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DATASHEET

Micro Vibration Sensor Module
MVSM 2.0

Revision 1.0
Supersedes data of -

2012 Nov. 27

MVS Module

FEATURES

- Easy Integration into Final Product – Minimize Product Development, Quicker Time to Market Protected against environmental stress
- Flexible parameterization options
- Small Size: 17.8 mm x 15.3 mm, Surface Mountable (2.54 mm grid)
- RoHS compliant, lead free

OPERATIONAL

- Operating Voltage: 2.0-5.5V (3.0V typical)
- Temperature Range: -40°C to +85°C
- Simple Interface
- Low-Current Consumption

DESCRIPTION

The Micro-Vibration-Sensor-Module MVSM is a small, surface mount module to activate consumer electronics systems while in motion. The module comprises a micro vibration sensor which detects motion.
It is connected to a low power micro controller that switches a MOSFET on, if the device is agitated.
When the device comes to rest, it is powered off by the microcontroller after a short delay time, which is flexibly adjustable. The whole system enters an idle mode with a very low power consumption of less than 3.5 µA.
There is also the opportunity to program the system according to your conceivabilities.

1. Interface Description

The micro vibration sensor is connected in series with a 4.7 Meg series resistor, limiting the current running through the sensor. If the vibration sensor detects motion, a trigger signal is sent to the micro-controller. It is waked up and switches the MOSFET FDV303N (Fairchild) on.
The MOSFET FDV303N is used to switch on/off your device. The source pin is connected to ground. The drain pin (TP1) should be connected to the line of your system, which has to be opened and will be bridged by the MOSFET. If you use different supply voltages both ground circuit points have to be connected together.

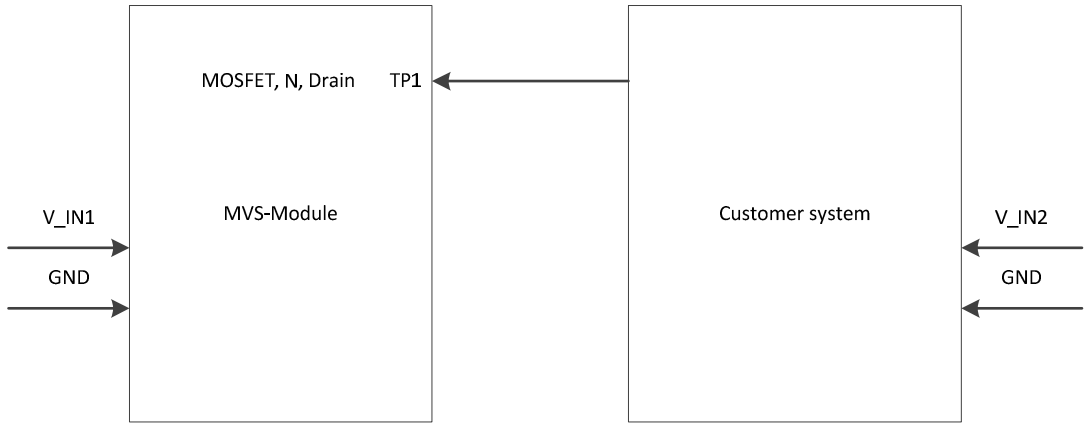

Figure 1: Typical connection scheme

The module MVSM is equipped with a PIC12F615SN from Microchip; you have the opportunity to program the microcontroller by the integrated interface yourself. We recommend, for example, the PICkit 3 programmer/debugger which is a simple, low-cost in-circuit debugger that is controlled by a PC running MPLAB IDE (v8.20 or greater) software.Figure show the typical connection scheme for PICkit 3 programmer.

