

Team Project
Quadrocopter

in the degree course ASM-SB
of the Faculty Graduate School
ASM2

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1 Introduction

This document is about the sensors we use and their maximum and minimum values. Compared with the physical needed values, we need to realize an autonomous flight.

2 Sensors and limits

The sensors we use.

2.1 Analog- Digital Converter

ADS1015

Resolution: 12 Bits

Programmable Sample Rate: 128 to 3300 Samples/Second

Power Supply/Logic Levels: 2.0V to 5.5V

Low Current Consumption: Continuous Mode: Only 150µA Single-Shot Mode: Auto Shut-Down

Internal Low-Drift Voltage Reference

Internal Oscillator

Internal PGA: up to x16

I2C Interface: 4-Pin-Selectable Addresses

Four Single-Ended or 2 Differential Inputs

Programmable Comparator

2.2 Infrared

GP2Y0A60SZ0F/LF?

1. Distance measuring sensor is united with PSD, infrared LED and signal processing circuit
2. Distance measuring range : 10 to 150 cm
3. Compact size (22.0 × 8.0 × 7.2mm)
4. Long distance measuring type (No external control signal required)
5. Analog output type
6. Update time: 16.5ms ± 3.7ms

2.3 GPS

Built-in 15X15X2.5mm ceramic patch antenna on the top of module

Ultra-High Sensitivity: -165dBm (w/o patch antenna), up to 45dB C/N of SVs in open sky reception.

High Update Rate: up to 10Hz (note1)

12 multi-tone active interference canceller (note2)

ISSCC2011Award – Section26.5

High accuracy 1-PPS timing support for Timing Applications (10ns jitter)

AGPS Support for Fast TTFF ("EPO" Enable 7 days/14 days)

"EASY" (note2)

: Self-Generated Orbit Prediction for instant positioning fix

"AlwaysLocate" (note2)

Intelligent Algorithm (Advance Power Periodic Mode) for power saving

Logger function Embedded (note2)

Automatic antenna switching function

Antenna Advisor function

Gtop Firmware Customization Services

Consumption current(@3.3V):

- Acquisition: 25mA Typical

- Tracking: 20mA Typical

E911, RoHS, REACH compliant

note 1: SBAS can only be enabled when update rate is less than or equal to 5Hz.

note2: Some features need special firmware or command programmed by customer, please refer to G-top "GPS command List"

2.4 IMU

2.4.1 3D accelerometer and 3D magnetometer module

Features ? 3 magnetic field channels and 3 acceleration channels ? $\pm 2/\pm 4/\pm 8/\pm 12$ gauss dynamically selectable magnetic full-scale ? $\pm 2/\pm 4/\pm 6/\pm 8/\pm 16$ g dynamically selectable linear acceleration full-scale ? 16-bit data output ? SPI / I²C serial interfaces ? Analog supply voltage 2.16 V to 3.6 V ? Power-down mode / low-power mode ? Programmable interrupt generators for free- fall, motion detection and magnetic field detection ? Embedded temperature sensor ? Embedded FIFO ? ECOPACK[®] , RoHS and "Green" compliant

2.4.2 MEMS pressure sensor

Features

- 260 to 1260 mbar absolute pressure range
- High-resolution mode: 0.020 mbar RMS
- Low power consumption:
- Low resolution mode: 5.5 uA
- High resolution mode: 30 uA
- High overpressure capability: 20x full scale
- Embedded temperature compensation
- Embedded 24-bit ADC
- Selectable ODR from 1 Hz to 25 Hz
- SPI and I2C interfaces
- Supply voltage: 1.71 to 3.6 V
- High shock survivability: 10,000 g
- Small and thin package
- "ECOPACK"

lead-free compliant

2.4.3 MEMS motion sensor: three-axis digital output gyroscope

Features

- Wide supply voltage, 2.2 V to 3.6 V
- Wide extended operating temperature range (from -40 °C to 85 °C)
- Low voltage compatible IOs, 1.8 V
- Low power consumption
- Embedded power-down
- Sleep mode
- Fast turn-on and wake-up
- Three selectable full scales up to 2000 dps
- 16 bit rate value data output
- 8 bit temperature data output
- I2C/SPI digital output interface
- 2 dedicated lines (1 interrupt, 1 data ready)
- User enable integrated high-pass filters
- Embedded temperature sensor
- Embedded 32 levels of 16 bit data output FIFO
- High shock survivability
- "ECOPACK" RoHS and "Green" compliant

2.5 LIDAR-Lite Laser Ranging Module

Modell LL-905-PIN-01

Performance

Range: 0-20m LED Emitter

Range: 0-60m Laser Emitterv Accuracy: +/- 0.025m

Power: 5vdc, <100ma

Acquisition Time: < 0.02 sec

Rep Rate: 1-100Hz

Con?gurations

- LED/PIN Diode, No Optics
 - LED/PIN Diode, 12mm Optics
 - Laser/PIN Diode 14mm Optics
- (Class 1 Laser Product)

Interface

- I2C
- PWM

Bibliography

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