High Accuracy MEMS IMU

Introduction

The MEMS can measure the angular rate information of pitch, roll and heading in real time and output it to the users.

A MEMS IMU sensor, gyroscope and accelerometer composed of MEMS gyroscope, MEMS accelerometer and magnetometer constitute the core components of the inertial navigation system. Through the built-in accelerometer and gyroscope, the IMU can measure linear acceleration and rotational angular velocity in three directions, and obtain the attitude, velocity and displacement information of the carriers.

IMU is mostly used in motion control equipment, such as vehicles and robots, and can also be used on occasions that require the use of attitude calculation for accurate displacement, such as inertial navigation equipment for submarines, aircraft, missiles and spacecraft. Compared with other navigation equipment, the inertial navigation system also has the important characteristics of comprehensive information, complete autonomy, strong concealment, real-time continuous information, free from time, geographical restrictions and human factors, which make it suitable for air, water, and underground work normally in the environment.

Specifications

MEMS Gyroscope		
Measurement range (°/s)	X	±2880
	Y	±200
	Z	±200
Zero-bias (°/s)	X	≤0.05
	Y、Z	≤0.1
Non-linearity (%FS)	X	≤0.1
Resolution (°/s)	X	≤0.05
	Y、Z	≤0.01
Bandwidth (-3dB) (Hz)	X	＞50
	Y、Z	＞50
Output noise (°/s√Hz)	X	≤0.15
	Y、Z	≤0.01
Zero-bias stability (°/s)	X	≤0.05 (1σ)
	Y、Z	≤0.01 (1σ)
Zero bias temperature drift (°/s)	X	≤0.05
Cross coupling (%FS)	–	≤1

MEMS Accelerometer		
Measurement range (g)	X	±100
	Y	±10
	Z	±10
Zero offset (g)	X	≤0.3
	Y、Z	≤0.005
Non-linearity (%FS)	X	≤2
		≤0.2
	Y、Z	≤0.2
Resolution (mg, rms)	X	≤150
		≤1
	Y、Z	≤1
Bandwidth (-3dB) (Hz)	X	＞50
	Y、Z	＞50
Output noise (mg√Hz)	X	＜20
		＜1
	Y、Z	＜1
Zero-bias stability (g)	X	≤60
		≤1
	Y、Z	≤1
Cross coupling (%FS)	–	＜1

Magnetometer		
Measurement range (gauss)	X、Y、Z	3
Zero offset (gauss)	X、Y、Z	≤0.4
Non-linearity (%FS)	X、Y、Z	≤1
Bandwidth (-3dB) (Hz)	X、Y、Z	＞500
Output noise (mgauss/√Hz)	X、Y、Z	≤1
Zero bias temperature drift (mgauss/℃)	X、Y、Z	≤5
Cross coupling (%FS)	–	≤1

Interface features	
Interface type	RS-422
Data format	8 data bits, 1 start bit, 1 stop bit, no parity
Baud rate	460800bps
Data updating rate	≥1000Hz
Operating mode	IMU active upload
Synchronization pulse	
High level	3.3V±0.2V
Low level	0V±0.2V
Trigger mode	Rising edge trigger
Environmental characteristics	
Operating temperature	-40℃～+70℃
Storage temperature	-45℃～+80℃
Vibration (g)	10g, X/Y/Z three directions, each axis 5min
Impact (g)	2000g, 0.5ms
Electrical specifications	
Input voltage	12VDC, ripple <20mV
Input current	＜100mA
Physical characteristics	
Dimension	55*55*29mm
Weight	＜150g

Interface definition

Connector type: J63A-232-009-161-TH

Wire lead No.:	Signal definition	Details
1	VCC	VCC
2	GND	GND
3	Y	RS422 send +
4	Z	RS422 send −
5	A	RS422 receive +
6	B	RS422 receive −
7	SYNC	Synchronous pulse reception