Using an Accelerometer Evaluation Board

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INTRODUCTION

This application note describes the Accelerometer Evaluation Board. The accelerometer evaluation boards are small circuit boards intended to serve as aids in system designs with the capability for mounting and quickly evaluating the low g devices. It also provides a means for understanding the best mounting position and location of an accelerometer in your product.

CIRCUIT DESCRIPTION

Figure 2 and Figure 3 are circuit schematics of the single and dual-axis evaluation boards respectively. The recommended decoupling capacitor at the power source and recommended RC filter at the output, are included on the evaluation board. This RC filter at the output of the accelerometer minimizes clock noise that may be present from the switched capacitor filter circuit. No additional components are necessary to use the evaluation board.

Refer to the respective datasheet of the device being used for specifications and technical operation of a specific accelerometer.

POWER HEADER ON LOW G SINGLE AXIS EVALUATION BOARDS

The power header provides a means for connecting to the accelerometer analog output through a wire to another breadboard or system. Four through-hole sockets are included to allow access to the following signals: VDD, GND, ST and STATUS. These sockets can be used as test points or as means for connecting to other hardware.

The ON/OFF switch (S1) provides power to the accelerometer and helps preserve battery life if a battery is being used as the power source. S1 must be set towards the ON position for the accelerometer to function. The green LED (D1) is lit when power is supplied to the accelerometer.

A self-test pushbutton (S2) on the evaluation board is a self-test feature that provides verification of the mechanical and electrical integrity of the accelerometer. The STATUS pin is an output from the fault latch and is set high if one of the fault conditions exists. A second pressing of the pushbutton (S2) resets the fault latch, unless of course one or more fault conditions continue to exist.

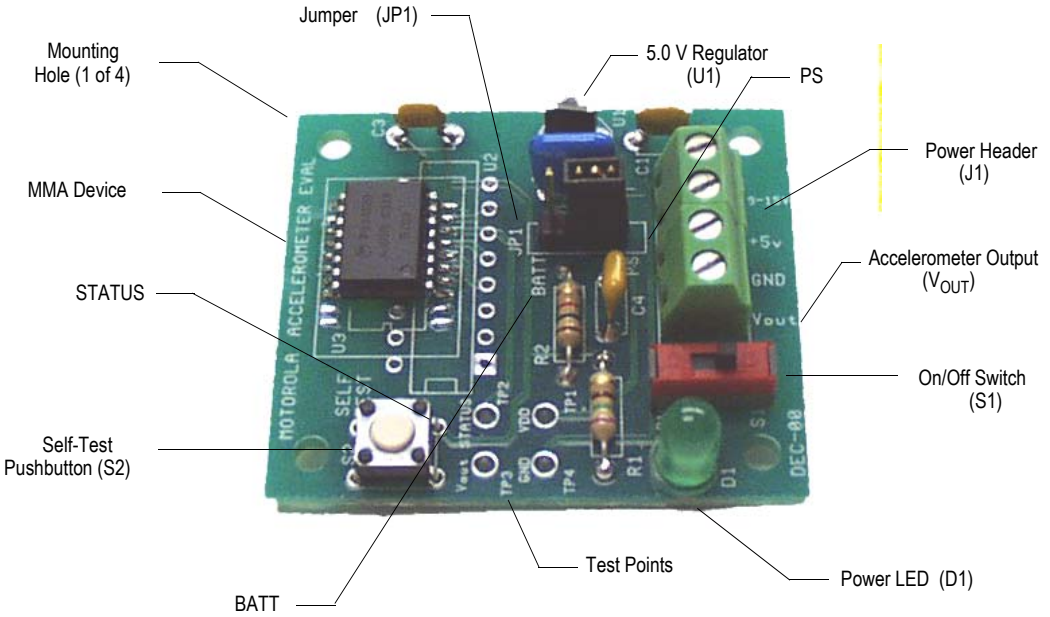

Figure 1. MMA1250D, MMA1260D, MMA1270D and MMA2260D Accelerometer Evaluation Board

