

SSA-LCM0XX

**High Performance Single Axis Closed Loop MEMS
Capacitive Accelerometer**



PRODUCTS FEATURES

- Very low noise
- High level of resistance to vibration and shock
- Is versatile for many applications
- Accelerometers have very robust designs
- It has embedded self test function
- Using tiny sealed LCC20 encapsulation

1. Technical Specifications

1.1. Basic

Table 1. Basic characteristics

Parameters (typical value)	SSA-LC2M002	SSA-LC2M003	SSA-LC2M010	SSA-LC2M030	Unit
Range	±2	±3	±10	±30	g
Nonlinearity (Full range typical Value)	0.1	0.1	0.1	0.1	%
Frequency Response (±5% bandwidth)	>100	>100	60	60	Hz
Frequency Response (±3dB bandwidth)	>1000	>1000	200	200	Hz
Noise Spectral Density	0.9	1.0	3.2	2.5	µg/√Hz
Zero Bias Temperature Coefficient (Maximum)	0.2	0.2	0.2	0.2	mg/°C
Zero Bias Stability	0.03	0.03	0.03	0.03	mg
Scale Factor	1800	1200	360	120	mV/g
Scale Factor Temperature Coefficient	50	50	50	50	ppm/°C
Scale Factor Reliability	50	50	50	50	ppm

1.2. Technical Specifications for SSA-LC2M002
Table 2. Electrical and mechanical characteristics

Parameter	Comments	Min.	Typ.	Max	Unit
Range		-	±2	-	g
Non linearity	IEEE Norm , % of full scale		0.1	0.3	%
Frequency Response	±5% bandwidth	100	-	-	Hz
	±3dB bandwidth	1000	-	-	Hz
Resonant Frequency		-	3.0	-	kHz
Resolution	1Hz		7	-	µg
Noise Spectral Density	In band [0.1Hz~100Hz]	-	10.1	-	µgrms
	@0.1Hz	-	3.0	-	µg/√Hz
	@1Hz	-	1.7	-	
	@10Hz	-	1.0	-	
	@100Hz	-	0.9	-	
Bias					
Zero Calibration		-8	-	+8	mg
Temperature Coefficient		-0.2	-	0.2	mg/°C
Stability	1 hour, 1σ	-	0.03	0.08	mg
Repeatability		-	0.15	0.40	mg
Scale Factor					
Scale Factor		1782	1800	1818	mV/g
Temperature Coefficient		-	50	80	ppm/°C
Stability	1σ#1	-	50	120	ppm
Repeatability		-	50	120	ppm
Axis Misalignment					
Input Axis Misalignment (Kp,Ko)		-	-	10	mrad
Self Test					
Frequency	Square wave output	-	19	-	Hz
Duty Cycle		-	50	-	%
Amplitude	Peak to peak	-	0.28	-	g
STEN Input Threshold Voltage	High level is valid	0.8	-	-	Vcc
Temperature Sensor					
Output Voltage	@25°C	-	2.47	-	V
Sensitivity		-	8.3	-	mV/°C
Output Current Load		-	-	20	µA
Output Capacitive Load		-	-	30	pF
Reset					
RSTN Input Threshold Voltage	Low level valid	-	-	0.2	Vcc
Power Supply (Vcc)					
Input Voltage		4.75	5	5.25	V
Running Current Consumption		-	5.4	-	mA
Startup Time	Turn on or RSTN pull-up	-	10	-	ms
Accelerometer Output					
Output Voltage	Full range differential output	-	±3.6	-	V
Resistance Load		10	-	-	kΩ
Capacitive Load		-	-	30	pF

