UM0534
User manual

STEVAL-MKI014V1
demonstration kit for the LIS344ALH

Introduction

The STEVAL-MKI014V1 is a demonstration kit designed to provide the user with a complete, ready-to-use platform for the evaluation of the LIS344ALH. The LIS344ALH is a low-power 3-axis linear capacitive accelerometer that includes a sensing element and an IC interface capable of taking information from the sensing element and providing an analog signal to an external application.

In addition to the MEMS sensor, the system includes a linear voltage regulator and a rail-to-rail low noise quad amplifier configured as a non-inverting buffer, making both direct sensor outputs and buffered sensor outputs available to the user.

The kit also provides an easy way to select among the two Full-scales allowed by the device, and to control its Power-down, Full-scale and Self-test pins.

1 Demonstration kit description

The block diagram of the demonstration kit and the layout of the board are shown respectively in *Figure 1* and *Figure 2*, while the full board photo of the is provided in *Figure 3*.

Figure 1. Demonstration board block diagram

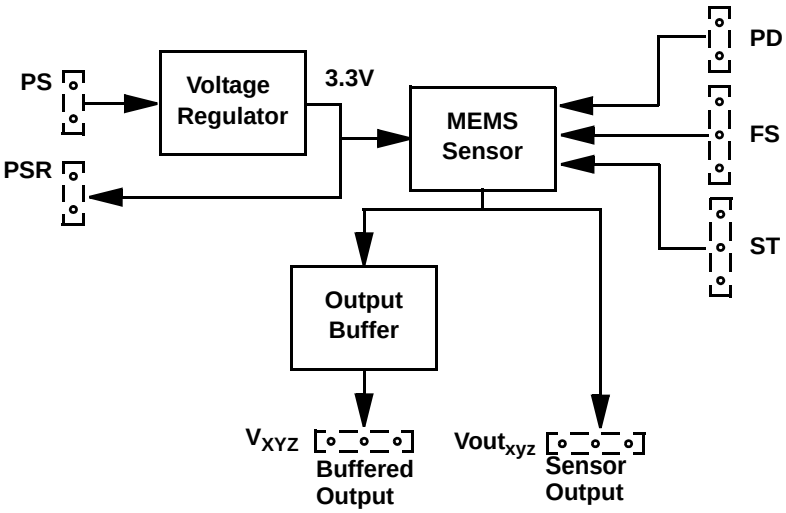


Figure 2. STEVAL-MKI014V1 top silk-screen board layout

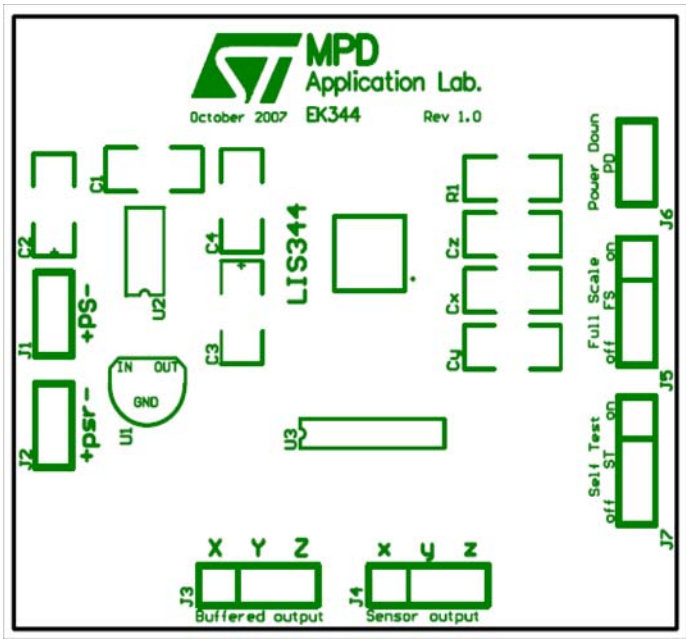
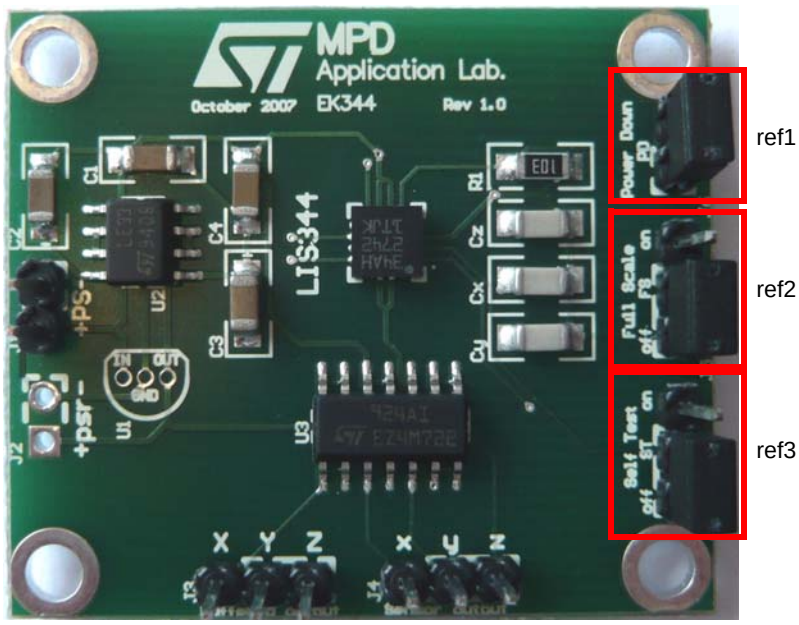


