



## 3 Axis Acceleration Sensor

## M-A370AD10



製品型番

M-A370AD10 : X2F000091000000



- Ultra-low noise, surpassing USGS New High Noise Model <sup>[1]</sup> 0.02  $\mu\text{G}/\sqrt{\text{Hz}}$  typ. (1 Hz ~ 10 Hz)
- High-precision Amplitude Response :  $\pm 0.4$  dB, Phase Response :  $\pm 0.1^\circ$ , Sensitivity Error :  $\pm 500 \times 10^{-6}$
- High dynamic range  $\pm 10$  G (170 dB)
- High bias stability Temperature Error :  $\pm 0.5$  mG Max., Bias Repeatability for 1 year :  $\pm 0.1$  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	$^\circ\text{C}$
Startup time	Power-on to start output.			900	ms

## Specifications

 $T_A = -30^\circ\text{C}$  to  $+85^\circ\text{C}$ ,  $V_{CC} = 3.15$  V to  $3.45$  V,  $\leq \pm 1$  G, unless otherwise noted.

Parameter	Test Conditions / Comments	Min.	Typ.	Max.	Unit
<b>ACCELERATION</b>					
<b>Sensitivity</b>					
Output Range	$f = \text{DC} \sim 210$ Hz	- 10		+ 10	G
Scale Factor	$2^{-24}$ G/LSB		0.06		$\mu\text{G}/\text{LSB}$
Sensitivity Error	$25^\circ\text{C}$ , -1 G ~ 1 G		$\pm 500$		$\times 10^{-6}$
Nonlinearity	$25^\circ\text{C}$ , -1 G ~ 1 G, Best fit straight line			$\pm 0.03$	%
Cross Axis Sensitivity	No alignment correction		$\pm 0.2$		%
<b>Bias</b>					
Initial Error	$25^\circ\text{C}$			$\pm 2.0$	mG
Bias Repeatability <sup>*4</sup>	One year after shipment, $25^\circ\text{C}$ , $V_{CC} = 3.3$ V, Average		$\pm 0.1$		mG
Bias Temperature Error	Bias offset change from $25^\circ\text{C}$ reference			$\pm 0.5$	mG
Temperature sensitivity			$\pm 0.1$		mG/ $^\circ\text{C}$
<b>Noise</b>					
Noise Density	$25^\circ\text{C}$ , Average, $f = 1$ Hz ~ 10 Hz		0.02	0.04	$\mu\text{G}/\sqrt{\text{Hz}}$ , rms
Cantilever Resonance Frequency <sup>*1</sup>	$25^\circ\text{C}$ , $V_{CC} = 3.3$ V		450		Hz
<b>FUNCTION</b>					
Built-in LPF cut off	-6 dB at $+25^\circ\text{C}$ , 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	$\mu\text{s}$
<b>TEMPERATURE SENSOR</b>					
Output Range		- 30		+ 85	$^\circ\text{C}$
16-bit Scale Factor <sup>*2</sup>	Output = 2634 (0x0A4A) at $25^\circ\text{C}$		- 0.0037918		$^\circ\text{C}/\text{LSB}$
<b>RELIABILITY</b>					
MTTF <sup>*3</sup>	$25^\circ\text{C}$	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.

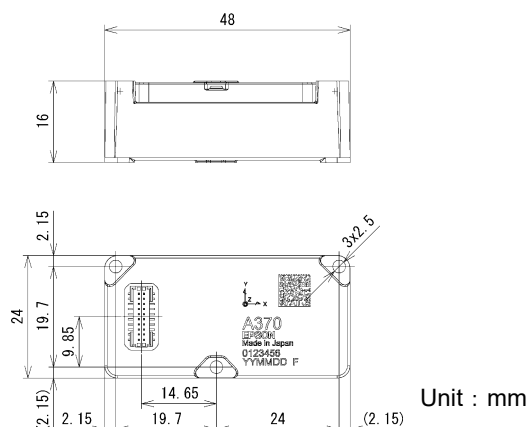
\*4) Estimated value from accelerated testing results.

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.

