1–MEMS Variable Capacitance Accelerometers

Models	Electrical Parameter									Reliability Parameter			Case Material
	Range	Sensitivity -(@100 Hz)	Amplitude Response ±10%	Non -linearity	Threshold	Transverse Sensitivity	Zero Measured -Output	Voltage	Current Drain	Basic Failure Rate	ESDS Level	Irradiation Y Dose	
	(g)	(mV/g)	(Hz)	(%FS)	(mg)	(%)	(mV)	(V)	(mA)	(10^{-6}/h)	1B	Gy(Si)	
MSA1000-02	±2	1000±20	0～250	±0.2	0.0002	2	2500±50	+5	6	0.09	1B	500	Aluminum Alloy
MSA1000-10	±10	200±10	0～800	±0.2	0.00	3	2500±50	+5	6	0.09	1B	500	Aluminum Alloy
MSA3000E-02	±2	1000±20	0～250	±0.2	0.0002	2	2500±50	+15	20	0.087	1B	500	Duralumin
MSA3000E-10	±10	200±10	0～800	±0.2	0.001	3	2500±50	+15	20	0.087	1B	500	Duralumin

User Manual

Based on a variable capacity micro-machined silicon element structure, the MSA1000A single axis MEMS accelerometer and the MSA3000E triaxial accelerometer can identify the micro acceleration vibration signal start from 0 Hz, typically applied for the micro-vibration measurement, modal analysis, inertial movement research and platform stability control in aerospace aircraft, satellite and loading platform.

1. Sensor connections and power supply requirements

It's a quad cable with Red, Black, Green & White for the outgoing cable of the MSA1000A single axis MEMS accelerometer. When the sensor is connected with the bridge circuit, the connections is as follows:

Pin	MSA1000A Description	Outgoing cable of the MSA1000A
1	Power VCC	Red
2	Ground GND	Black
3	OUT-	Black
4	OUT+	Green
5	—	White

Notes: The GND and OUT- of the bridge circuit must be shortened with the MSA1000A BLACK cable.

2. The relation between the Sensor Parameter Value and the Supply Voltage

(1) Zero voltage and Sensitivity are proportion to the Supply Voltage.
For example, MSA1000A-02,
when the supply voltage is 5V, the Zero voltage is 2500g;
when the supply volatge is 7V, the Zero voltage is 3500
when the supply voltage is 3.3V, the Zero voltage is 1650/g;

(2) The Supply Voltage range for MSA1000A MEMS accelerometer is +3 ~ +7V. All values in the data sheet are specified at 5.0 VDC supply voltage unless otherwise stated.With 3.3V supply voltage, as the Sensitivity value would be decreased, the SNR would be also decreased, and the threshold value would be decreased;
With 7V supply voltage, as the Sensitivity value would be increased, the SNR would be also increased, and the threshold value would be increased.
Considering the thermal and derate design, we won cause reducing life to the product.

(3) For MSA3000E, there hasnn Zero voltage, Sensitivity and Supply Voltage ; the Supply Voltage range is +7 ~ +18 V.

1–1– MSA1000A Accelerometer

Features

- DC Response
- ±2g Range
- Movement, Low Frequency and Tilt Measurement
- 20,000g Shock Resistance

Notes

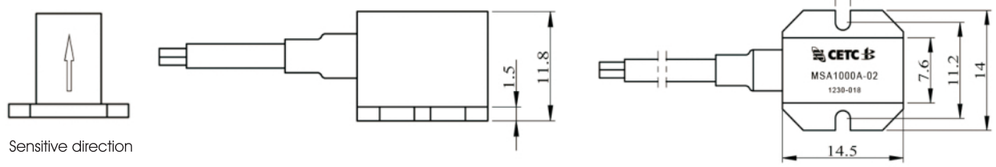
Based on a variable capacity micro-machined silicon element structure, the MSA1000A single axis MEMS accelerometer and the MSA3001F triaxial accelerometer can identify the micro acceleration vibration signal start from 0 Hz, typically applied for the micro-vibration measurement, modal analysis, inertial movement research and platform stability control in aerospace aircraft, satellite and loading platform.

