



The model H48C is a 3-axis accelerometer module, which is composed of a precise sensor's chip, produced by MEMS (Micro Electro Mechanical System) technology, and CMOS-IC chip with the op-amplifiers and the several new functions written below. For each products, the performance variations among products, and moreover those drifts over temperature are compensated before shipment, whose novel function is first realized in the small and thin package size. So H48C could be used without calibration for most applications. And also H48C has the high reliability due to the ceramic package and the air-tight seal.

Features

- Detect three(X,Y,Z) axes simultaneously
- High total-accuracy of 10% by "compensation IC" so as not need the calibration.
- Single supply voltage of +2.2 to +3.6V
- Very low power consumption and further, STBY mode equipped.

Operation current 0.58mA at 3V

Stand by current 1 μ A max.

- Capable to detect "Static(Tilt) and "Dynamic" acceleration
 - High shock durability (>5000g)
 - With a new function of "Free Fall Detection"
- Send the pulse during almost zero G for all of three axes at the same time.
- With an output of temperature sensor
 - Very small and thin package(QFN type)
- Package dimensions ; 4.8 × 4.8 × 1.5mm
- Leadless solder is available.

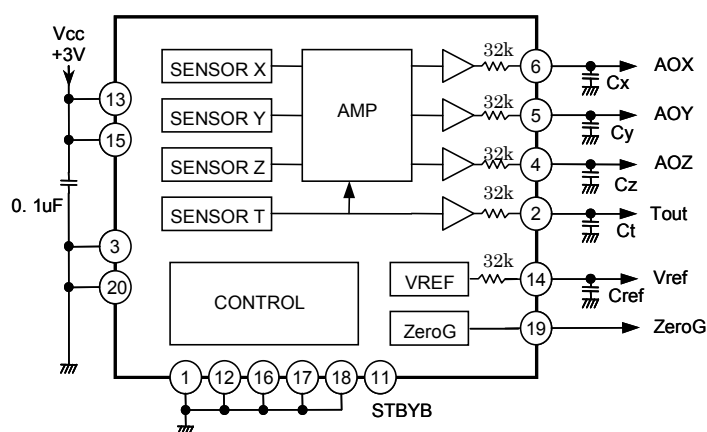


Fig. 2 Functional block diagram

Note 1) Output voltages are designed to be ratiometric to Vcc. The power supply for A/D converter is recommended to use the same power supply as H48C.

2) The magnitudes of 3 axes acceleration and temperature are calculated by the below equations.

$$g_x = (AOX - Vref) / 333mV [g] \quad T = (Tout - Vref) / 10mV + 25 [^{\circ}C]$$

$$g_y = (AOY - Vref) / 333mV [g]$$

$$g_z = (AOZ - Vref) / 333mV [g]$$

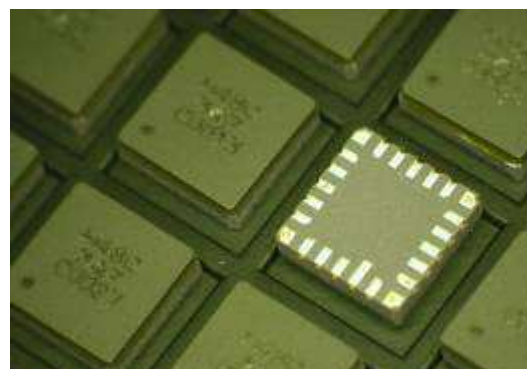
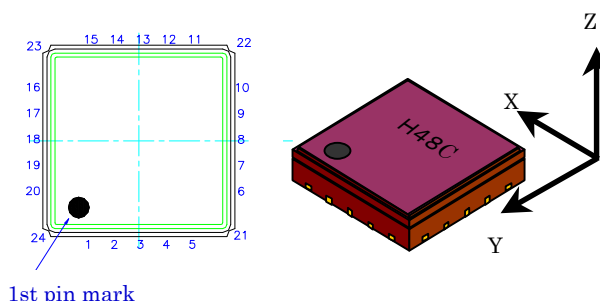


Fig. 1 H48C appearance



1st pin mark

Table 1 Pin description

Pin No.	Name	Description
1	Reserved	To Ground
2	Tout	Output voltage on temperature sensor
3	AGND	Ground for analog circuit block
4	AOZ	Analog output voltage of Z axis
5	AOY	Analog output voltage of Y axis
6	AOX	Analog output voltage of X axis
7	NC	No connection
8	NC	No connection
9	NC	No connection
10	NC	No connection
11	STBYB	Control of standby mode (Low(0V):Standby, High(Vcc±0.3):Operating)
12	Reserved	To Ground
13	AVCC	Operating voltage for analog circuit block
14	Vref	Reference voltage (1/2VCC)
15	DVCC	Operating voltage for digital circuit block
16	Reserved	To Ground
17	Reserved	To Ground
18	Reserved	To Ground
19	ZeroG	Flag output on zero g detection (Free fall detection)
20	DGND	Ground for digital circuit block

Note : Pin numbers of 21, 22, 23 and 24 are the lands to enhance the soldering strength.

3) The recommended values of Cx, Cy, Cz, Ct and Cref are 0.01 to 0.1 μ F. In detail, the technical note No.2 shall be referred.