1.3. Technical Specifications for SSA-LC2M003
Table 3. Electrical and mechanical characteristics

Parameter	Comments	Min.	Typ.	Max	Unit
Range		-	±3	-	g
Non linearity	IEEE Norm , % of full scale		0.1	0.3	%
Frequency Response	±5% bandwidth	100	-	-	Hz
	±3dB bandwidth	1000	-	-	Hz
Resonant Frequency		-	3.0	-	kHz
Resolution	1Hz	-	7	-	µg
Noise Spectral Density	In band [0.1Hz~100Hz]	-	11.4	-	µgrms
	@0.1Hz	-	2.8	-	µg/√Hz
	@1Hz	-	1.5	-	
	@10Hz	-	1.2	-	
	@100Hz	-	1.0	-	
Bias					
Zero Calibration		-12	-	+12	mg
Temperature Coefficient		-0.2	-	0.2	mg/°C
Stability	1 hour, 1σ	-	0.03	0.08	mg
Repeatability		-	0.15	0.40	mg
Scale Factor					
Scale Factor		1188	1200	1212	mV/g
Temperature Coefficient		-	50	80	ppm/°C
Stability	1σ	-	50	120	ppm
Repeatability		-	50	120	ppm
Axis Misalignment					
Input Axis Misalignment (Kp,Ko)		-	-	10	mrad
Self Test					
Frequency	Square wave output	-	19	-	Hz
Duty Cycle		-	50	-	%
Amplitude	Peak to peak	-	0.55	-	g
STEN Input Threshold Voltage	High level is valid	0.8	-	-	Vcc
Temperature Sensor					
Output Voltage	@25°C	-	2.47	-	V
Sensitivity		-	8.3	-	mV/°C
Output Current Load		-	-	20	µA
Output Capacitive Load		-	-	30	pF
Reset					
RSTN Input Threshold Voltage	Low level valid	-	-	0.2	Vcc
Power Supply (Vcc)					
Input Voltage		4.75	5	5.25	V
Running Current Consumption		-	5.4	-	mA
Startup Time	Turn on or RSTN pull-up	-	10	-	ms
Accelerometer Output					
Output Voltage	Full range differential output	-	±3.6	-	V
Resistance Load		10	-	-	kΩ
Capacitive Load		-	-	30	pF

1.4. Technical Specifications for SSA-LC2M010
Table 4. Electrical and mechanical characteristics

Parameter	Comments	Min.	Typ.	Max	Unit
Range		-	±10	-	g
Non linearity	IEEE Norm , % of full scale		0.1	0.3	%
Frequency Response	±5% bandwidth	-	60	-	Hz
	±3dB bandwidth	-	200	-	Hz
Resonant Frequency		-	6.0	-	kHz
Resolution	1Hz	-	20	-	µg
Noise Spectral Density	In band [0.1Hz~100Hz]	-	37.4	-	µgrms
	@0.1Hz	-	8.6	-	µg/√Hz
	@1Hz	-	6.6	-	
	@10Hz	-	3.8	-	
	@100Hz	-	3.2	-	
Bias					
Zero Calibration		-40	-	+40	mg
Temperature Coefficient		-0.2	-	0.2	mg/°C
Stability	1 hour, 1σ	-	0.03	0.08	mg
Repeatability		-	0.15	0.40	mg
Scale Factor					
Scale Factor		356.4	360.0	363.6	mV/g
Temperature Coefficient		-	50	80	ppm/°C
Stability	1σ	-	50	120	ppm
Repeatability		-	50	120	ppm
Axis Misalignment					
Input Axis Misalignment (Kp,Ko)		-	-	10	mrad
Self Test					
Frequency	Square wave output	-	19	-	Hz
Duty Cycle		-	50	-	%
Amplitude	Peak to peak	-	0.55	-	g
STEN Input Threshold Voltage	High level is valid	0.8	-	-	Vcc
Temperature Sensor					
Output Voltage	@25°C	-	2.47	-	V
Sensitivity		-	8.3	-	mV/°C
Output Current Load		-	-	20	uA
Output Capacitive Load		-	-	30	pF
Reset					
RSTN Input Threshold Voltage	Low level valid	-	-	0.2	Vcc
Power Supply (Vcc)					
Input Voltage		4.75	5	5.25	V
Running Current Consumption		-	5.4	-	mA
Startup Time	Turn on or RSTN pull-up	-	10	-	ms
Accelerometer Output					
Output Voltage	Full range differential output	-	±3.6	-	V
Resistance Load		10	-	-	kΩ
Capacitive Load		-	-	30	pF

1.5. Technical Specifications for SSA-LC2M030
Table 5. Electrical and mechanical characteristics

Parameter	Comments	Min.	Typ.	Max	Unit
Range		-	±30	-	g
Non linearity	IEEE Norm , % of full scale		0.1	0.3	%
Frequency Response	±5% bandwidth	-	60	-	Hz
	±3dB bandwidth	-	200	-	Hz
Resonant Frequency		-	6.0	-	kHz
Resolution	1Hz	-	30	-	µg
Noise Spectral Density	In band [0.1Hz~100Hz]	-	43.8	-	µgrms
	@0.1Hz	-	18.9	-	µg/√Hz
	@1Hz	-	10.6	-	
	@10Hz	-	3.7	-	
	@100Hz	-	2.3	-	
Bias					
Zero Calibration		-60	-	+60	mg
Temperature Coefficient		-0.2	-	0.2	mg/°C
Stability	1 hour, 1σ	-	0.03	0.08	mg
Repeatability		-	0.15	0.40	mg
Scale Factor					
Scale Factor		118.8	120.0	121.2	mV/g
Temperature Coefficient		-	50	80	ppm/°C
Stability	1σ	-	50	120	ppm
Repeatability		-	50	120	ppm
Axis Misalignment					
Input Axis Misalignment (Kp,Ko)		-	-	10	mrad
Self Test					
Frequency	Square wave output	-	19	-	Hz
Duty Cycle		-	50	-	%
Amplitude	Peak to peak	-	0.55	-	g
STEN Input Threshold Voltage	High level is valid	0.8	-	-	Vcc
Temperature Sensor					
Output Voltage	@25°C	-	2.47	-	V
Sensitivity		-	8.3	-	mV/°C
Output Current Load		-	-	20	uA
Output Capacitive Load		-	-	30	pF
Reset					
RSTN Input Threshold Voltage	Low level valid	-	-	0.2	Vcc
Power Supply (Vcc)					
Input Voltage		4.75	5	5.25	V
Running Current Consumption		-	5.4	-	mA
Startup Time	Turn on or RSTN pull-up	-	10	-	ms
Accelerometer Output					
Output Voltage	Full range differential output	-	±3.6	-	V
Resistance Load		10	-	-	kΩ
Capacitive Load		-	-	30	pF

