UM0247
User guide

EK3L02AQ3
Evaluation Kit

Introduction

The EK3L02AQ3 is an Evaluation Kit designed to provide the user with a complete, ready-to-use platform for the evaluation of the LIS3L02AQ3, a low-power 3-Axis linear capacitive accelerometer that includes a sensing element and an IC interface able to take information from the sensing element and to provide an analog signal to the external world.

Besides the MEMS sensor, the system mounts a linear voltage regulator and a rail to rail Low noise Quad amplifier configured as non-inverting buffer thus making both direct sensor outputs and buffered sensor outputs available to the user.

The kit provides also an easy way to select among the two full-scales FS allowed by the device, and to control its Power-Down (PD) and Self-Test (ST) pins.

Contents

1 Evaluation Kit Description

The EK3L02AQ3 is an Evaluation Kit designed to provide the user with a complete, ready-to-use platform for the evaluation of the LIS3L02AQ3 3-axis analog output linear accelerometer. The block diagram of the evaluation kit and the top silk-screen of the board are shown respectively in *Figure 1* and *Figure 2* while the photo of the full board is given in *Figure 3*.

Figure 1. Evaluation Board Block Diagram

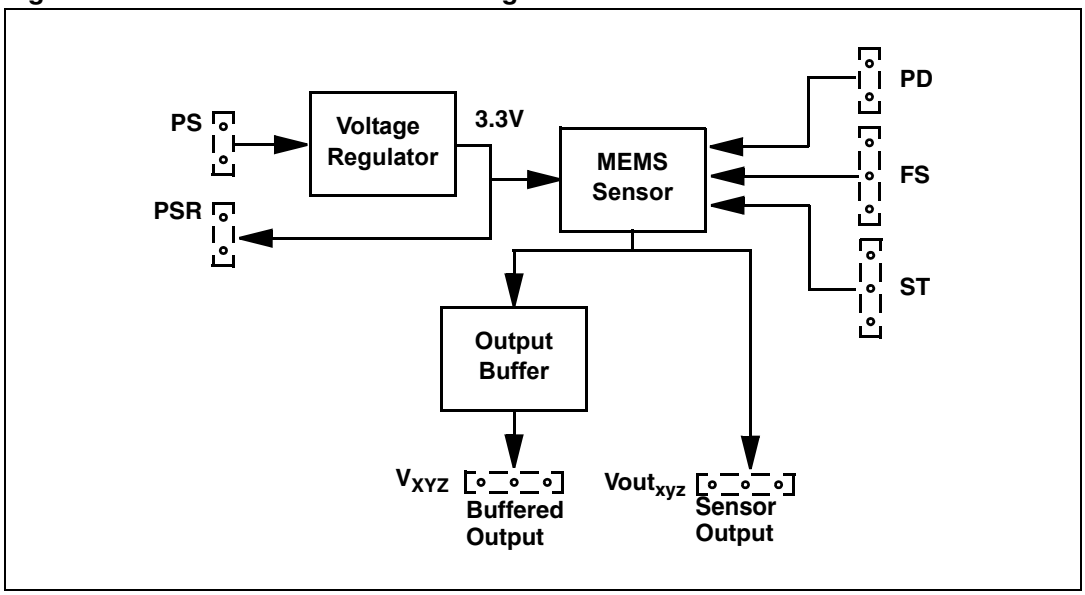


Figure 2. Top silk-screen for EK3L02AQ3 board layout

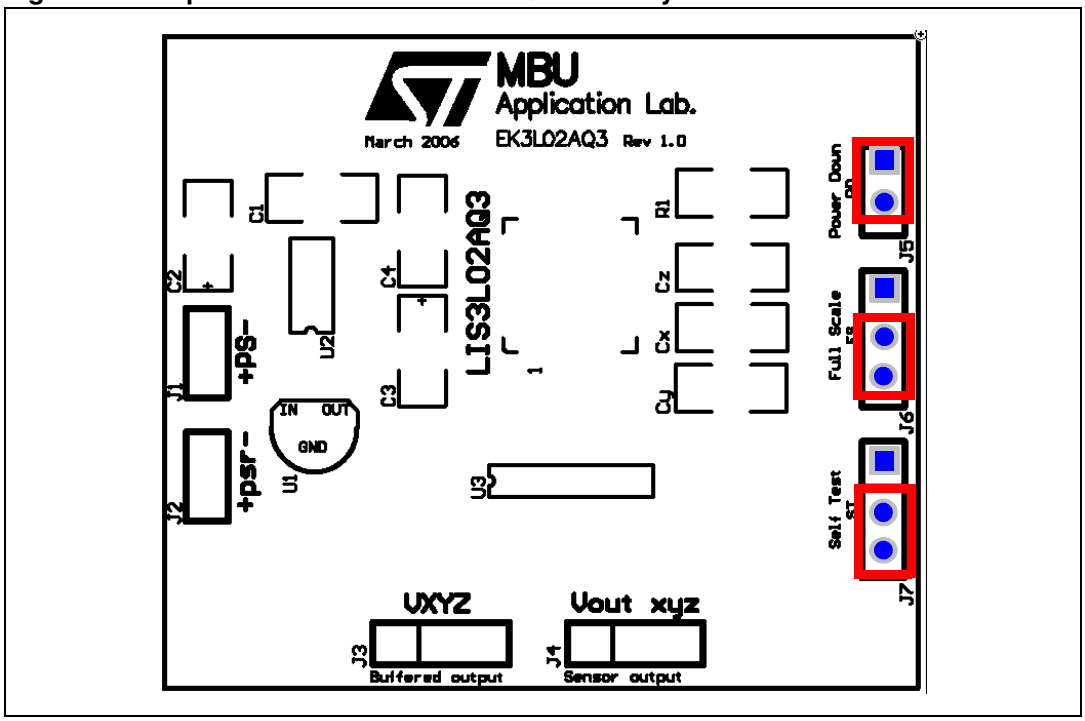
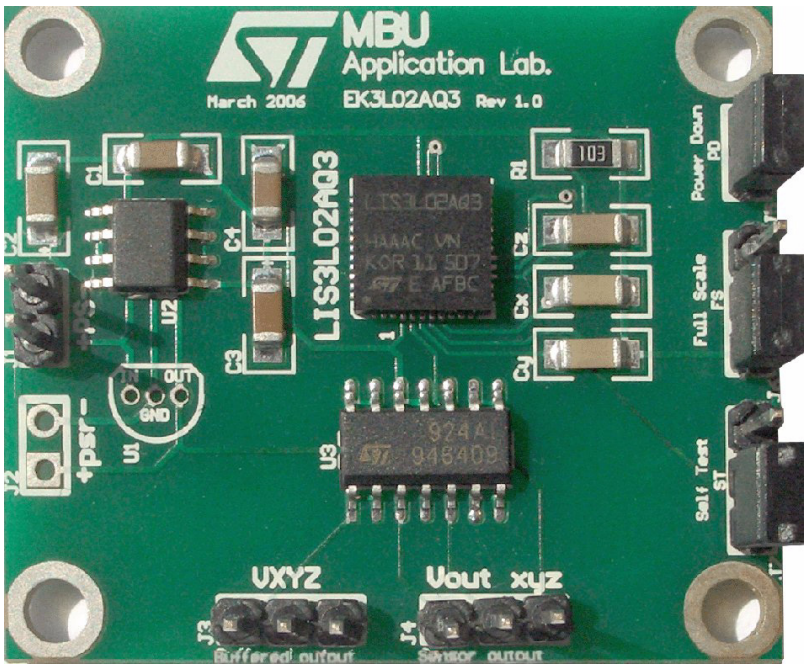


Figure 3. Board photograph



1.1 Operating the Evaluation Kit

To operate the evaluation kit it is necessary to supply it through the connector marked as J1 (PS) with a dc voltage comprised between 3.7V and 18V. The suggested supply voltage is 5V. The typical current consumption of the LIS3L02AQ3 MEMS sensor is 0.85 mA while the typical current consumption of the whole board is in the range of 6 mA.

The voltage applied to the board is then regulated through a linear voltage regulator which supplies the MEMS sensor at 3.3V.

