6050 orientation

Motors spinning direction and MPU6050 orientation should correspond to Figure 5.

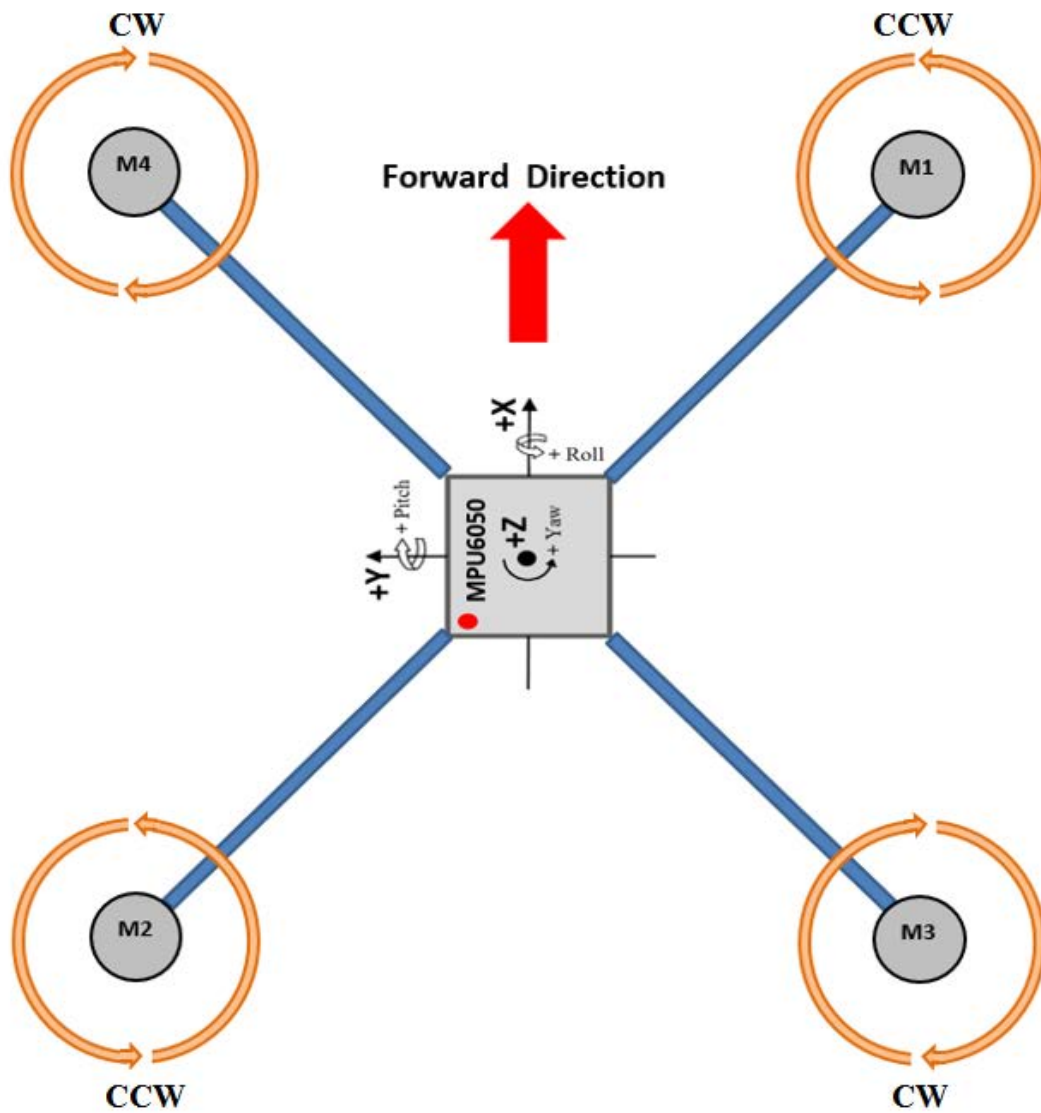


Figure 5. MPU6050 and Motors orientation



## 4. Evaluation board

Controller's Evaluation board schematics provided in Figure 6. Schematic drawing performed by the tool from the [www.expresspcb.com](http://www.expresspcb.com).

