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MMA7361 3-Axis Accelerometer Module

http://www.apexelectrix.com

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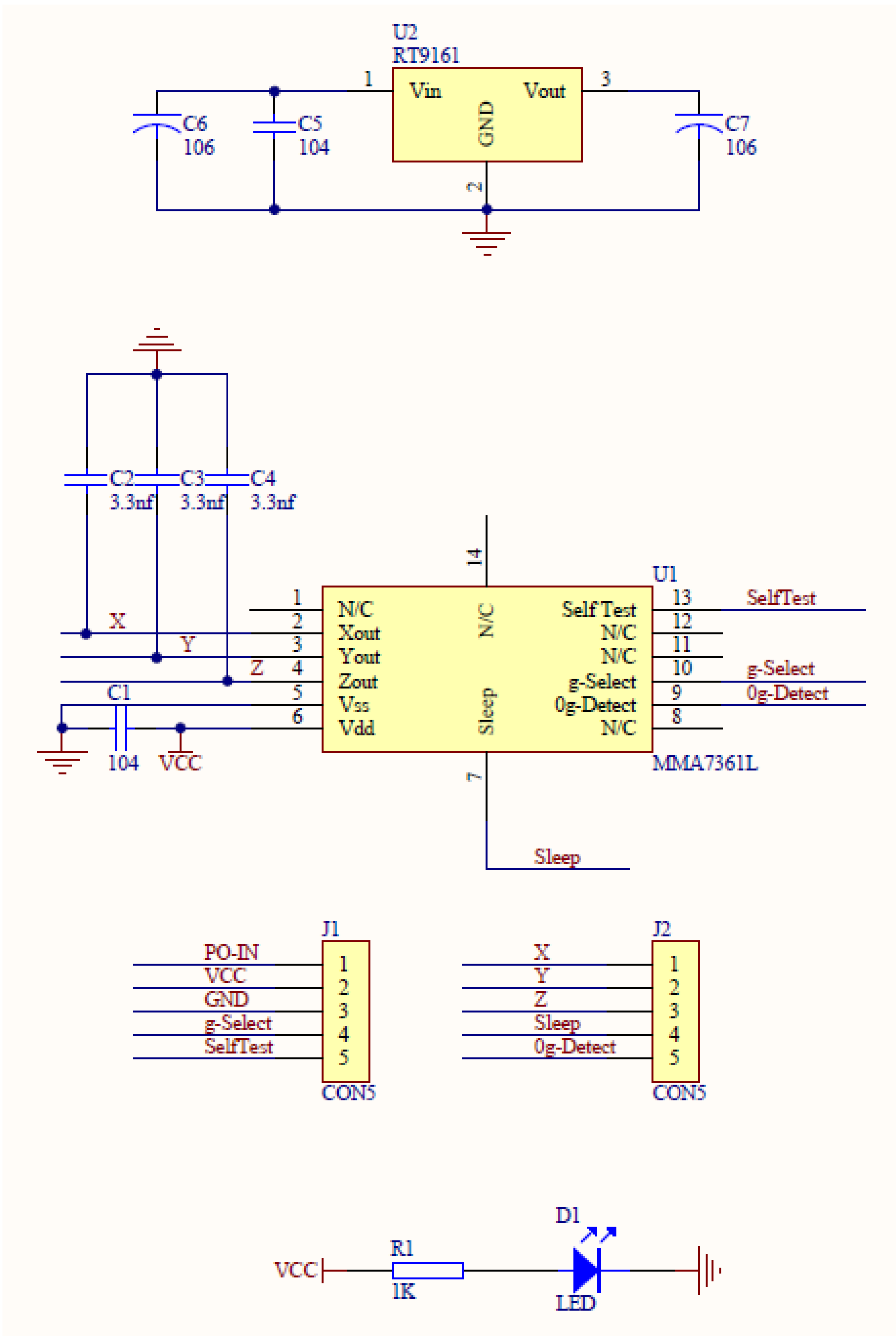
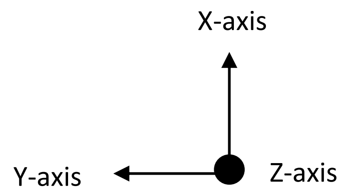
Circuit Diagram:



Pin Configuration:



Description of Pins:

X-axis	This is the analog signal out along the X-axis
Y-axis	This is the analog signal out along the Y-axis
X-axis	This is the analog signal out along the Z-axis
Sleep	This pin will put the chip to sleep when pulled low to consume less power and will resume operation when pulled high.
0g detect	This pin will go high when 0g is detected on all 3 axis. Useful to detect free fall
5v in	This pin is attached to a built in regulator that will bring the 5v down to the 3.3v that the chip is required to run on.
3.3v in	This pin bypasses the regulator for 5v in for those who have a pre-regulated 3.3v bus.
Ground	This pin must be connected to the ground of the circuit.
Sense select	This pin is used to select between the two sensitivities. If this pin is low it is in 1.5g mode. When high, it switches to 6g mode.
Self-test	This chip has a built in self-test to verify that both the mechanical and electrical bits inside the chip are functioning properly. To use the self-test feature, hold the module upside down to put a force of -1g on the Z-axis. The self-test then applies an electrostatic force which deflects the Z-axis which would then read +1g. Useful also for calibration.