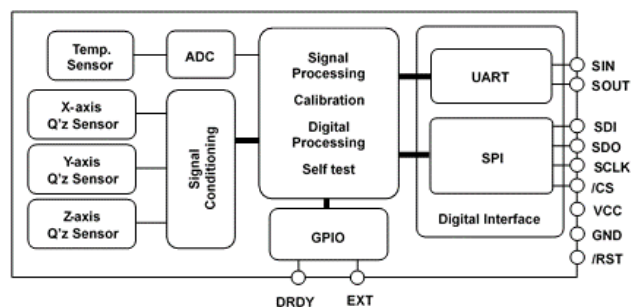
Note) The Max/Min value is the maximum/minimum value of the design or factory shipment examination, unless otherwise specified.

Note) The calibrated standard 1 G gravitational acceleration value is  $9.80665 \text{ m/s}^2$ .

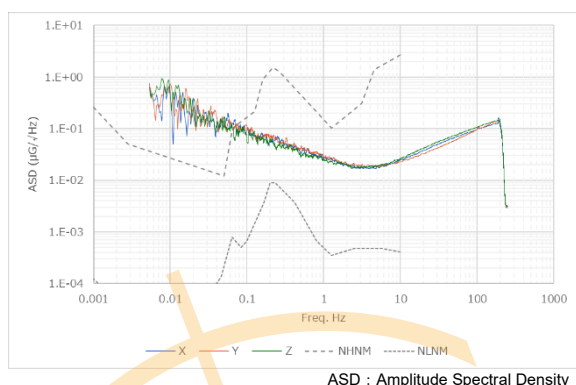
## Outline Dimensions



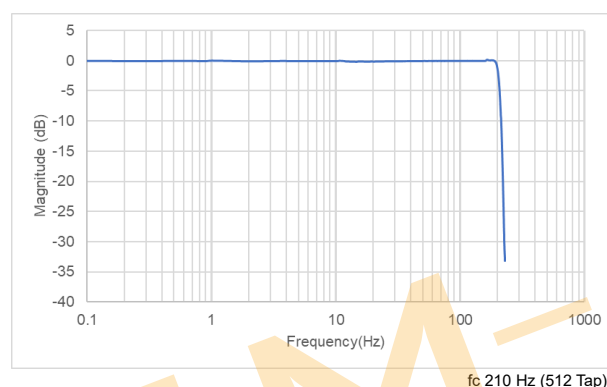
## Block Diagram



## Noise Density



## Frequency Response



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."

When exporting, please follow the relevant laws and regulations of the region and complete the necessary procedures.

## Notice of the Document

NOTICE : PLEASE READ CAREFULLY BELOW BEFORE THE USE OF THIS DOCUMENT ©Seiko Epson Corporation 2025

