International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 3 Issue 2, February - 2014

Comparison of Barometric Pressure Sensors

Monisha. D. S
SECM
Mangalore, India

Srividya. S
SCEM
Mangalore, India

Prajna Rai
SCEM
Mangalore, India

Abstract: **In this paper we have compared two barometers which differ in their characteristics and specification. Barometers are widely used weather instrument used to measure the atmospheric pressure. We had done a project on UAV in which we have used a barometer keeping that as reference we have written this paper.The two barometers compared are MS5611-01BA from MEAS Switzerland and BMP180 from BOSCH.**

1.1 INTRODUCTION:

A barometer is a widely used weather instruments that measures the atmospheric pressure i.e., weight of air in atmosphere. There are two main types of barometers. They are widely available and reliable mercury barometers and newer digital friendly aneroid barometer.

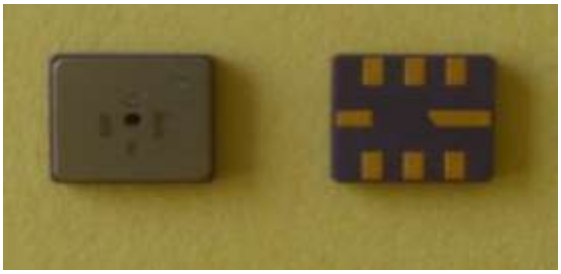
The first mercury barometer was devised by Evangelista Torricelli in 1963. The mercury barometer is typically a glass tube of about 3feet high with one end open and the other end sealed. The tube is filled with mercury and is placed upside down in a container called the reservoir which also contains mercury. The mercury level in glass tube falls creating a vacuum at the top. The barometer works by balancing the weight of mercury in the glass tube against the atmospheric pressure. If the weight of mercury is more than the atmospheric pressure, the mercury level in glass tube falls and if weight of mercury is less than the atmospheric pressure, the mercury level rises.

The newer digital barometer uses electrical charges to measure air pressure. This enables them to take multiple accurate recordings of pressure and produce more accurate weather fore cast.

1.2 MAIN:

Here we compare two newly emerged barometers which differ in their functionalities and specifications. The two barometers we compare are MS5611-01BA a new generation of high resolution sensors from MEAS Switzerland and The BMP180 is a new generation of high precision digital pressure sensors for consumer applications.

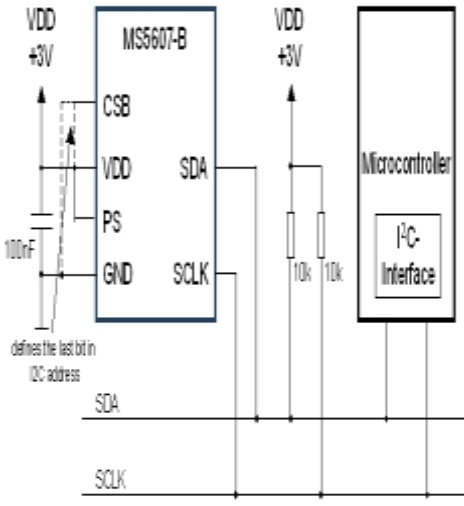
The MS5611-01BA consists of a piezo-resistive sensor and a sensor interface IC. The main function of the MS5611-01BA is to convert the uncompensated analogue output voltage from the piezo-resistive pressure sensor to a 24-bit digital value, as well as providing a 24-bit digital value for the temperature of the sensor.



The BMP180 consists of a piezo-resistive sensor, an analog to digital converter and a control unit with E2PROM and a serial I2C interface. The BMP180 delivers the uncompensated value of pressure and temperature. The E2PROM has stored 176 bit of individual calibration data. This is used to compensate offset, temperature dependence and other parameters of the sensor.

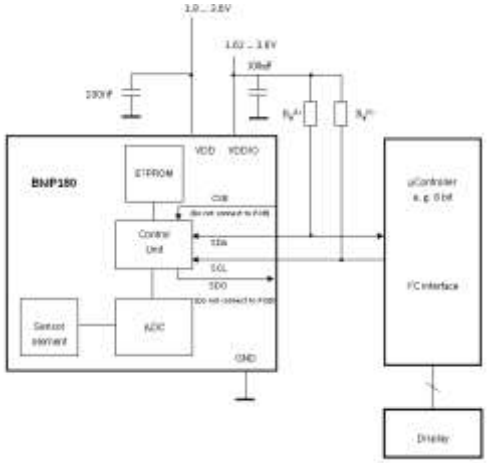
1) Application circuit:

MS5611-01BA:



[1]