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1.6. Absolute maximum ratings

Table 6.

Parameter	Minimum	Maximum	Description
Power Supply	-0.3V	5.8V	
Pins voltage	-0.3V	Vcc+0.3V	
Working Temperature	-40°C	+125°C	
Storage Temperature	-55°C	+150°C	
Vibration Resistance	-	6.06g	SSA-LC2M002/SSA-LC2M003, random, with power on [20, 2000Hz], X, Y, Z axis, each axis 15minutes
	-	20g	SSA-LC2M010, SSA-LC2M030 random, with power on [20, 2000Hz], X, Y, Z axis, each axis 15 minutes
Shock Resistance	-	6000g	3 times/axis, 0.15ms, half sine wave, ±X, ±Y, ±Z axis
	-	1500g	3 times/axis, 0.5ms, half sine wave, ±X, ±Y, ±Z axis
ESD Level	-2kV	2kV	HBM mode

2. Pins definition

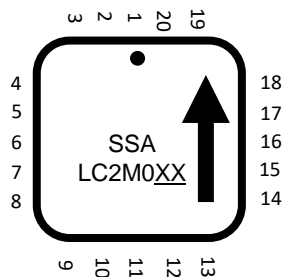


Table 7.

Pins No.	Pins Name	Definition	Description
1, 3, 4, 5, 6, 8, 9, 10, 19, 20	GND	connect to ground	power ground
2	MODE	digital input	select output mode (low level is differential output mode, high level is single-ended output mode, default is inner drop down mode)
7	Vcc	power	5V power input
11	STEN	digital input	self test input, default inner drop down, self test is valid when it is high level
12	RSTN	digital input	external reset input, default inner pull up, low level reset is valid
13	PORN	digital output	power on reset output, the output is high when the power voltage is stable
14	OUTP/V2.5	analog output	differential output positive/2.5V reference voltage output
15	OUTN/OUTS	analog output	differential output negative/Single-Ended output
16	TEMP	analog output	temperature sensor output
17	ERR	digital output	self test output or system fault output
18	NC	-	no connection

