



## **Introduction**

The STEVAL-MKI019V1 is a demonstration kit designed to provide the user with a complete, ready-to-use platform for the evaluation of the LIS302SG. The LIS302SG 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.

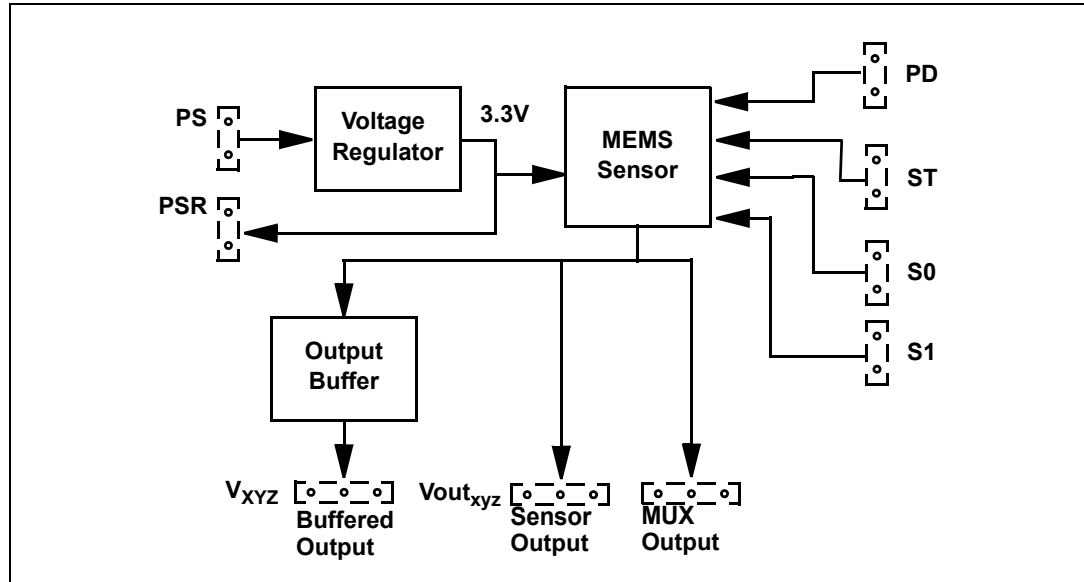
In addition to the MEMS sensor, the system includes a linear voltage regulator and a rail-to-rail low noise quad amplifier configured as a non-inverting buffer, making both direct sensor outputs and buffered sensor outputs available to the user.

The kit also provides an easy way to control the Power-down 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 is provided in *Figure 3*.