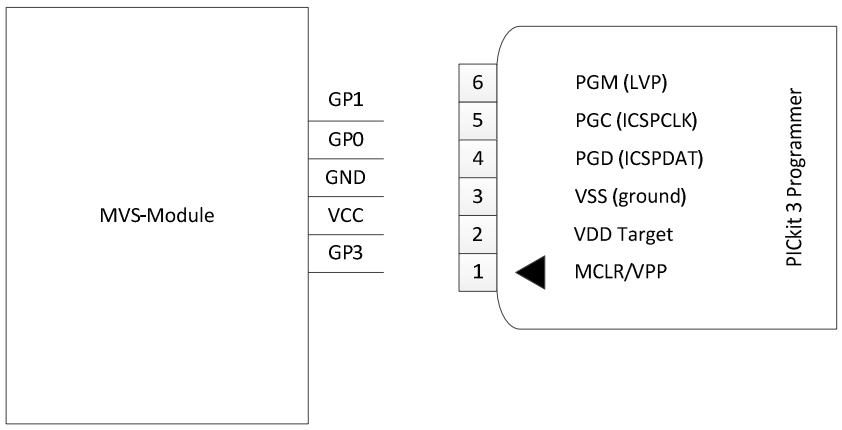

Figure 2: PICkit 3 Programmer connector pinout

2. Pin description

PIN	SYMBOL	TYPE	DESCRIPTION
1	GP2	I	Sensor signal
2	GP4	O	voltage divider for operating time
3	GND	Power	Ground
4	GP5	O	LED output
5	TP1	I	MOSFET, N, Drain
6	GND	Power	Ground
7	GP1	O	MOSFET, N, Gate
8	GP0	O	voltage devider enable
9	GND	Power	Ground
10	VCC	Power	Power supply
11	GP3	O	-

Legend: Pin type abbreviation: O = Output, I = Input

3. Pin Diagram

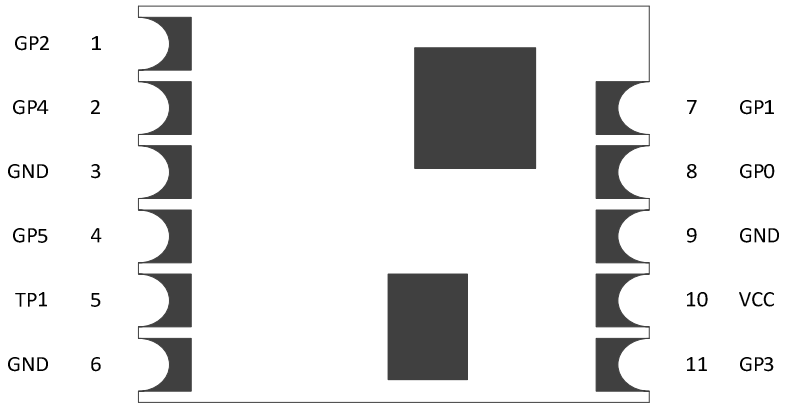

Figure 3: Pin Diagram, MVSM

4. Operating Conditions

MVS-Module

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply voltage	V_{CC}	+2.00	+5.50	Vdc
Current (ON)	I_{CC}	0,6	3.8	mA
Operating ambient temperature	T_{amb}	-40	+85	°C

MOSFET N-Channel

PARAMETER	SYMBOL	FDV303N	UNIT
Drain-Source Voltage	V_{DDS}	25	Vdc
Drain/Output Current - Continuous - Pulsed	I_D	 0.68 2.00	A
Maximum Power Dissipation	P_D	0.35	W
Static Drain - Source On-Resistance	RDS(ON)	0.45 W @ VGS = 4.5 V 0.6 W @ VGS = 2.7 V	