MSA1000A featured with small size, light weight, solid structure. The supply voltage range is +3V ~ +7V. The Full Scale Output is 2V at +5V supply voltage. The inherent gas damping and stop design assure the 20,000 shock resistance and the constant accelerated velocity.

Typical Application

- National Defense:Aircraft Structure/Modal Analysis, Tremble Measurement, Loading Micro Vibration
- Industry:Bridge Measurement, Micro-vibration, Stable Control of Optical Platform

Structure(Unit: mm)



Sensor Connections		
Red	+ 5V	+supply voltage
Black	GND	Ground
Green	V_{out}	Output

PERFORMANCE

All values are typical at +25℃ and +5Vdc excitation unless otherwise stated. Specifications subject to change without notice

Parameter	Unit	MSA1000-02	MSA1000-10
Full Scale	g	±2	±10
Sensitivity	mV/g	1000±20	200±10
Amplitude Response5%	Hz	0～250	0～800
Mounted Resonance Frequency	Hz	1300	3000
Non-Linearity	%FS (Typ) %FS (Max)	±0.2 ±0.5	±0.2 ±0.5
Transverse Sensitivity	% (Max)	2	2
Zero Measured Output	mV (Max)	2500±50	2500±50
Thermal Zero Shift (0℃～+50℃) (-25℃～+75℃)	%FSOMax %FSOMax	±1.0 ±2.0	±1.0 ±2.0
Thermal Sensitivity Shift (0℃～+50℃) (-25℃～+75℃)	%Max %Max	±2.0 ±3.0	±2.0 ±3.0
Performance			
mechanical stops	g	±4	±30
Recovery Time	ms	＜10	＜10
Threshold	mg	0.0002	0.001
Start Time （1% Setting Accuracy）	ms	1	1
Electrical			
Excitation	Vdc	+3～+7	
Current	mA	6	
Residual Noise rms	μV	100（0.5～100Hz） 500（0.5～10KHz）	
Physical			
Case, Material	Aluminum Alloy		
Cable	Integral Cable, Four Conductor No. 34 AWG		
Identification	Manufacturers Logo,Model Number and Serial Number		
Mounting	Holes for Two M1.6 Mounting Screws/0.68 Nm		
Weight	4.9 grams(cable weights 12.1 grams/meter)		
Environmental adaptability			
Acceleration Limits(in Any Direction) Static	20000g		
Sinusoidal/Random Vibration	100g Peak （20～2000Hz） 40g RMS（20～2000Hz）		
Shock（Half-Sine Pulse）	5000g，150μs（2g and 10g Range）		
Zero Shift	0.1%FSO（5000g Impact）		
Operation	-55℃～+121℃		
Storage	-73℃～+150℃		
Humidity/Altitude	Seal, No effect		
ESD Sensitivity	2000V		
Space environment	Total dose 50 Krad Si		

Notes:

1.Full Scale Output : 4V.

2.Overload depends on Electrical Clipping and Mechanical Stops, whichever occurs first.

MSA3000E Variable Capacitance Triaxial Accelerometers

Features

- DC Response
- 2g Range
- Movement, Low Frequency and Tilt Measurement
- 20,000g Shock Resistance

