Data Sheet

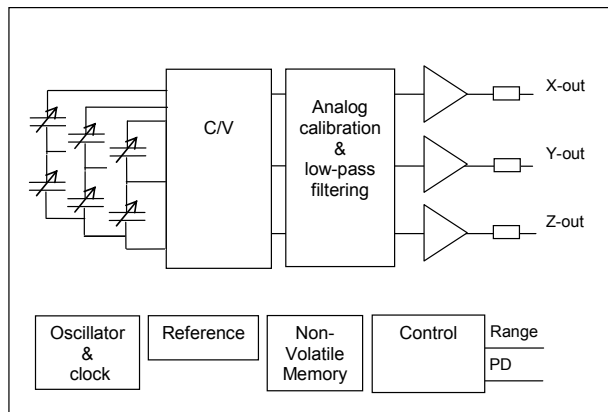# CMA3000-A01 3-AXIS LOW POWER ANALOG OUTPUT ACCELEROMETER

Features

- 1.7 V – 3.6 V supply voltage
- Ratiometric analog voltage output for x, y and z acceleration
- User selectable ± 2 g and ± 8 g measurement ranges
- Low current consumption
  - Active 180 uA
  - Power down < 0.1uA
- Size 2x2x0.95 mm3
- Proven capacitive 3D-MEMS technology
- High shock durability
- RoHS compliant / lead free soldering

Applications

CMA3000-A01 is targeted to battery operated devices. Typical applications are but not limited

- Gaming input devices
- Computer peripherals
- Free fall detection
- Activity monitoring

Figure 1 CMA3000-A01 Block Diagram

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PRELIMINARY - Subject to changes
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1/4
Rev. 12

Performance Characteristics Targets [1]

Parameter	Condition	Typical supply range 1.7 – 2.7 V			Extended supply range 2.7 – 3.6 V			Units
		Min	Typ [2]	Max	Min	Typ [2]	Max	
Vdd		1.7	2.5	2.7	2.7	3.3	3.6	V
Operating temperature **		-40	-	85	-40	-	85	°C
Current consumption *	Power down	-	<0.1	-	-	<0.1	-	µA
	Active	-	180		-	200	-	
Acceleration range *	Range pin set to "1"	-2	-	2	-2	-	2	g
	Range pin set to "0"	-8	-	8	-8	-	8	
Offset * [3]	X and Y axis	-	Vdd/2	-	-	Vdd/2	-	V
	Z axis	-	Vdd/2 +sens	-	-	Vdd/2 +sens	-	
Offset calibration error * [3]	Full scale=2 g, T=+25 °C	-100	±25	+100	-	±100	-	mg
Offset temperature error ** [4]	-40 ... +85 °C X and Z axis Y axis		±1 ±2.5		- -	±1 ±2.5	- -	mg/°C
Sensitivity * [5]	Full scale=2 g	-	Vdd/6	-	-	Vdd/6	-	V/g
	Full scale=8 g	-	Vdd/24	-	-	Vdd/24	-	V/g
Sensitivity calibration error *	T=+25 °C	-10	-	+10	-	±10	-	%
Sensitivity temperature error ** [6]	-40 ... +85 °C		±0.02			±0.02		%/°C
Non-Linearity ** [7]		-	1.5	3	-	1.5	-	% FS
Cross-Axis sensitivity ** [8]		-	1	-	-	1	-	%
Bandwidth** [9]	C_L =100 nF	30	50	70	30	50	70	Hz
	C_L =0 nF X and Z axis Y axis		120 200		- -	120 200	- -	Hz
Noise ** [10]	Full scale=2 g	-	300	600	-	300	600	µg/√Hz
	Full scale=8 g	-	300	600	-	300	600	µg/√Hz
Output resistance		28	32	36	28	32	36	kΩ