The outputs (Voutx, Vouty and Voutz) of the LIS3L02AQ3 linear accelerometer are band limited through the usage of three capacitors Cx, Cy and Cz of 1.5nF which, together with the output resistance R_{out}=110KΩ of the sensor, create a single-pole low-pass filter having a cut-off frequency of about 1KHz.

In case a different cut-off frequency f_t is required, the above capacitances must be replaced by the users with other components having the value given by the following formula:

$$C(x, y, x) = \frac{1}{2 \cdot \pi \cdot R_{out} \cdot f_t}$$

As anticipated above, the EK3L02AQ3 makes both the direct sensor outputs and the buffered signals available to the outside through two different connector which are named respectively J4 (Sensor output) and J3 (Buffered output). In particular the three channels are made available going from the left to right of the board in the order $Vout_x$, $Vout_y$ and $Vout_z$.

The buffering of the sensor outputs is obtained though the usage of a rail-to-rail low-noise quad-amplifier configured as non-inverting buffer.

1.2 Driving PD, FS and ST signals

The board allows to control PD (Power-Down), FS (Full-Scale selection) and ST (Self Test) signals through the usage of test points (marked respectively J5, J6 and J7) and jumpers.

1.2.1 Power-Down

When the jumper is removed from J5 (PD) the MEMS sensor is in normal mode, otherwise (i.e. jumper inserted into J5) it is in power-down mode.

1.2.2 Full-Scale

When the jumper related to J6 (FS) is either inserted as shown by the red box in *Figure 2* or completely removed from the board the full-scale of the device is set to 2g. In case the jumper is inserted so to short-circuit the central and upper pins of J6, the full-scale of the device is set to 6g.

1.2.3 Self-Test

When the jumper related to J7 (ST) is either inserted as highlighted by the red box in *Figure 2* or completely removed from the board the self-test feature is disabled.