Notes

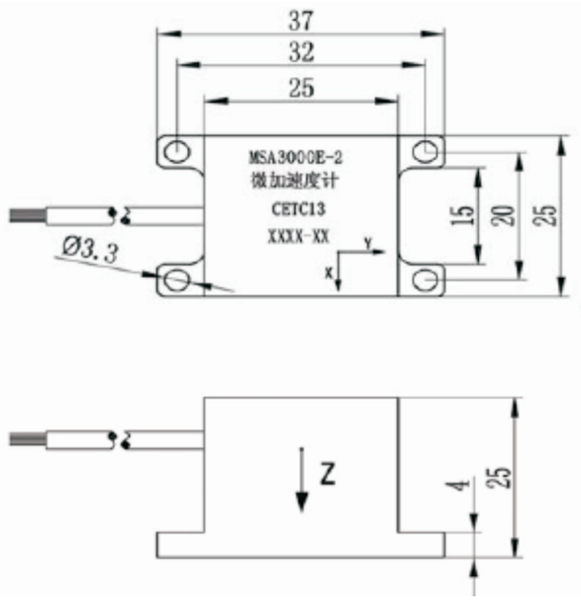
Based on a variable capacity micro-machined silicon element structure, the MSA3000E triaxial accelerometer can identify the micro acceleration vibration signal start from 0 Hz, typically applied for the micro-vibration measurement, modal analysis, inertial movement research and platform stability control in aerospace aircraft, satellite and loading platform.

MSA3000E featured with small size, light weight, solid structure. The supply voltage range is +7V ～ +40V. The Full Scale Output is

Typical Application

- National Defense:Aircraft Structure/Modal Analysis, Tremble Measurement, Loading Micro Vibration
- Industry:Bridge Measurement, Micro-vibration, Stable Control of Optical Platform

Structure(Unit: mm)



Electrical connections		
Red	+15V	+PWR
Red	-15V	-PWR
Black	GND	Ground
Green	UXout	Xaxisoutput
Yellow	UYout	Yaxisoutput
White	UZout	Zaxisoutput

PERFORMANCE

All values are typical at +25℃ and +5Vdc excitation unless otherwise stated.
Specifications subject to change without notice

Parameter	Unit	MSA3000E-02	MSA3000E-10
Full Scale	g	±2	±10
Sensitivity	mV/g	1000±20	200±10
Amplitude Response	Hz	0～250	0～800
Mounted Resonance Frequency	Hz	1300	3000
Non-Linearity	%FS (Typ) %FS (Max)	±0.2 ±0.5	±0.2 ±0.5
Transverse Sensitivity	% (Max)	3	3
Zero Measured Output	mV (Max)	2500±50	2500±50
Thermal Zero Shift (0℃～+50℃) (-25℃～+75℃)	%FSOMax %FSOMax	±1.0 ±2.0	±1.0 ±2.0
Thermal Sensitivity (0℃～+50℃) Shift (-25℃～+75℃)	%Max %Max	±2.0 ±3.0	±2.0 ±3.0
Performance	Unit	MSA3000E-02	MSA3000E-10
mechanical stops	g	±4	±30
Recovery Time	ms	＜10	＜10
Threshold	mg	0.0002	0.001
Start Time (1% Setting Accuracy)	ms	1	1
Electrical			
Excitation	Vdc	+7～+40	
Power supply	mA	20	
Residual Noise rms	μV	100 (0.5～100Hz) 500 (0.5～10KHz)	
Physical			
Case, Material	Aluminum Alloy		
Cable	Integral Cable, Four Conductor No. 34 AWG		
Identification	Manufacturer		
Mounting			
Weight			
Environmental adaptability			
Acceleration Limits(in Any Direction) Static	20000g		
Sinusoidal/Random Vibration	100g Peak (20～2000Hz) 40gRMS (20～2000Hz)		
Shock (Half-Sine Pulse)	5000g, 150μs (2g and 10g Range)		
Zero Shift	0.1%FSO (5000g Impact)		
Operation	-55℃～+121℃		
Storage	-73℃～+150℃		
Humidity/Altitude	Seal, No effect		
ESD Sensitivity	2000V		
Space environment	otal dose 50 Krad Si		

Notes:

1.Full Scale Output : 4V.

2.Zero voltage and Sensitivity are proportion to the Supply Voltage, technical performance corresponding to +5V power supply voltage.

3.Overload depends on Electrical Clipping and Mechanical Stops, whichever occurs first.