4) When Zero G detection not necessary, Pin No.19 must not be connected.



Table 2 General specifications

Parameters		Conditions	Specifications			Units
			Min.	Typ.	Max.	
1	Operating Voltage Vcc	Temperature range -25°C to +75°C	2.2	3	3.6	V
2	Current	Vcc=3.0V		0.58	0.85	mA
3	Stand by current	Vcc=3.0V、Temp. ≤ 65°C			1	uA
4	Turn on time	Output level of 99% after standby changed to be high.	150 × Cx, Cy, Cz (μF)			ms
5	Storage temp. range		-40		85	°C
6	Operating temp. range		-25		75	°C
7	Measurement range		-3		+3	g
8	Sensitivity	Operating voltage 3V and 25 °C	318	333	348	mV/g
		Operating voltage 3V and 65 °C	315	333	351	mV/g
		Operating voltage 3V and within operating temp. range	306		360	mV/g
9	Zero g voltage	Operating voltage 3V and 25 °C	-15	0	15	mV
		Operating voltage 3V and 65 °C	-18	0	18	mV
		Operating voltage 3V and within operating temp. range	-23		23	mV
10	Cross-axis sensitivity			2	6	%
11	Non-linearity		-2		+2	%
12	Frequency response	Cx,Cy,Cz=0.01uF, -3dB	DC	500		Hz
13	Noise performance	BW =0.1 to 100Hz		0.6		mVrms
				1.8		mgrms
14	Shock durability	Pendulum type tester	5000			g
15	Accuracy of temp. sensor	within 0 to 75°C	-3		3	°C
16	Zero g threshold for free fall detection			0.4		g

Note 1) Above sensitivity and zero g voltage specifications are the initial data when those devices will be shipped out, and all specifications shall be changed without any notifications.

2) 1g=9.81m/s²

3) Sensitivity and zero g voltage are defined as the difference between output voltage of each axis(AOX, AOY, AOZ) and reference voltage(Vref). Those voltages are proportional to Vcc because they are designed to be retiometric to Vcc.



Table 3 Absolute maximum ratings

Parameter	Rating	Unit
Operating voltage V_{cc}	-0.3 to +4.5	V
Each external terminal voltage	-0.3 to $V_{cc}+0.3$	V
Operating temp. range	-25 to +75	°C
Storage temp. range	-40 to +85	°C

Note: Stresses above those listed under Table 3 may cause permanent damage to the device.

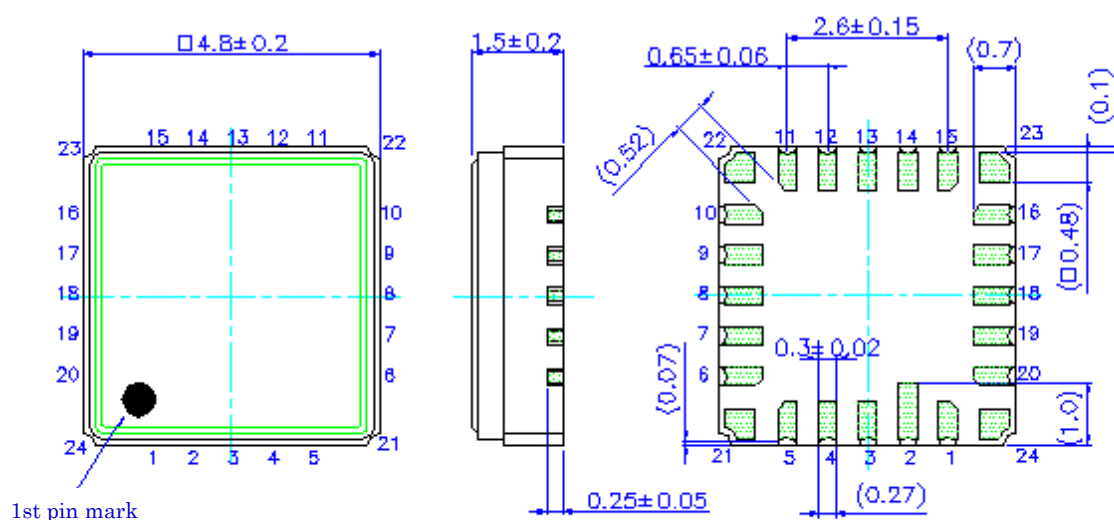


Fig. 3 Package dimensions

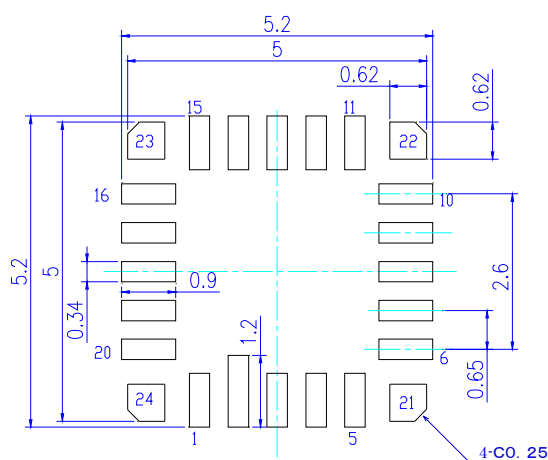


Fig. 4 Reference pattern of footprint for circuit board