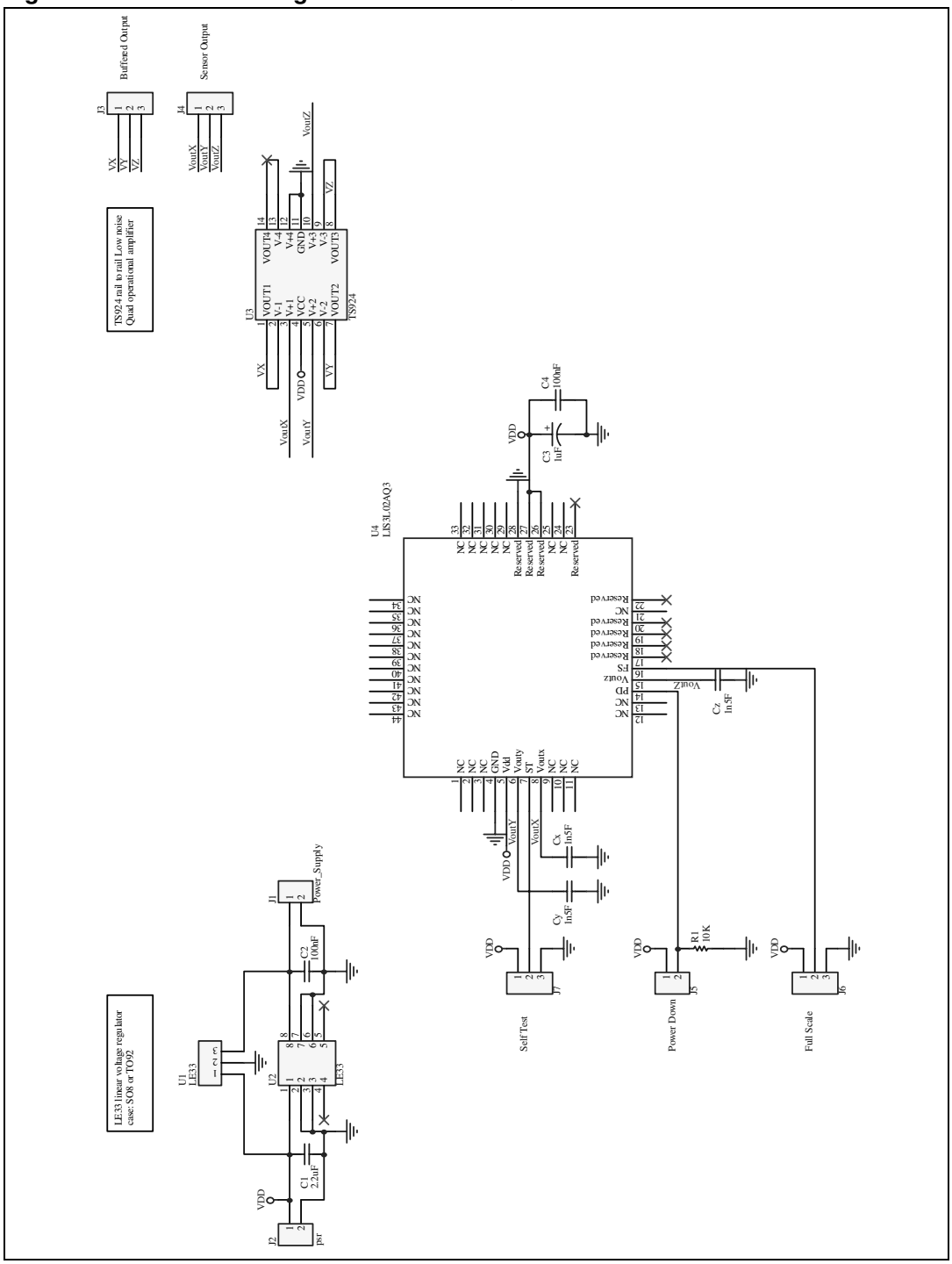
In order to activate the self-test feature the afore said jumper must be into J7 so to short-circuit its central and upper pins.

When this function is activated the seismic mass of the sensor is moved by means of an electrostatic test-force simulating a definite input acceleration. Under these conditions the sensor outputs will exhibit a voltage change in their DC levels as specified in the datasheet of the LIS3L02AQ3 sensor.

2 Schematic Diagram

The schematic diagram of the EK3L02AQ3 evaluation kit is shown in *Figure 4*.

Figure 4. Schematic diagram for EK3L02AQ3 board



3 Bill Of Material

The Bill of Material for EK3L02AQ3 evaluation kit is given in *Table 1*

Table 1. Bill of Material

Item	Quantity	Reference	Value
1	2	C2,C4	100nF
2	1	C1	2.2uF
3	3	Cx,Cy,Cz	1.5nF
4	1	C3	1uF
5	1	R1	10K
6	3	J1,J2,J5	CON2
7	4	J3,J4,J6,J7	CON3
8	2	U1,U2	LE33
9	1	U3	TS924
10	1	U4	LIS3L02AQ3

4 Revision History

Table 2. Document revision history

Date	Revision	Changes
31-May-2006	1	Initial release.