- The content of this document is subject to change without notice. Before purchasing or using Epson products, please contact with sales representative of Seiko Epson Corporation ("Epson") for the latest information and be always sure to check the latest information published on Epson's official web sites and resources.
- This document may not be copied, reproduced, or used for any other purposes, in whole or in part, without Epson's prior consent.
- Information provided in this document including, but not limited to application circuits, programs and usage, is for reference purpose only. Epson makes no guarantees against any infringements or damages to any third parties' intellectual property rights or any other rights resulting from the information. This document does not grant you any licenses, any intellectual property rights or any other rights with respect to Epson products owned by Epson or any third parties.
- Using Epson products, you shall be responsible for safe design in your products; that is, your hardware, software, and/or systems shall be designed enough to prevent any critical harm or damages to life, health or property, even if any malfunction or failure might be caused by Epson products. In designing your products with Epson products, please be sure to check and comply with the latest information regarding Epson products (including, but not limited to this document, specifications, data sheets, manuals, and Epson's web site). Using technical contents such as product data, graphic and chart, and technical information, including programs, algorithms and application circuit examples under this document, you shall evaluate your products thoroughly both in stand-alone basis and within your overall systems. You shall be solely responsible for deciding whether to adopt/use Epson products with your products.
- Epson has prepared this document carefully to be accurate and dependable, but Epson does not guarantee that the information is always accurate and complete. Epson assumes no responsibility for any damages you incurred due to any misinformation in this document.
- No dismantling, analysis, reverse engineering, modification, alteration, adaptation, reproduction, etc., of Epson products is allowed.
- Epson products have been designed, developed and manufactured to be used in general electronic applications and specifically designated applications ("Anticipated Purpose"). Epson products are NOT intended for any use beyond the Anticipated Purpose that requires particular quality or extremely high reliability in order to refrain from causing any malfunction or failure leading to critical harm to life and health, serious property damage, or severe impact on society, including, but not limited to listed below ("Specific Purpose"). Therefore, you are strongly advised to use Epson products only for the Anticipated Purpose. Should you desire to purchase and use Epson products for Specific Purpose, Epson makes no warranty and disclaims with respect to Epson products, whether express or implied, including without limitation any implied warranty of merchantability or fitness for any Specific Purpose. Space equipment (artificial satellites, rockets, etc.)/Transportation vehicles and their control equipment (automobiles, aircraft, trains, ships, etc.)/Medical equipment/Relay equipment to be placed on sea floor/ Power station control equipment/Disaster or crime prevention equipment/Traffic control equipment/Financial equipment Other applications requiring similar levels of reliability as the above
- Epson products listed in this document and our associated technologies shall not be used in any equipment or systems that laws and regulations in Japan or any other countries prohibits to manufacture, use or sell. Furthermore, Epson products and our associated technologies shall not be used for the purposes of military weapons development (e.g. mass destruction weapons), military use, or any other military applications. If exporting Epson products or our associated technologies, please be sure to comply with the Foreign Exchange and Foreign Trade Control Act in Japan, Export Administration Regulations in the U.S.A (EAR) and other export-related laws and regulations in Japan and any other countries and to follow their required procedures.
- Epson assumes no responsibility for any damages (whether direct or indirect) caused by or in relation with your non-compliance with the terms and conditions in this document or for any damages (whether direct or indirect) incurred by any third party that you give, transfer or assign Epson products.
- For more details or other concerns about this document, please contact our sales representative.
- Company names and product names listed in this document are trademarks or registered trademarks of their respective companies.

SEIKO EPSON CORPORATION

MD SALES DEPT.

[https://global.epson.com/products\\_and\\_drivers/sensing\\_system/contact/](https://global.epson.com/products_and_drivers/sensing_system/contact/)

Distributed by [www.texim-europe.com](http://www.texim-europe.com)

## **Disclaimer**

ALL PRODUCTS, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Texim Europe B.V. its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Texim"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Texim makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product.

It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application.

Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time.

All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts.

Please contact us if you have any questions about the contents of the datasheet.

This may not be the latest version of the datasheet. Please check with us if a later version is available.





## Headquarters & Warehouse

Elektrostraat 17  
NL-7483 PG Haaksbergen  
The Netherlands

T: +31 (0)53 573 33 33  
E: [info@texim-europe.com](mailto:info@texim-europe.com)  
Homepage: [www.texim-europe.com](http://www.texim-europe.com)



### The Netherlands

Elektrostraat 17  
NL-7483 PG Haaksbergen

T: +31 (0)53 573 33 33  
E: [nl@texim-europe.com](mailto:nl@texim-europe.com)



### Belgium

Zuiderlaan 14, box 10  
B-1731 Zellik

T: +32 (0)2 462 01 00  
E: [belgium@texim-europe.com](mailto:belgium@texim-europe.com)



### UK & Ireland

St Mary's House, Church Lane  
Carlton Le Moorland  
Lincoln LN5 9HS

T: +44 (0)1522 789 555  
E: [uk@texim-europe.com](mailto:uk@texim-europe.com)



### Germany

Bahnhofstrasse 92  
D-25451 Quickborn

T: +49 (0)4106 627 07-0  
E: [germany@texim-europe.com](mailto:germany@texim-europe.com)



### Germany

Martin-Kollar-Strasse 9  
D-81829 München

T: +49 (0)89 436 086-0  
E: [muenchen@texim-europe.com](mailto:muenchen@texim-europe.com)



### Austria

Warwitzstrasse 9  
A-5020 Salzburg

T: +43 (0)662 216 026  
E: [austria@texim-europe.com](mailto:austria@texim-europe.com)



### Nordic

Stockholmsgade 45  
2100 Copenhagen

T: +45 88 20 26 30  
E: [nordic@texim-europe.com](mailto:nordic@texim-europe.com)



### Italy

Martin-Kollar-Strasse 9  
D-81829 München

T: +49 (0)89 436 086-0  
E: [italy@texim-europe.com](mailto:italy@texim-europe.com)