Figure 3. STEVAL-MKI014V1 board photograph



1.1 Operating the demonstration kit

To operate the evaluation kit it is necessary to supply it through the connector marked as J1 (PS) with a dc voltage between 3.7 V and 18 V. The suggested supply voltage is 5 V. The typical current consumption of the LIS344ALH MEMS sensor is 0.68 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 3.3 V.

The outputs ($Vout_x$, $Vout_y$ and $Vout_z$) of the LIS344ALH linear accelerometer are band limited through the usage of three 1.5 nF capacitors (Cx, Cy and Cz) which, together with the sensor's 110 kΩ output resistor R_{out}, create a single-pole low-pass filter with a cut-off frequency of approximately 1 kHz.

If a different cut-off frequency f_t is required, the user should replace the above capacitors with components having values derived using the following formula:

Equation 1

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

As mentioned above, the STEVAL-MKI014V1 makes both the direct sensor outputs and the buffered signals available through two separate connectors: J4 (Sensor Output) and J3 (Buffered Output). Specifically, the three channels are made available 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 achieved through the use of a rail-to-rail low-noise quad-amplifier configured as a non-inverting buffer.

1.2 Driving the Power-down, Full-scale selection and Self-test signals

The board allows the control of the Power-down, Full-scale selection and Self-test signals through the use of test points (marked J6, J5 and J7, respectively) and jumpers.

1.2.1 Power-down

When the jumper is removed from J6 (Power-down, *Figure 3*, ref1) the MEMS sensor is in normal mode, otherwise it is in power-down mode.

1.2.2 Full-scale

When the jumper J5 (Full-scale, *Figure 3*, ref2) is in the “off” position, the Full-scale is set to 2 *g*, otherwise it is set to 6 *g*.