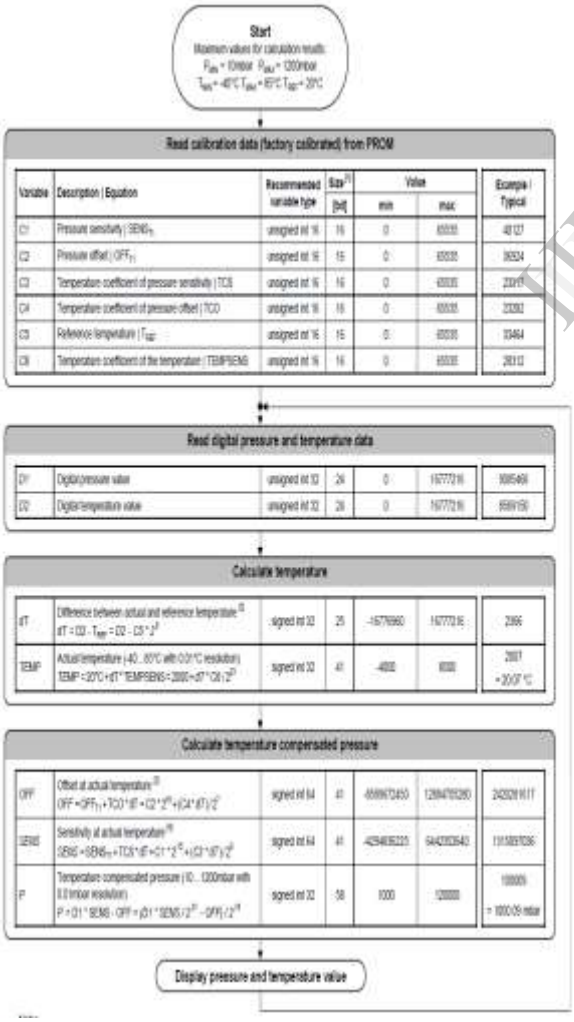
BMP180:



[2]

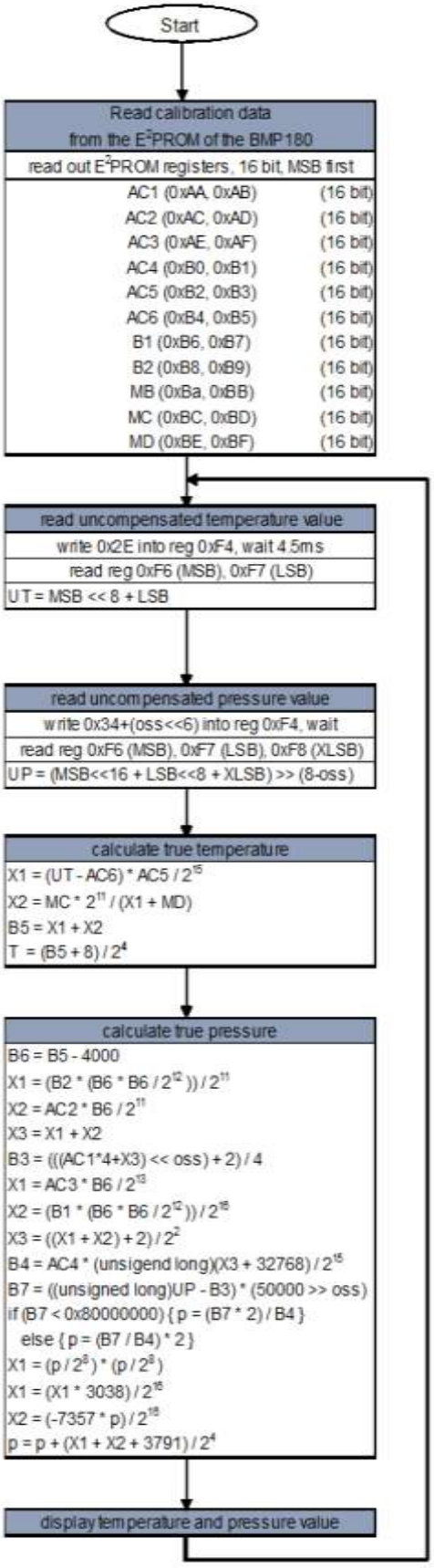
2) FLOWCHART FOR PRESSURE AND TEMPERATURE CALCULATION:

MS5611-01BA:



[1]

BMP180:



[2]

3) ELECTRICAL CHARACTERISTICS:

MS5611-01BA has a operating supply voltage from 1.8V and 3.6V with a typical voltage of 3.0v. its operating temperature is from -40 to +85℃ with typical temperature of +25℃. it has a typical peak supply current of 1.4mA. and typical standby supply current of 0.02µA.