4.1 MVS-Module to customer system connection scheme

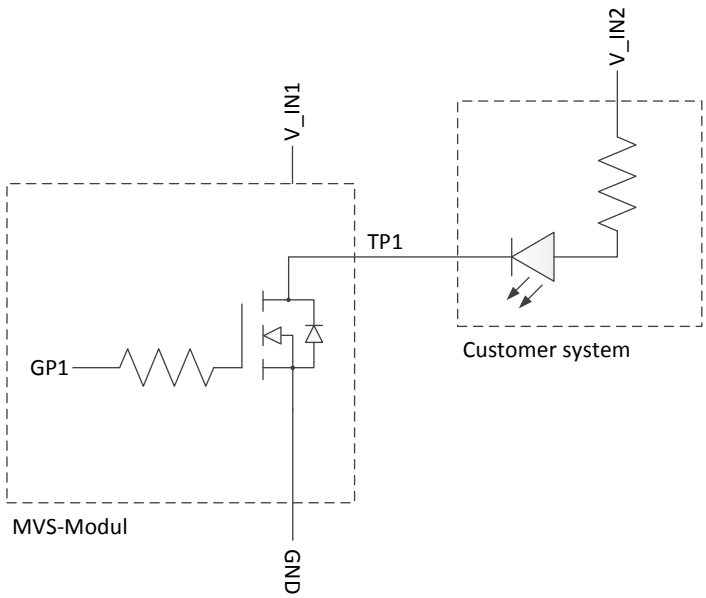

Figure 4: Typical connection scheme

5. Operating time

Time in seconds the device is active when motions occur. The value is determined during start-up phase and depends on the voltage-divider value of R1 and R2. The operating time in seconds corresponds 1:1 to the A/D value, set by the voltage divider. The max. operating time is 256 sec. The min. operating time is 1 second. Default operating time is set to 3 seconds (R1 100k, R2 1.2K)

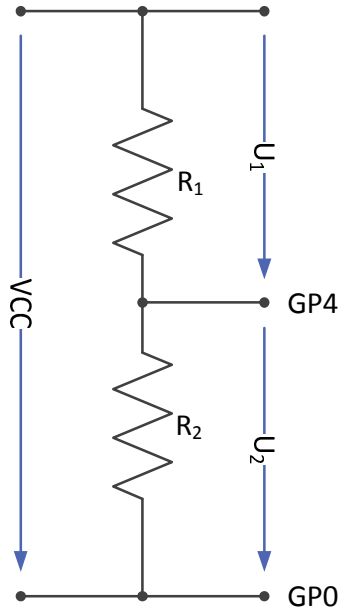

Figure 5: Voltages-divider

$$T_{ON} = \frac{R_2}{R_1 + R_2} * 255[\text{sec}]$$

	kOhm R_1	kOhm R_2	V U_2	sec T_{ON}
1	0	2608	3,00	255
2	10	2153	2,99	254
3	12	1777	2,98	253
4	15	1467	2,97	252
5	18	1211	2,96	251
6	22	999	2,94	250
7	26	825	2,91	247
8	32	681	2,87	244
9	38	562	2,81	239
10	46	464	2,73	232
11	56	383	2,62	222
12	68	316	2,47	210
13	83	261	2,28	194
14	100	215	2,05	174
15	121	178	1,78	152
16	147	147	1,50	128
17	178	121	1,22	103
18	215	100	0,95	81
19	261	83	0,72	61
20	316	68	0,53	45
21	383	56	0,38	33
22	464	46	0,27	23
23	562	38	0,19	16
24	681	32	0,13	11
25	825	26	0,09	8
26	999	22	0,06	5
27	1211	18	0,04	4
28	1467	15	0,03	3
29	1777	12	0,02	2
30	2153	10	0,01	1
31	2608	0	0,00	1