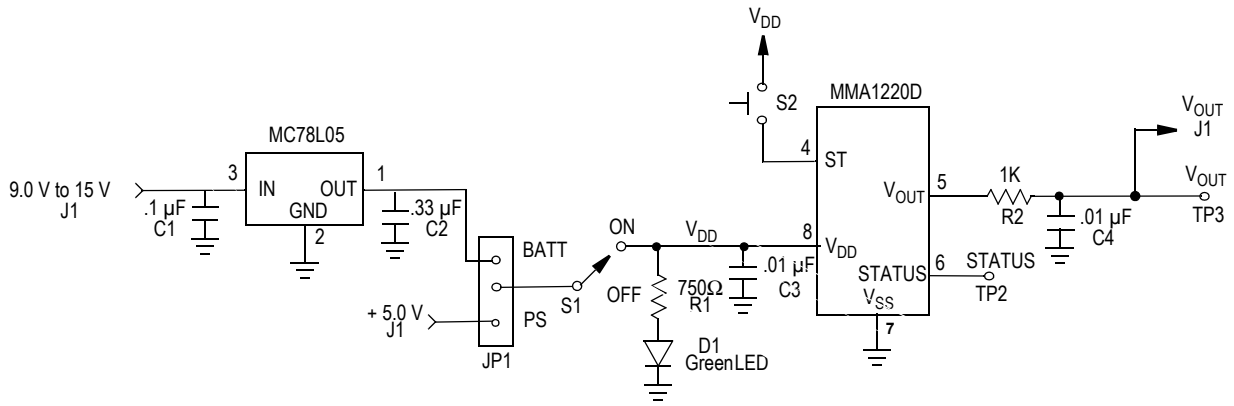

Figure 2. MMA1250D, MMA1260D, MMA1270D and MMA2260D Evaluation Board Circuit Schematics

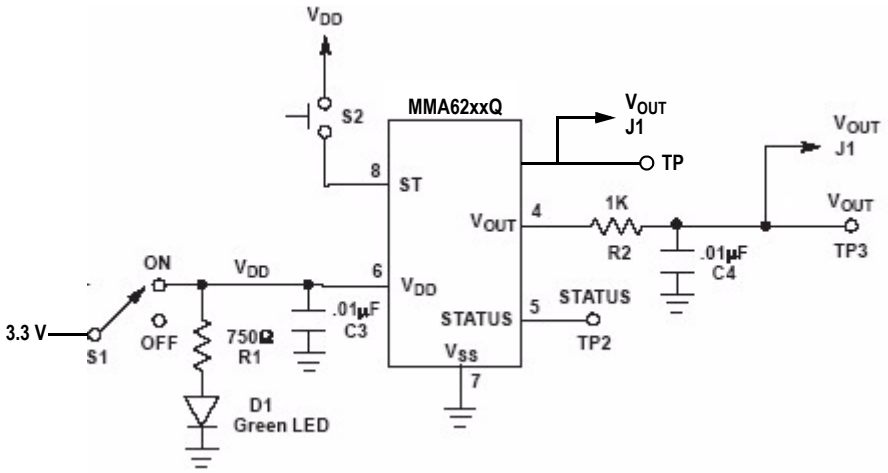

Figure 3. MMA6200Q Series Evaluation Board Circuit Schematic

OPTIONAL SOCKET MOUNTING

The board allows for direct mounting of a 16-pin DIP or SOIC package. For the SOIC device, a 20-pin test socket is used to allow for evaluation of more than one device without soldering directly to the board and potentially damaging the PCB. Care must be taken in placing the device correctly in the socket as four pins of the socket will not be used. With the board oriented as shown in Figure 3, Pin 1 should face downward and the device should be positioned toward the top of the test socket, thereby exposing the bottom four pins of the test socket. The socket is marked to help identify the four unused socket pins. Lids to secure the device in the socket are included with the board and delicately snap into place. The lids can be removed by applying pressure to the sides of the lid or by lifting the top and bottom snaps of the lid.

The evaluation board has a 4-pin header (J1 in Figure 1) for interfacing to a 5 volt power source or a 9 to 15 volt power source (for example, 9 V battery). Jumper JP1 (see Figure 1) must have the following placement: on PS if a 5 V supply is being used or on BATT if a 9 V to 15 V supply is used. A 5 V regulator (U1 in Figure 1) supplies the necessary power for the accelerometer in the BATT option.