*   100% tested in production
**   Qualified during product validation
[1]   The product is factory calibrated at 2.5 V in room temperature.
[2]   Typical values are not guaranteed.
[3]   Z-axis +1g position. Soldering process can cause offset shift which is typically less than 130 mg. Please see TN68_CMA3000_Assembly_Instructions for further details.
[4]   Offset temperature error = {Vout(0g)-Offset} / Sensitivity [g]. Sensitivity = Calibrated sensitivity. Offset= Calibrated offset.
[5]   Sensitivity = {Vout(+1g) - Vout(-1g)}/2 [V/g] .
[6]   Sensitivity temperature error = {[Vout(+1g)-Vout(-1g)]/2 - Sensitivity} / Sensitivity x 100% [%]. Sensitivity = Calibrated sensitivity.
[7]   Best fit straight line.
[8]   The cross-axis sensitivity determines how much acceleration, perpendicular to the measuring axis, couples to the output. The total cross-axis sensitivity is the geometric sum of the sensitivities of the two axes which are perpendicular to the measuring axis. The angular alignment error between X, Y and Z axis is included into the cross axis sensitivity.
[9]   Frequency responce -3dB roll off frequency = 1/(2π*32kΩ*C_L), when C_L≥50 nF.
[10] Average noise/axis over the measurement bandwidth defined as $\sqrt{\frac{1}{3}(n_x{}^2+n_y{}^2+n_z{}^2)}$, where nx, ny and nz are the measured signal's standard deviation due to noise in x, y and z directions.
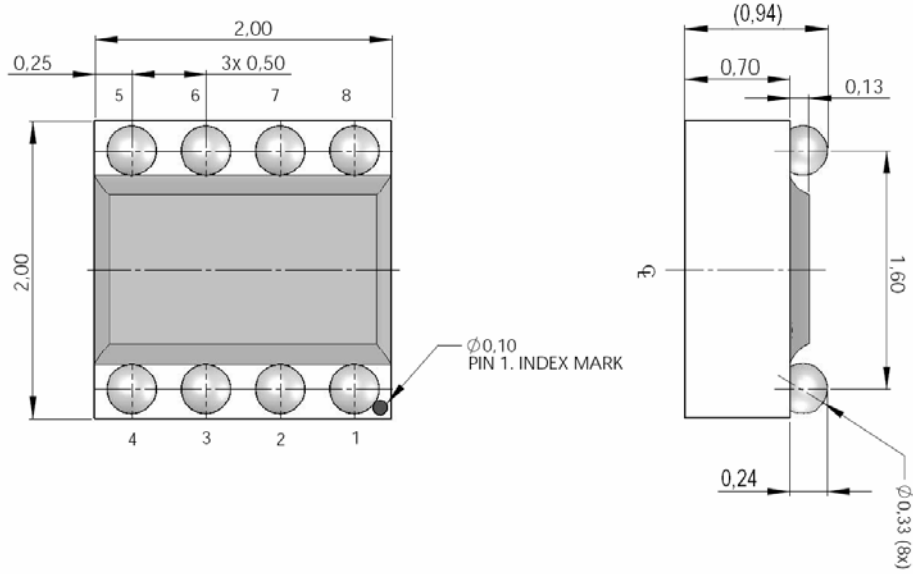
Figure 2 Package dimensions in mm with ±50 µm tolerance.
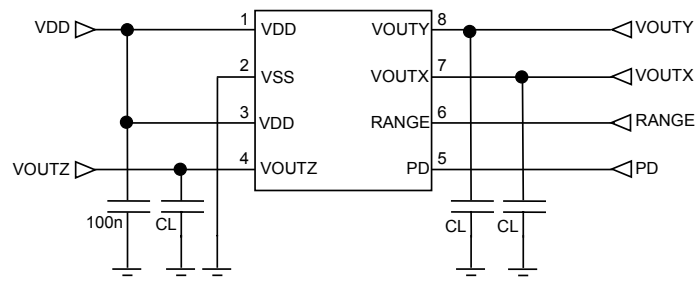
Figure 3 Application schematic

Note the symmetrical ground plane under the component.
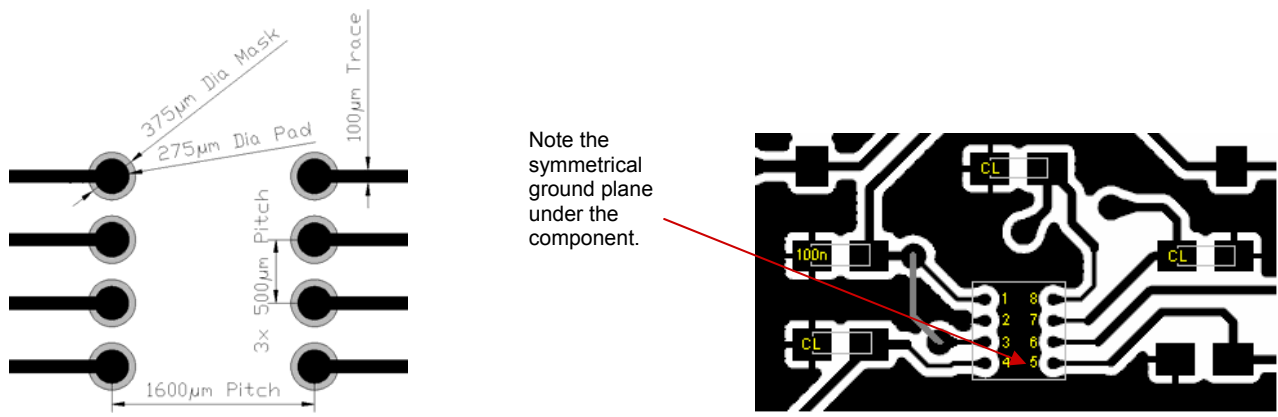
Figure 4 Recommended layout pattern (not actual size, for reference only)

Table 1 Pin descriptions

Pin #	Name	Function
1	VDD	Supply voltage
2	VSS	Ground
3	VDD	Supply voltage
4	VOUTZ	Output voltage Z-channel
5	PD	Power Down
6	RANGE	Acceleration Range selection
7	VOUTX	Output voltage X-channel
8	VOUTY	Output voltage Y-channel

Document Change Control

Rev.	Date	Change Description
0.1	15-May-07	1st version
0.2	22-May-07	Application schematic added
0.3	24-Aug-07	Pin order updated, component layout pattern added
0.4	10-Sep-07	Block diagram updated
0.5	11-Jan-08	Acceleration range control polarity updated
0.6	16-Jan-08	Offset level added, package drawing, pad layout updated
0.7	14-Feb-08	Performance characteristics update
0.8	03-Jun-08	Target values updated. Figure 2 updated.
0.9	04-Jul-08	Figure 2 updated.
0.10	28-Aug-08	Current consumption, sensitivity and sensitivity temperature error, non-linearity, cross axis sensitivity and noise updated.
0.11	10-Dec-08	Performance characteristics and notes updated. Figure 2 updated.
0.12	29-Dec-08	Version for launch