Table 1: Example values for R1 and R2

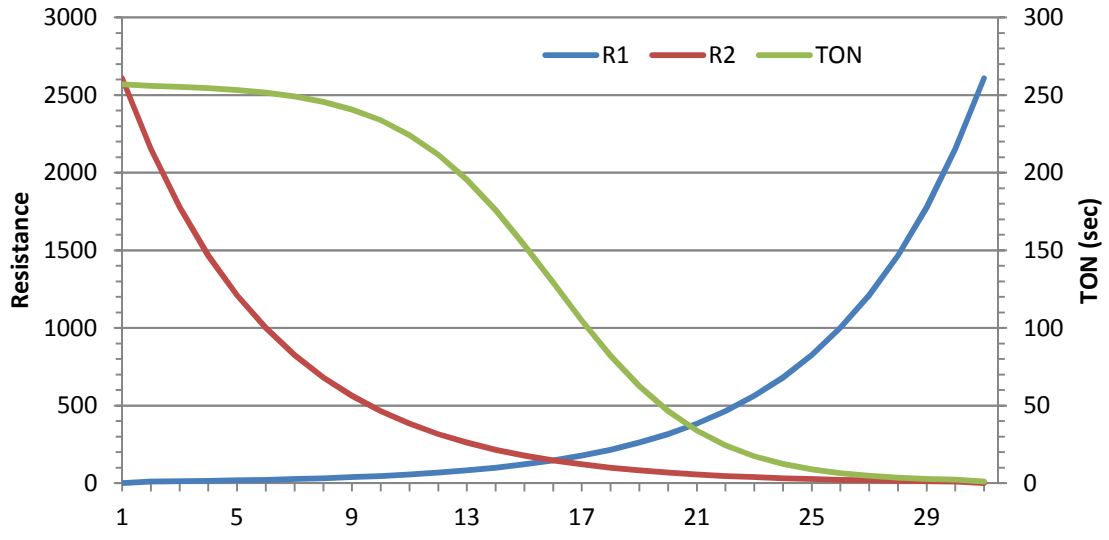

Figure 6: Opterating time

6. Schematic

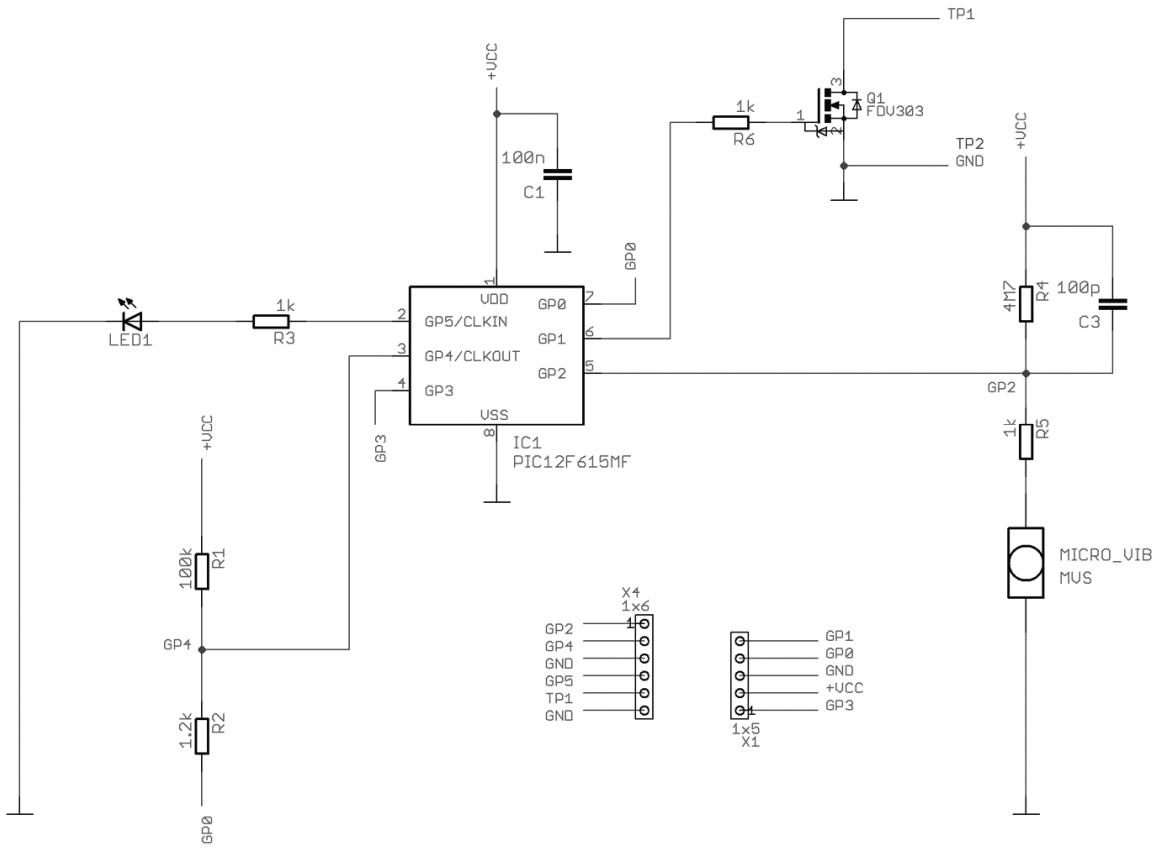

Figure 7: MVSM schematic

7. Printed Circuit Board

The MVS Module printed circuit board is constructed with FR4 material, two layers and 0.80 mm thick. The layers are shown in Figure 2-2 through Figure 2-6.

