3 Axis Acceleration Sensor

M-A370AD10

RoHS Compliant

製品型番
M-A370AD10 : X2F000091000000

- Ultra-low noise, surpassing USGS New High Noise Model [1] 0.02 µG/√Hz typ. (1 Hz ~ 10 Hz)
- High-precision Amplitude Response : ±0.4 dB, Phase Response : ± 0.1 °, Sensitivity Error : ± 500 × 10^{-6}
- High dynamic range ± 10 G (170 dB)
- High bias stability Temperature Error : ± 0.5 mG Max., Bias Repeatability for 1 year : ± 0.1 mG Typ.
- GNSS synchronization by 1 PPS (Pulse Per Second)
- 3-axis digital output SPI / UART that is not easily affected by noise

Recommended Application

- Seismic measurement • Resource exploration • Tilt measurement
- Structural Health Monitoring (SHM) • Vibration analysis / control / stabilization

[1] Peterson, J., "Observations and Modeling of Seismic Background Noise", USGS Open-File Report 93-322, 1993

Recommended Operating Condition

Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CC} to GND		3.15	3.3	3.45	V
Digital input voltage to GND		GND		V_{CC}	V
Digital output voltage to GND		- 0.3		V_{CC} + 0.3	V
Operating temperature range		- 30		+ 85	°C
Startup time	Power-on to start output.			900	ms

Specifications

T_A = - 30 °C to + 85 °C, V_{CC} = 3.15 V to 3.45 V, ≤ ± 1 G, unless otherwise noted.

Parameter	Test Conditions / Comments	Min.	Typ.	Max.	Unit
ACCELERATION					
Sensitivity					
Output Range	f = DC ~ 210 Hz	- 10		+ 10	G
Scale Factor	2^{-24} G/LSB		0.06		µG/LSB
Sensitivity Error	25 °C, -1 G ~ 1 G		± 500		x10^{-6}
Nonlinearity	25 °C, -1 G ~ 1 G, Best fit straight line			± 0.03	%
Cross Axis Sensitivity	No alignment correction		± 0.2		%
Bias					
Initial Error	25°C			± 2.0	mG
Bias Repeatability *4	One year after shipment, 25 °C, V_{CC} = 3.3 V, Average		± 0.1		mG
Bias Temperature Error	Bias offset change from 25°C reference			± 0.5	mG
Temperature sensitivity			± 0.1		mG/°C
Noise					
Noise Density	25 °C, Average, f = 1 Hz ~ 10 Hz		0.02	0.04	µG/√Hz, rms
Cantilever Resonance Frequency *1	25 °C, V_{CC} = 3.3 V		450		Hz
FUNCTION					
Built-in LPF cut off	-6 dB at +25 °C, selectable	9		210	Hz
User LPF			4, 64, 128, 512		Tap
Output data rate	User selectable	50		1,000	Hz
1 PPS Input Cycle		1 - 10^{-5}	1	1 + 10^{-5}	s
Ext.trigger jitter	ADC's completion to Ext.trigger input	0		5	µs
TEMPERATURE SENSOR					
Output Range		- 30		+ 85	°C
16-bit Scale Factor *2	Output = 2634 (0x0A4A) at 25 °C		- 0.0037918		°C/LSB
RELIABILITY					
MTTF*3	25 °C	87,600			h

*1) Please make sure that a vibration on this product around the resonance frequency does not exceed 5 mG. Please take an appropriate action (e.g. installing a damper mechanism) if it exceeds 5 mG.

*2) This is a reference value used for the internal temperature correction, and is not guaranteed to accurately output the interior temperature.

*3) Based on the test results, the estimated value is determined under the condition of an 80 % reliability level.

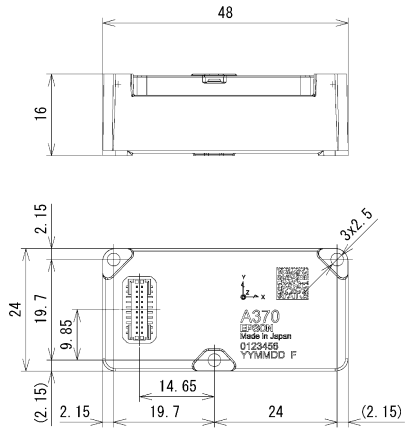
*4) Estimated value from accelerated testing results.

Note) The values in the specifications are based on the data calibrated at the factory. The values may change according to the way the product is used.

Note) The Max/Min value is the maximum/minimum value of the design or factory shipment examination, unless otherwise specified.

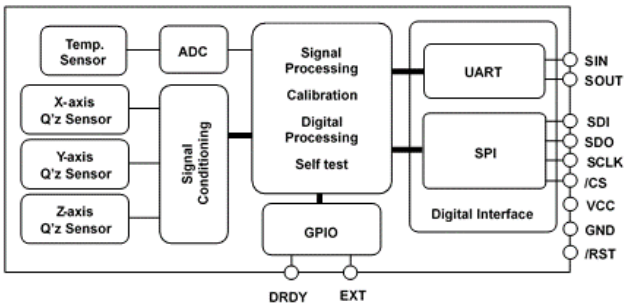
Note) The calibrated standard 1 G gravitational acceleration value is 9.80665 m/s^2.

Outline Dimensions

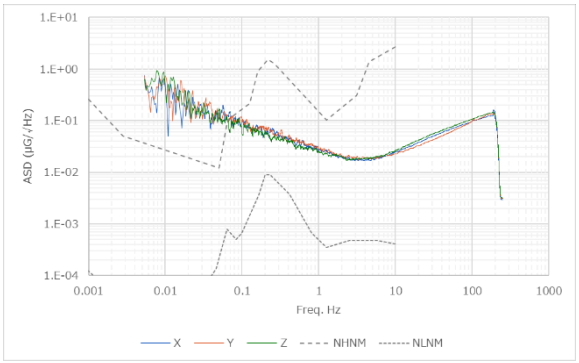


Unit : mm

Block Diagram

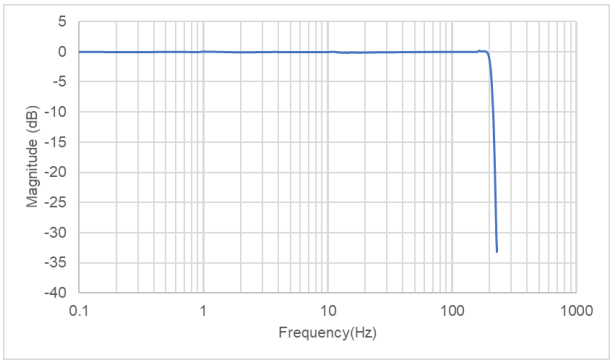


Noise Density



ASD : Amplitude Spectral Density

Frequency Response



fc 210 Hz (512 Tap)

Note) The product characteristics shown above are just examples and are not guaranteed as specifications.
Note) This product is subject to export regulations as defined by the "Foreign Exchange and Foreign Trade Act."
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