**Figure 1. Demonstration board block diagram**



**Figure 2. Top silk-screen for STEVAL-MKI019V1 board layout**

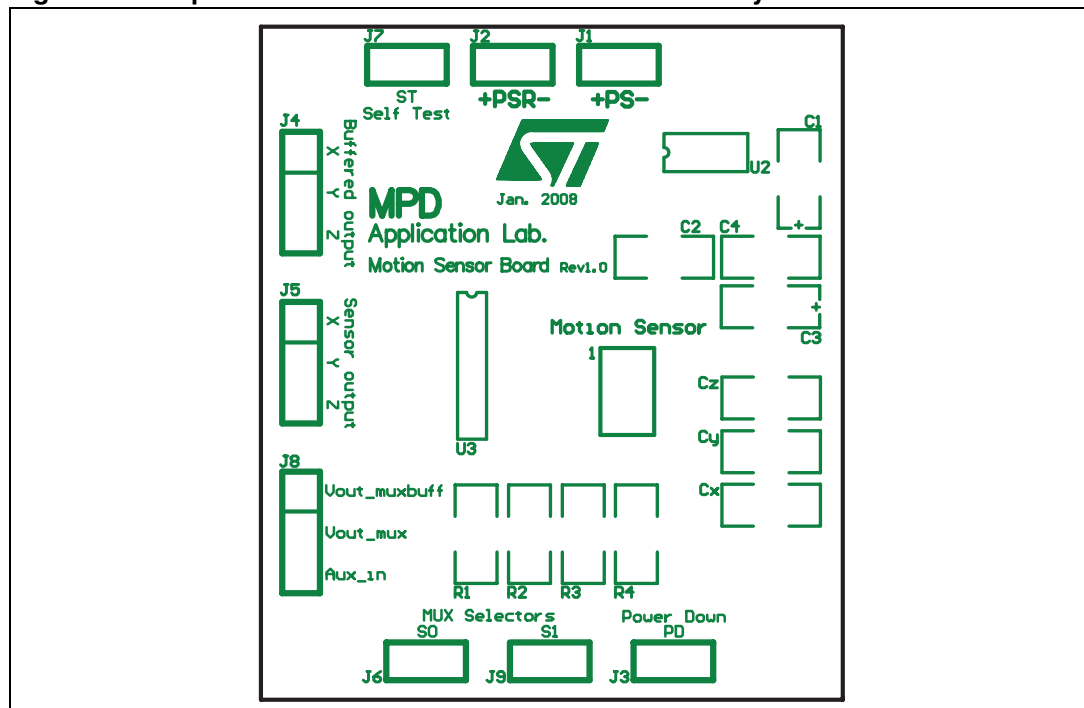
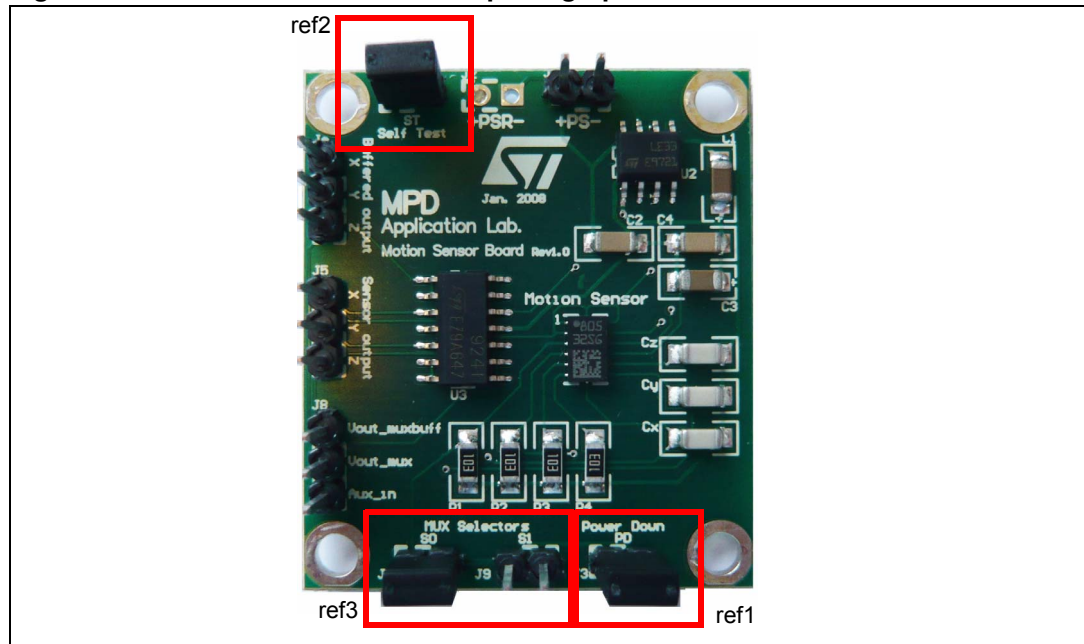


Figure 3. STEVAL-MKI019V1 board photograph



### 1.1 Operating the demonstration kit

To operate the demonstration kit it is necessary to supply it through the connector marked 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 LIS302SG MEMS sensor is 0.65 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 ( $V_{out_x}$ ,  $V_{out_y}$  and  $V_{out_z}$ ) of the LIS302SG linear accelerometer are band limited through the use of three 4.7 nF capacitors ( $C_x$ ,  $C_y$  and  $C_z$ ) which, together with the sensor's 32 k $\Omega$  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**

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

As mentioned above, the STEVAL-MKI016V1 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  $V_{out_x}$ ,  $V_{out_y}$  and  $V_{out_z}$ .

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 Power-down and self-test signals

The board allows the control of the Power-down and Self-test signals through the use of test points (marked J3 and J7, respectively) and jumpers.

### 1.2.1 Power-down

When the jumper is removed from J3 (Power-down, [Figure 3](#), ref1) the MEMS sensor is in normal mode, otherwise it is in power-down mode.

### 1.2.2 Self-test

When the jumper is removed from J7 (Self-Test, [Figure 3](#), ref2) the self-test feature is disabled. In order to activate the self-test feature the jumper must be inserted into J7.

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 LIS302SG sensor.

### 1.2.3 Multiplexed output

The device provides an embedded multiplexer to allow the redirection of either the analog output signals  $V_{out_x}$ ,  $V_{out_y}$ , and  $V_{out_z}$  or of an auxiliary input signal onto a single pin for operation with a single channel A/D converter. Output selection can be achieved through jumpers J6 and J9 (S0 and S1, [Figure 3](#), ref3). Refer to [Table 1](#) for MUX configuration.