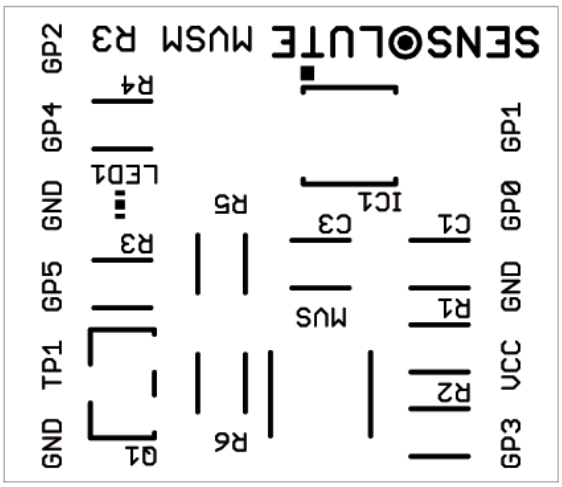

Figure 8: Top silk screen

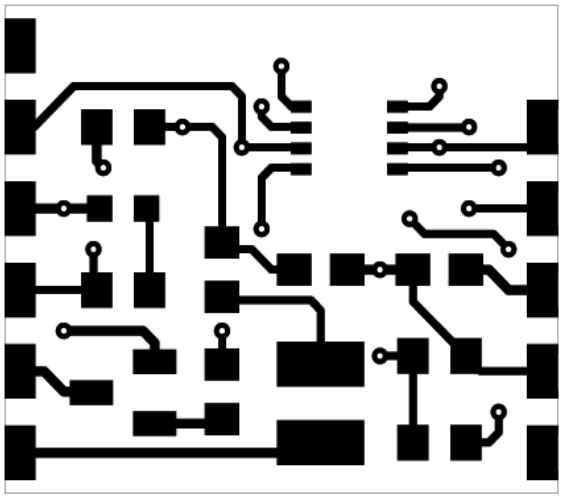

Figure 9: Top copper

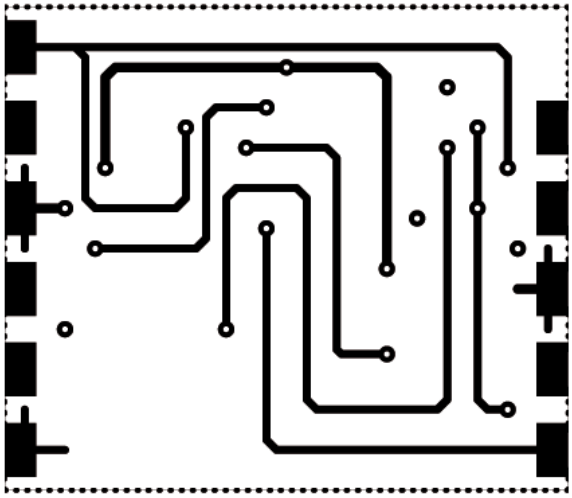

Figure 10: Bottom copper

8. Module details

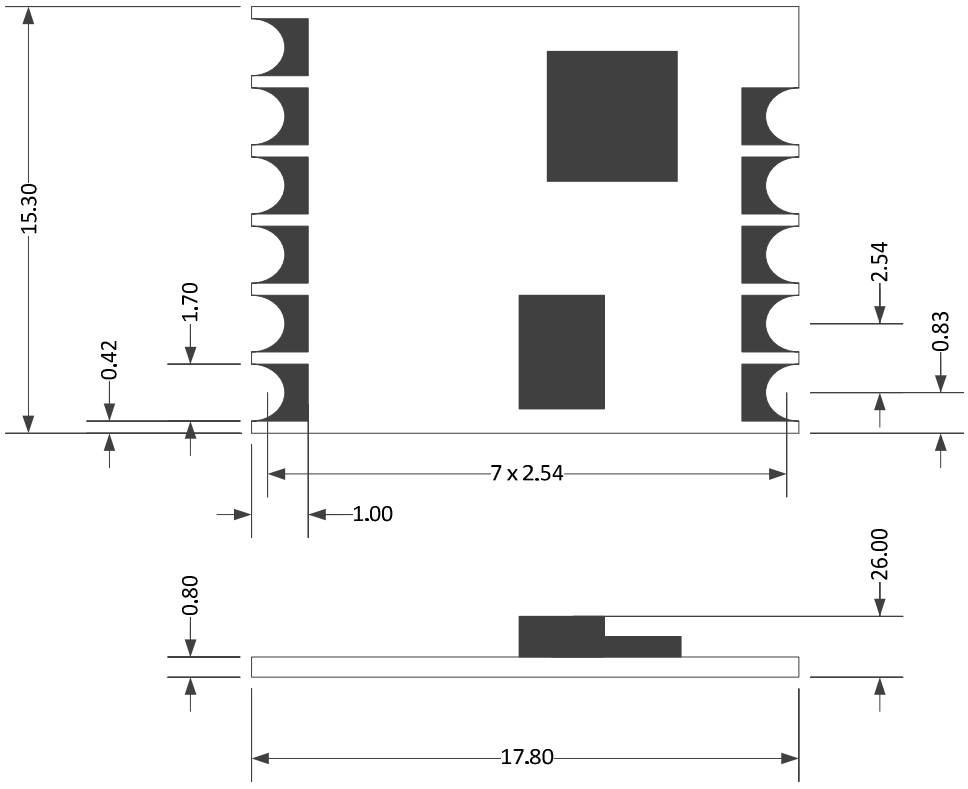

Figure 11: Module details (mm)

9. Mounting Details

