Anne PELISSIER le 28/11/2017

ACCELEROMETRE
ADXL203 EB

L'accéléromètre ADXL203EB mesure les accélérations dynamiques (ex : vibrations) et statiques (ex : gravité) dans deux directions

l'ADXL 203 EB mesure des accélérations entre ±1.7 g , avec une sensibilité de 1000 mV /g , et une fréquence maximale de 50 Hz

Branchement

Connecter les bornes au fils (attention au sens , on connecte les bornes G,Y,X, et V) reliés au boitier
Alimenter avec une tension continue de 5 V sur le boitier .

Vérifier le bon fonctionnement du capteur :

En le posant à l'horizontale, il affiche environ 2.5 V sur chacune des voies.
En le plaçant verticalement, l'une des voies affiche 1 volt de plus ou de moins
(soit une accélération de ±g)
Regarder les "sens " sur le schéma ci-contre en repérant le point sur le composant

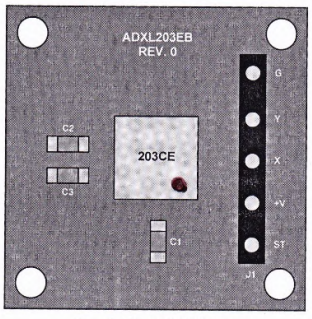

Figure 2. ADXL203EB Physical Layout

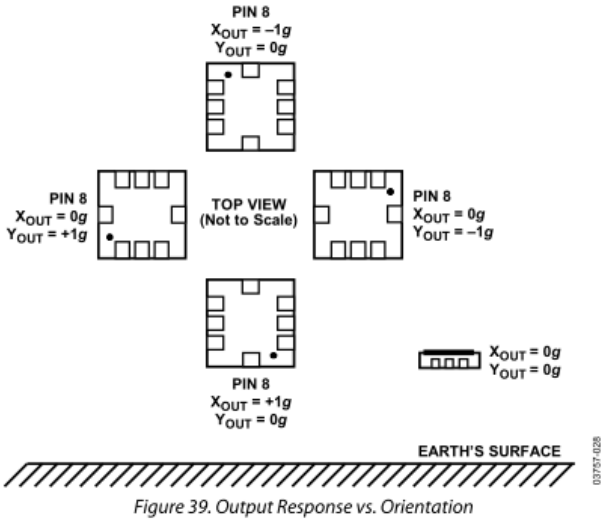

Figure 39. Output Response vs. Orientation

Extraits du datasheet

Parameter	Test Conditions	ADXL103/ADXL203 Min	Typ	Max	Unit
SENSOR	Each axis				
Measurement Range[1]		±1.7			*g*
Nonlinearity	% of full scale		±0.2	±1.25	%
Package Alignment Error			±1		Degrees
Alignment Error (ADXL203)	X to Y sensor		±0.1		Degrees
Cross-Axis Sensitivity			±1.5	±3	%
SENSITIVITY (RATIOMETRIC)[2]	Each axis				
Sensitivity at X_{OUT}, Y_{OUT}	V_S = 5 V	960	1000	1040	mV/*g*
Sensitivity Change Due to Temperature[3]	V_S = 5 V		±0.3		%
ZERO *g* BIAS LEVEL (RATIOMETRIC)	Each axis				
0 *g* Voltage at X_{OUT}, Y_{OUT}	V_S = 5 V	2.4	2.5	2.6	V
Initial 0 *g* Output Deviation From Ideal	V_S = 5 V, 25°C		±25		mg
0 *g* Offset vs. Temperature			±0.1	±0.8	mg/°C

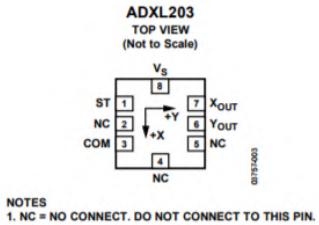

Figure 4. ADXL203 Pin Configuration

Table 6. ADXL203 Pin Function Descriptions

Pin No.	Mnemonic	Description
1	ST	Self Test
2	NC	Do Not Connect
3	COM	Common
4	NC	Do Not Connect
5	NC	Do Not Connect
6	Y_{OUT}	Y Channel Output
7	X_{OUT}	X Channel Output
8	V_S	3 V to 6 V

SETTING THE BANDWIDTH USING C_X AND C_Y

The ADXL103/ADXL203 has provisions for band limiting the X_{OUT} and Y_{OUT} pins. Capacitors must be added at these pins to implement low-pass filtering for antialiasing and noise reduction. The equation for the 3 dB bandwidth is

$$f_{-3\,dB} = 1/(2\pi(32\ k\Omega) \times C_{(X,\,Y)})$$

or more simply,

$$f_{-3\,dB} = 5\ \mu F/C_{(X,\,Y)}$$

The tolerance of the internal resistor (R_{FILT}) can vary typically as much as ±25% of its nominal value (32 kΩ); thus, the bandwidth varies accordingly. A minimum capacitance of 2000 pF for C_X and C_Y is required in all cases.

Table 7. Filter Capacitor Selection, C_X and C_Y

Bandwidth (Hz)	Capacitor (µF)
1	4.7
10	0.47
50	0.10
100	0.05
200	0.027
500	0.01

USING THE ADXL203 AS A DUAL-AXIS TILT SENSOR

One of the most popular applications of the ADXL203 is tilt measurement. An accelerometer uses the force of gravity as an input vector to determine the orientation of an object in space.

An accelerometer is most sensitive to tilt when its sensitive axis is perpendicular to the force of gravity, that is, parallel to the earth's surface. At this orientation, its sensitivity to changes in tilt is highest. When the accelerometer is oriented on axis to gravity, that is, near its +1 *g* or −1 *g* reading, the change in output acceleration per degree of tilt is negligible. When the accelerometer is perpendicular to gravity, its output changes nearly 17.5 mg per degree of tilt. At 45°, its output changes at only 12.2 mg per degree, and resolution declines.

Dual-Axis Tilt Sensor: Converting Acceleration to Tilt

When the accelerometer is oriented so both its x-axis and y-axis are parallel to the earth's surface, it can be used as a 2-axis tilt sensor with a roll axis and a pitch axis. Once the output signal from the accelerometer has been converted to an acceleration that varies between −1 *g* and +1 *g*, the output tilt in degrees is calculated as

$$PITCH = ASIN(A_X/1\ g)$$

$$ROLL = ASIN(A_Y/1\ g)$$

Be sure to account for overranges. It is possible for the accelerometers to output a signal greater than ±1 *g* due to vibration, shock, or other accelerations.