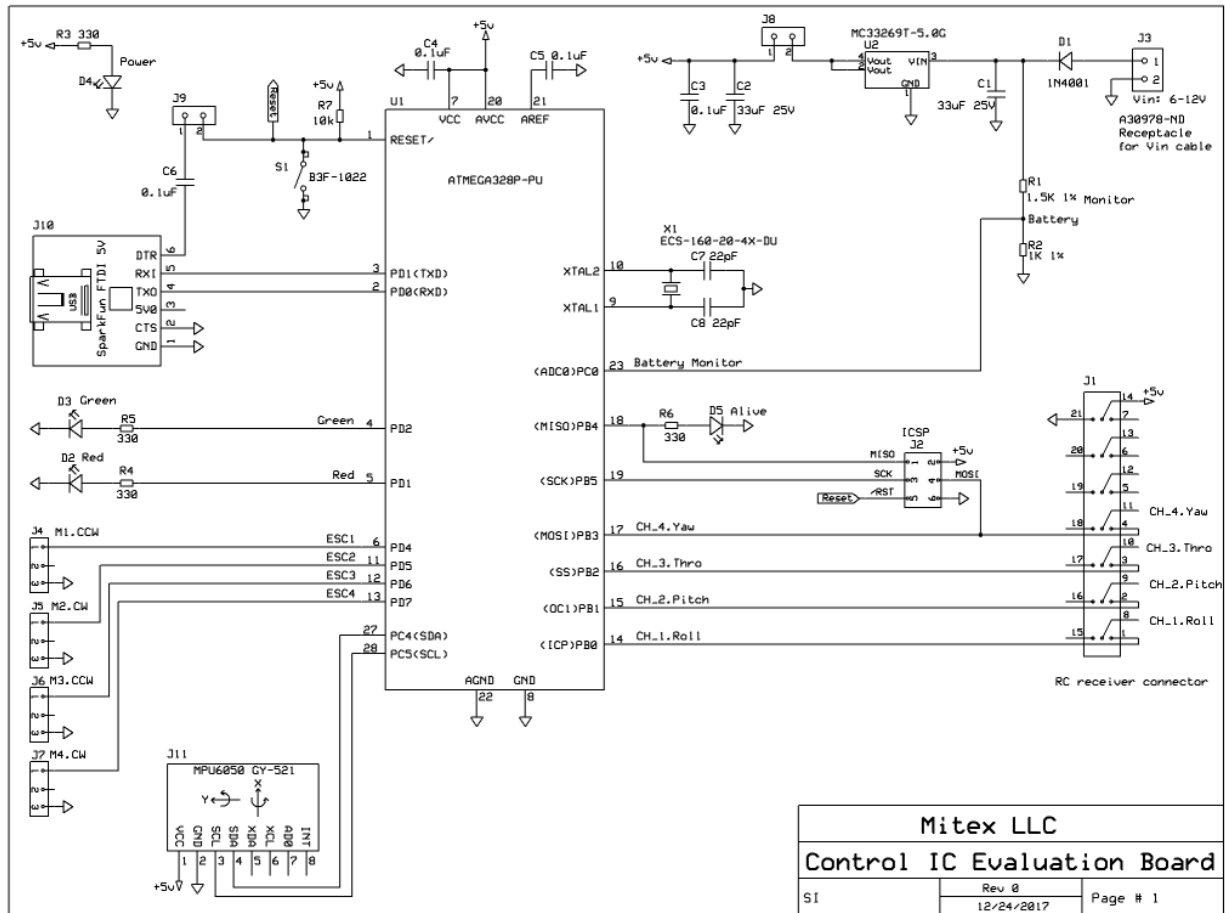
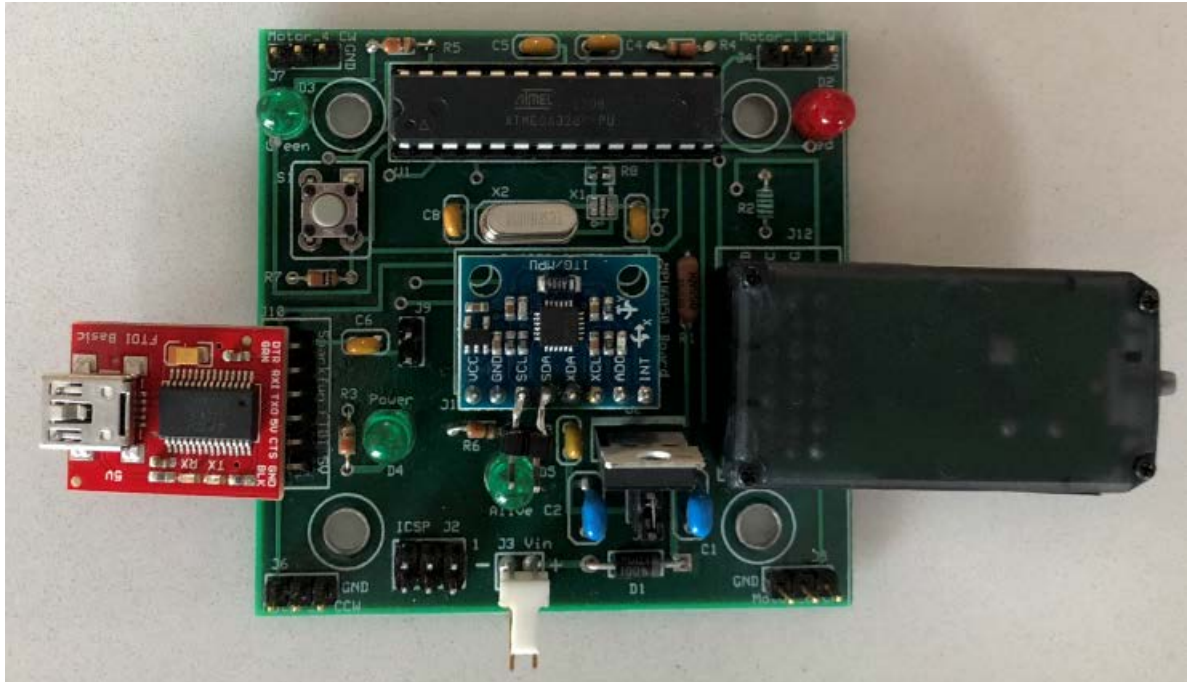


Figure 5. Quadcopter controller module schematics

Controller's Evaluation board picture provided in Figure 6.



**Figure 6. Quadcopter controller module board**

Controller's Evaluation board picture on the Drone provided in Figure 7.



Figure 7. Quadcopter with the controller IC

## 5. Revision history

Date	Revision	Description
02/03/18	0	Quadcopter controller module user guide

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## 6. Disclaimer

We expressly disclaims any liability arising out of the application or use of the Quadcopter controller IC. We reserve the right to make changes, at any time, to the Quadcopter controller IC as deemed desirable in the sole discretion of ours. We assume no obligation to correct any errors contained herein or to advise you of any correction if such be made. We will not assume any liability for the accuracy or correctness of any engineering or technical support or assistance provided to you in connection with the Quadcopter controller IC.

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