Parameter	condition	min	Typ.	max	unit
Supply voltage		1.8	3.0	3.6	V
Operating temperature		-40	+25	+85	℃
Peak supply current	During conversion		1.4		mA
Standby supply current	At 25℃		0.02	0.14	µA

[1]

Whereas BMP180 has a operating supply voltage from 1.8 to 3.6V and typical voltage of 2.5V. its operating temperature is from -40 to +85℃. it has a typical peak supply current of 650µA and standby supply current of 0.1µA.

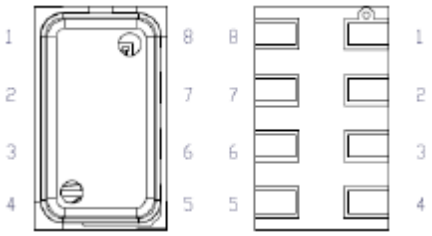
Parameter	Condition	min	Typ.	max	Unit
Supply voltage	Operational	1.8	2.5	3.6	V
Operation temerature	Ripple max.50m vpp	-40		+85	℃
Peak supply voltage	During conversion		650	1000	µA
Standby supply voltage	@25℃		0.1	4^1	µA

[2]

4) PIN DIAGRAM AND ITS CONFIGURATION:

MS5611-01BA:

Pin diagram:



[1]

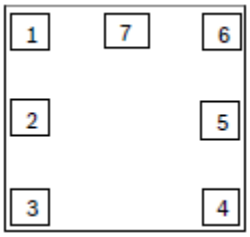
Pin Configuration:

Pin	Name	Type	Function
1	VDD	P	Positive supply voltage
2	PS	I	Protocol select PS high (VDD) → I²C PS low (GND) → SPI
3	GND	G	Ground
4	CSB	I	Chip select (active low), internal connection
5			
6	SDO	O	Serial data output
7	SDI / SDA	I / IO	Serial data input / I²C data IO
8	SCLK	I	Serial data clock

[1]

BMP180:

Pin diagram:



[2]

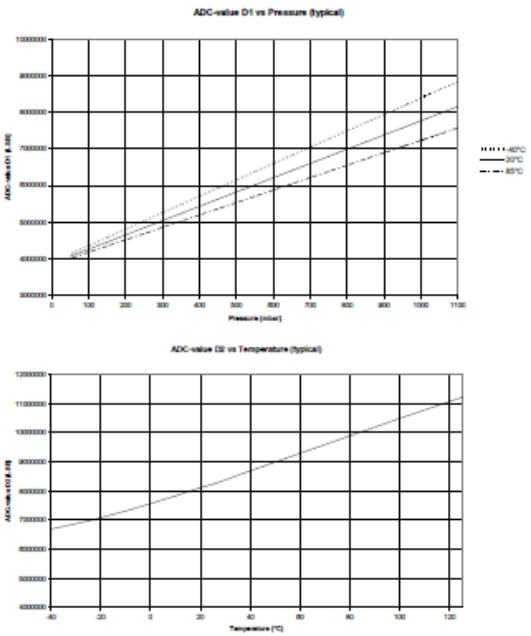
Pin Configuration:

in No	Name	Function
1	CSB*	Chip select
2	VDD	Power supply
3	VDDIO	Digital power supply
4	SDO*	SPI output
5	SCL	I2C serial bus clock input
6	SDA	I2C serial bus data (or SPI input)
7	GND	Ground

[2]

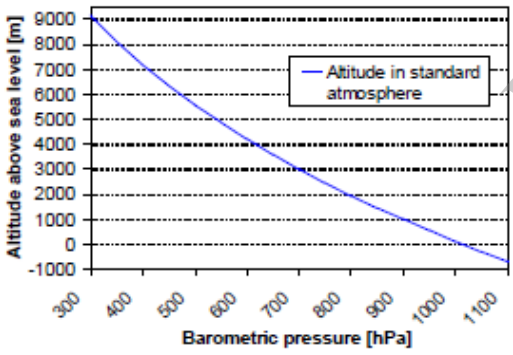
5) Performance characteristic graphs:

MS5611-01BA:



[1]

BMP180:



[2]

REFERENCE

1. Datasheet of MS5611-01BA from MEAS Switzerland
2. Datasheet of BMP180 from BOSCH
3. "Evangelista Torricelli, The Invention of the Barometer". Juliantrubin.com. Archived from the original on 9 February 2010. Retrieved 2010-02-04.
4. Weather.about.com
5. Infoplease.com