Electrical Characteristics: (Taken from datasheet for MMA7361)

Table 2. Operating Characteristics

Unless otherwise noted: $-40°C \le T_A \le 85°C$, $2.2\ V \le V_{DD} \le 3.6\ V$, Acceleration = 0g, Loaded output[1]

Characteristic	Symbol	Min	Typ	Max	Unit
Operating Range[2]					
Supply Voltage[3]	V_{DD}	2.2	3.3	3.6	V
Supply Current[4]	I_{DD}	—	400	600	µA
Supply Current at Sleep Mode[4]	I_{DD}	—	3	10	µA
Operating Temperature Range	T_A	-40	—	+85	°C
Acceleration Range, X-Axis, Y-Axis, Z-Axis					
g-Select: 0	g_{FS}	—	±1.5	—	g
g-Select: 1	g_{FS}	—	±6.0	—	g
Output Signal					
Zero-g (T_A = 25°C, V_{DD} = 3.3 V)[5], [6]	V_{OFF}	1.485	1.65	1.815	V
Zero-g[4]	V_{OFF}, T_A	-2.0	±0.5	+2.0	mg/°C
Sensitivity (T_A = 25°C, V_{DD} = 3.3 V)					
1.5g	$S_{1.5g}$	740	800	860	mV/g
6g	S_{6g}	190.6	206	221.5	mV/g
Sensitivity[4]	S, T_A	-0.0075	±0.002	+0.0075	%/°C
Bandwidth Response					
XY	f_{-3dBXY}	—	400	—	Hz
Z	f_{-3dBZ}	—	300	—	Hz
Output Impedance	Z_O	—	32	—	kΩ
0g-Detect	$0g_{detect}$	-0.4	0	+0.4	g
Self Test					
Output Response					
X_{OUT}, Y_{OUT}	Δg_{STXY}	+0.05	-0.1	—	g
Z_{OUT}	Δg_{STZ}	+0.8	+1.0	+1.2	g
Input Low	V_{IL}	V_{SS}	—	0.3 V_{DD}	V
Input High	V_{IH}	0.7 V_{DD}	—	V_{DD}	V
Noise					
Power Spectral Density RMS (0.1 Hz – 1 kHz)[4]	n_{PSD}	—	350	—	$\mu g/\sqrt{Hz}$
Control Timing					
Power-Up Response Time[7]	$t_{RESPONSE}$	—	1.0	2.0	ms
Enable Response Time[8]	t_{ENABLE}	—	0.5	2.0	ms
Self Test Response Time[9]	t_{ST}	—	2.0	5.0	ms
Sensing Element Resonant Frequency					
XY	$f_{GCELLXY}$	—	6.0	—	kHz
Z	f_{GCELLZ}	—	3.4	—	kHz
Internal Sampling Frequency	f_{CLK}	—	11	—	kHz
Output Stage Performance					
Full-Scale Output Range (I_{OUT} = 3 µA)	V_{FSO}	V_{SS}+0.1	—	V_{DD}–0.1	V
Nonlinearity, X_{OUT}, Y_{OUT}, Z_{OUT}	NL_{OUT}	-1.0	—	+1.0	%FSO
Cross-Axis Sensitivity[10]	$V_{XY, XZ, YZ}$	-5.0	—	+5.0	%

1. For a loaded output, the measurements are observed after an RC filter consisting of an internal 32kΩ resistor and an external 3.3nF capacitor (recommended as a minimum to filter clock noise) on the analog output for each axis and a 0.1µF capacitor on V_{DD} - GND. The output sensor bandwidth is determined by the Capacitor added on the output. $f = 1/2\pi * (32 \times 10^3) * C$. C = 3.3 nF corresponds to BW = 1507HZ, which is the minimum to filter out internal clock noise.
2. These limits define the range of operation for which the part will meet specification.
3. Within the supply range of 2.2 and 3.6 V, the device operates as a fully calibrated linear accelerometer. Beyond these supply limits the device may operate as a linear device but is not guaranteed to be in calibration.
4. This value is measured with g-Select in 1.5g mode.
5. The device can measure both + and – acceleration. With no input acceleration the output is at midsupply. For positive acceleration the output will increase above $V_{DD}/2$. For negative acceleration, the output will decrease below $V_{DD}/2$.
6. For optimal 0g offset performance, adhere to AN3484 and AN3447
7. The response time between 10% of full scale V_{DD} input voltage and 90% of the final operating output voltage.
8. The response time between 10% of full scale Sleep Mode input voltage and 90% of the final operating output voltage.
9. The response time between 10% of the full scale self test input voltage and 90% of the self test output voltage.
10. A measure of the device's ability to reject an acceleration applied 90° from the true axis of sensitivity.