Table 1. Pin Out Description

Pin	Name	Description
4	ST	Logic input pin to initiate self-test
5	V_{OUT}	Output voltage of the accelerometer
6	STATUS	Logic output pin to indicate fault
7	V_{SS}	Power supply ground
8	V_{DD}	Power supply input

Board Layout and Content

Figure 4 and Figure 5 show the layout used on the evaluation board. Through-hole mounting components have been selected to facilitate component replacement.

Mounting Considerations

System design and sensor mounting can affect the response of a sensor system. The placement of the sensor itself is critical to obtaining the desired measurements. It is important that the sensor be mounted as rigidly as possible to obtain accurate results. Since the thickness and mounting of the board varies, parasitic resonance may distort the sensor

measurement. Hence, it is vital to fasten and secure to the largest mass structure of the system, i.e. the largest truss, the largest mass, the point closest to source of vibration. On the other hand, dampening of the sensor device can absorb much of the vibration and give false readings as well. The evaluation board has holes on the four corners of the board for mounting. It is important to maintain a secure mounting scheme to capture the true motion.

Orientation of the sensor is also crucial. For best results, align the sensitive axis of the accelerometer to the axis of vibration. In the case of the MMA1220D, the sensitive axis is perpendicular to the plane of the evaluation board.

SUMMARY

The Accelerometer Evaluation Board is a design-in tool for customers seeking to quickly evaluate an accelerometer in terms of output signal, device orientation, and mounting considerations. Both through-hole and surface mount packages can be evaluated. With the battery supply option and corner perforations, the board can easily be mounted on the end product; such as a motor or a piece of equipment. Easy access to the main pins allows for effortless interfacing to a microcontroller or other system electronics. The simplicity of this evaluation board provides reduced development time and assists in selecting the best accelerometer for the application.

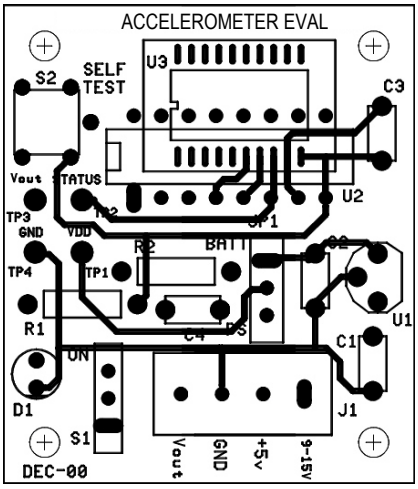

Figure 4. Board Layout (Component Side)

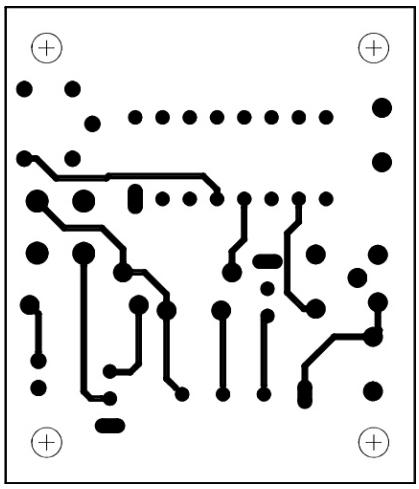

Figure 5. Board Layout (Back Side)

ORDERING INFORMATION

The Accelerometer Evaluation Boards are available to order as Evaluation Kits. Each kit includes an Evaluation Board with the accelerometer in an anti–static bag, a sensor repository CD that contains sensor brochures, data sheets, and the revised data book, and instructions for using the Evaluation Board.

Table 2 shows the kits that are available, or will be available soon. Check our website for availability.

Table 2. Evaluation Kits Order Information

Part Number	G Range	Axis
Kit1925MMA1250D	5.0g	Z
Kit1925MMA1260D	1.5g	Z
Kit1925MMA1270D	2.5g	Z
Kit1925MMA2260D	1.5g	X
Kit1925MMA6260Q	1.5g	XY, 50 Hz
Kit1925MMA6261Q	1.5g	XY, 300 Hz
Kit1925MMA6262Q	1.5g	XY, 150 Hz
Kit1925MMA6263Q	1.5g	XY, 900 Hz
Kit1925MMA6231Q	1.5g	XY, 300 Hz
Kit1925MMA6233Q	1.5g	XY, 900 Hz

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