The MVSM is a surface mountable module. Module dimensions are shown in Figure 11. The module Printed Circuit Board (PCB) is 0.80mm thick with castellated mounting points on the edge. Figure 12 is a recommended host PCB footprint for the MVSM.

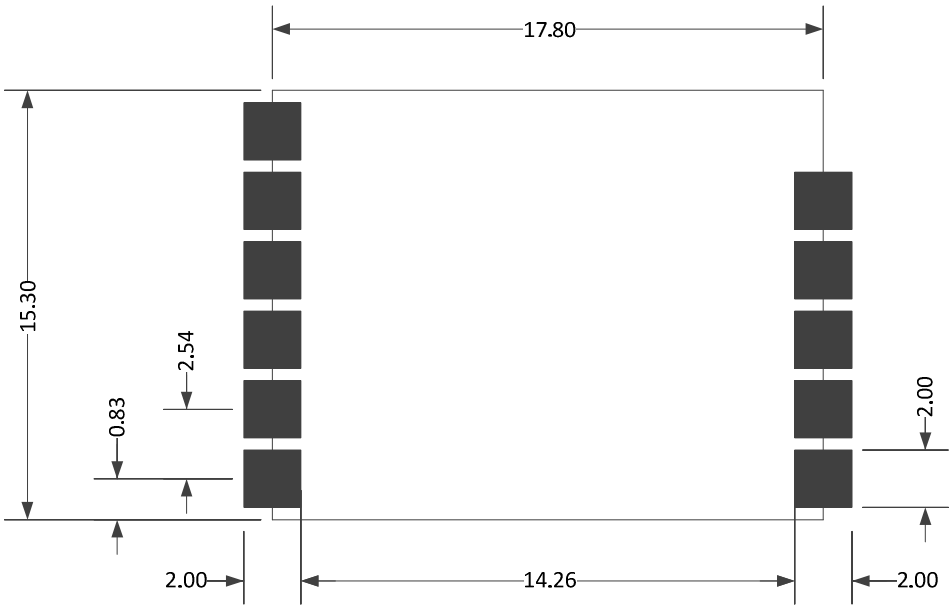

Figure 12: Recommended PCB footprint (mm)

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