1.2.3 Self-test

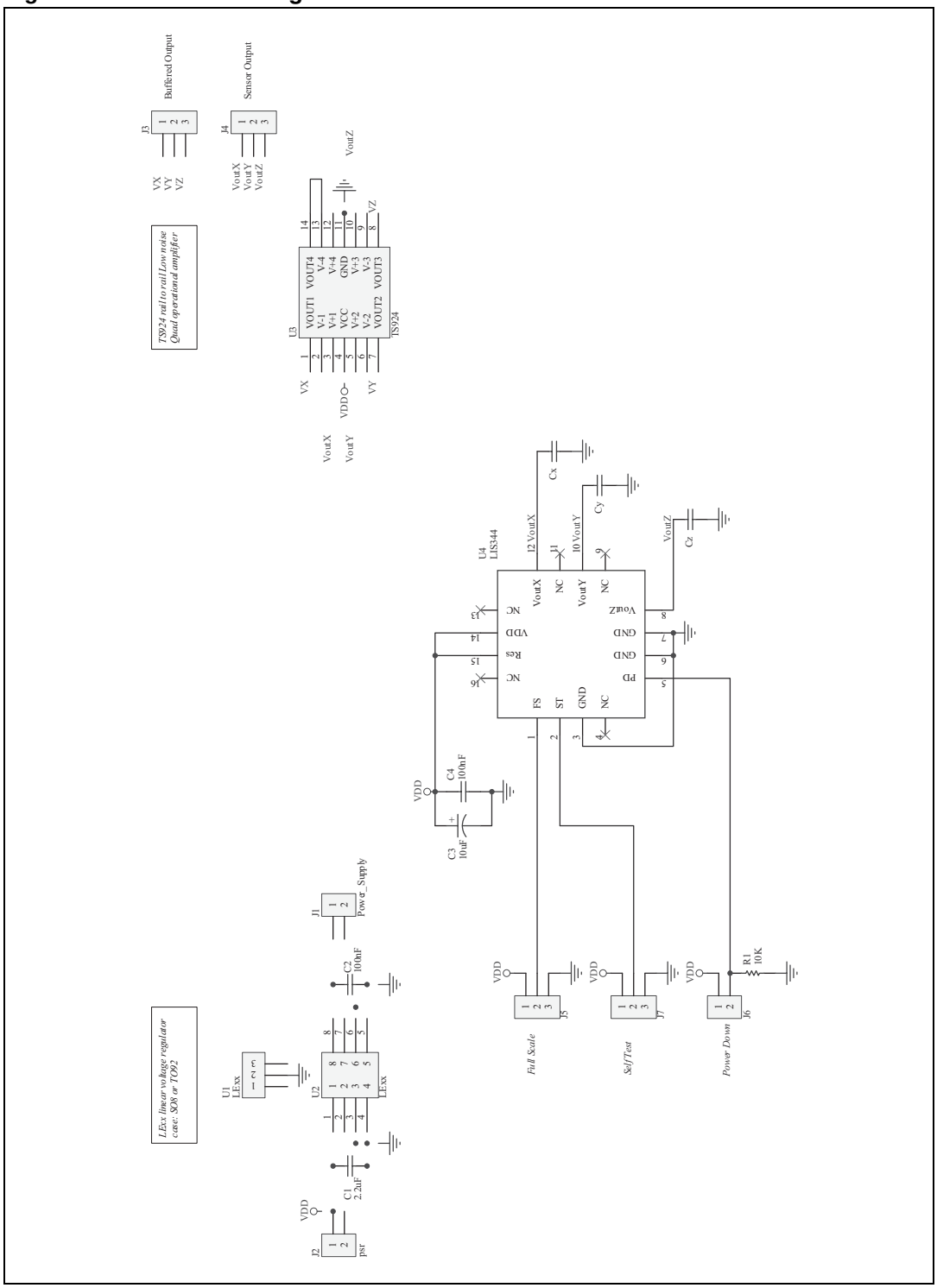
When the jumper is removed from J7 (Self-test *Figure 3*, ref3) the self-test feature is disabled. To activate the self-test feature, the jumper must be in “on” position.

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 LIS344ALH sensor.

2 Schematic diagram

The schematic diagram of the STEVAL-MKI014V1 demonstration kit is shown in *Figure 4*.

Figure 4. Schematic diagram for STEVAL-MKI014V1 board



3 Bill of material

The bill of material for STEVAL-MKI014V1 demonstration kit is provided in *Table 1*

Table 1. Bill of material

Item	Quantity	Reference	Value
1	2	C2,C4	100 nF
2	1	C1	2.2 µF
3	3	Cx,Cy,Cz	1.5 nF
4	1	C3	10 µF
5	1	R1	10 kΩ
6	3	J1,J2,J6	CON2
7	4	J3,J4,J5,J7	CON3
8	2	U2	LE33
9	1	U3	TS924
10	1	U4	LIS344ALH

4 Revision history

Table 2. Document revision history

Date	Revision	Changes
24-June-2008	1	Initial release.

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