3. Dimension and package type

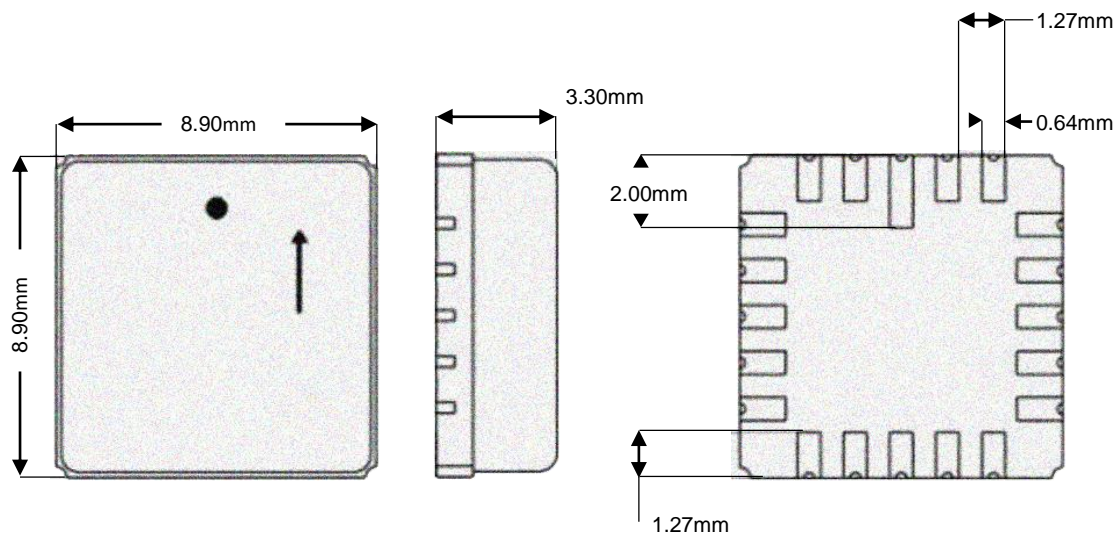


Figure 3.1. Mechanical dimensions

Table 8. Sizes

Parameter	Comments	Min	Typical	Max	Unit
Lead Finishing	Au plating	0.5	-	-	um
	Ni Plating	2	-	-	um
	W (tungsten)	16	-	-	um
Weight		0.63	0.639	0.645	grams
Size	X	8.95	9	9.07	mm
	Y	8.92	9.01	9.1	mm
	Z	3.3	3.38	3.45	mm
Packaging	LCC20 pin housing				
Proximity effect	The sensor is sensitive to external parasitic capacitance. Moving metallic objects with large mass or parasitic effect in close proximity of the accelerometer (mm range) must be avoided to ensure best product performances. A ground plane below the accelerometer is recommended as a shielding.				
Reference plane for axis alignment	LCC must be tightly fixed to the circuit board, using the bottom of the housing as the reference plane for axis alignment. Using the lid as reference plane or for assembly may affect specifications and product reliability (i.e. axis alignment and/or lid soldering integrity)				

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4. External connection

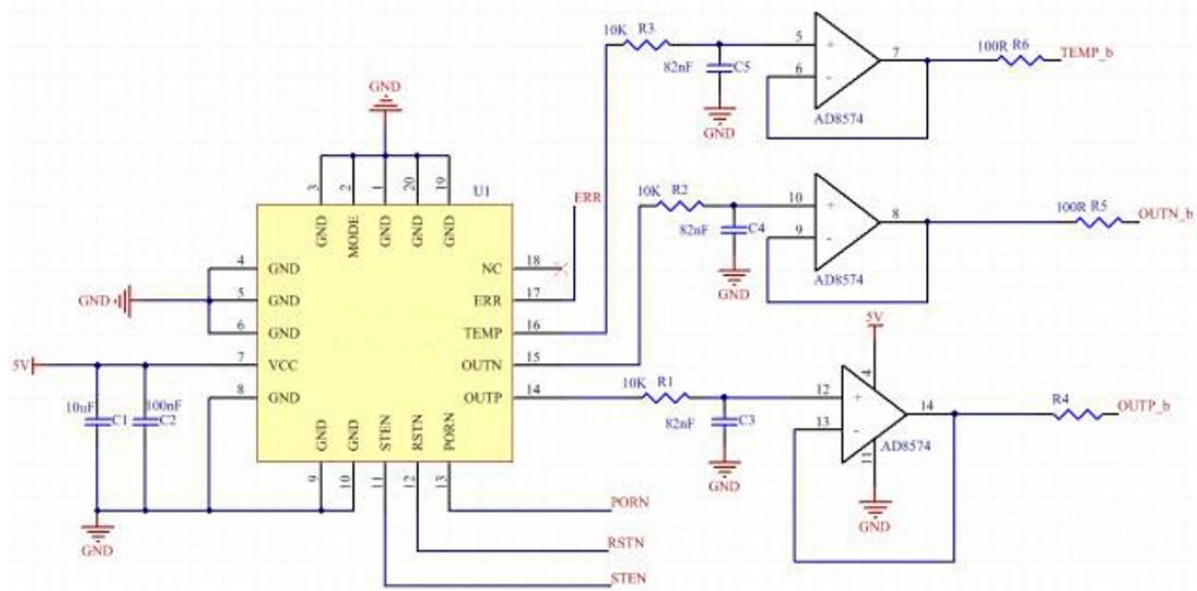
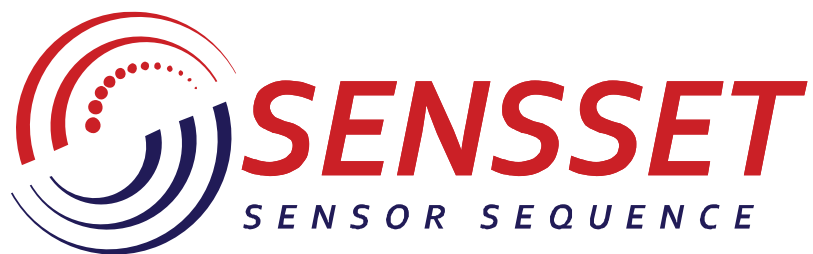


Figure 4.1.



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Development, production and supply of high-tech sensors