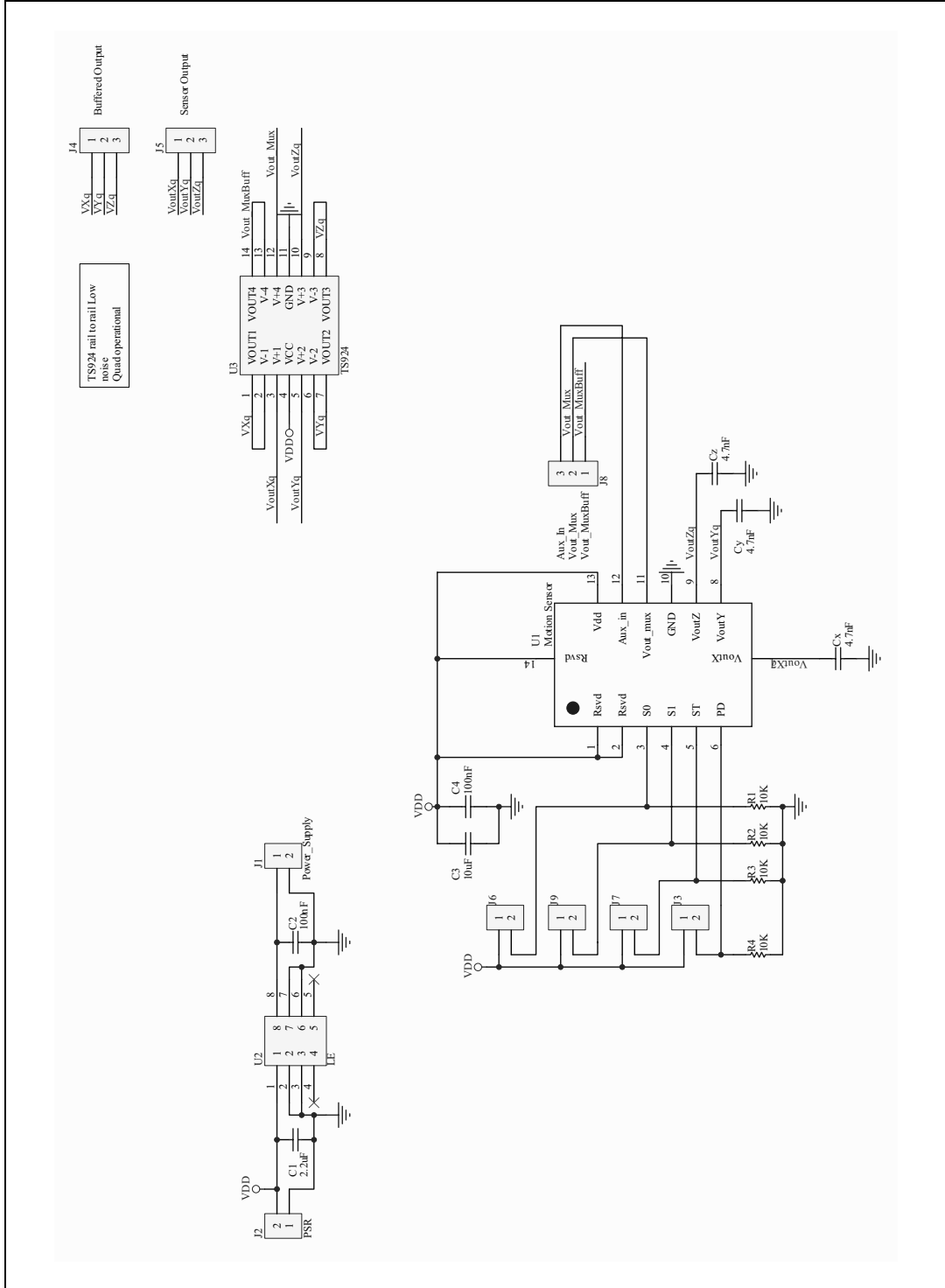
**Table 1. MUX I/O table**

S1 pin	S0 pin	MUX status
0	0	Vout=Vout X
0	1	Vout=Vout Y
1	0	Vout=Vout Z
1	1	Vout=Aux_in

## 2 Schematic diagram

The schematic diagram of the STEVAL-MKI019V1 demonstration kit is shown in [Figure 4](#).

**Figure 4. Schematic diagram for STEVAL-MKI019V1 board**



### 3 Bill of material

The bill of material for STEVAL-MKI019V1 demonstration kit is provided in [Table 2](#).

**Table 2. Bill of material**

Item	Quantity	Reference	Value
1	2	C2,C4	100 nF
2	1	C1	2.2 $\mu$ F
3	3	Cx,Cy,Cz	4.7 nF
4	1	C3	10 $\mu$ F
5	4	R1, R2, R3, R4	10 k $\Omega$
6	6	J1,J2,J3,J6,J7,J9	CON2
7	3	J4,J5,J8	CON3
8	1	U1	LIS302SG
9	1	U2	LE33
10	1	U3	TS924

## 4 Revision history

**Table 3. Document revision history**

Date	Revision	Changes
24-June-2008	1	Initial release.
17-Oct-2008	2	Changed: <i>Figure 4</i>

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2008 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

[www.st.com](http://www.st.com)



# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STEVAL-MKI019V1](#)