



3 Axis Acceleration Sensor

M-A352AD10



Product number
M-A352AD10 : X2F0000110001



- Ultra-low noise : 0.2 μ G/ $\sqrt{\text{Hz}}$ typ.
- Frequency response characteristics: DC to 460 Hz (-6dB)
- Low jitter external trigger function for synchronous sampling
- High dynamic range: ± 15 G (148 dB at $f_c = 16$ Hz / 512 Tap)
- 3-axis digital output SPI / UART
- Power consumption : 20 mA Typ. (Output data rate 200 Hz)

Recommended Application

- SHM (Structural Health Monitoring) • seismic observation
- Vibration analysis, control and stabilization • Motion analysis and control

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
ACCELERATION					
Sensitivity					
Output dynamic range	$f = \text{DC to } 460 \text{ Hz}$	-15		+15	G
Scale factor	2^{-24} G / LSB		0.06		$\mu\text{G / LSB}$
Sensitivity error	$+25^{\circ}\text{C}$, ≤ 1 G		± 500		$\times 10^{-6}$ (ppm)
Nonlinearity	≤ 1 G, Best fit straight line, $+25^{\circ}\text{C}$	-0.03		+0.03	% of FS
Cross axis sensitivity			± 0.2		%
Bias					
Initial error	$+25^{\circ}\text{C}$	-2		+2	mG
Bias repeatability	$T_A = +25^{\circ}\text{C}$ and $V_{CC} = 3.3\text{V}$ for one year after shipment		3		mG
Bias temperature error	$+25^{\circ}\text{C}$	-2		+2	mG
Temperature sensitivity			± 0.1		mG / $^{\circ}\text{C}$
Noise					
Noise density	$+25^{\circ}\text{C}$, Avg, $f = 0.5 \text{ Hz to } 6 \text{ Hz}$		0.2	0.7	$\mu\text{G / } \sqrt{\text{Hz}}$, rms
Cantilever resonance frequency ^{*1}	$+25^{\circ}\text{C}$, $V_{CC} 3.3 \text{ V}$		850		Hz
Frequency property					
-6 dB bandwidth	User selectable	9		460	Hz
FUNCTION					
Built-in LPF cut off	-6 dB at $+25^{\circ}\text{C}$, selectable	9		460	Hz
User LPF			4, 64, 128, 512		Tap
Output data rate	User selectable	50		1,000	Hz
Ext.trigger input cycle		1		20	ms
Ext.trigger jitter	ADC's completion to Ext.trigger input	0		5	μs
TEMPERATURE SENSOR					
Output range		-30		+85	$^{\circ}\text{C}$
Scale factor ^{*2}	Output = 2634 (0x0A4A) at $+25^{\circ}\text{C}$		-0.0037918		$^{\circ}\text{C / LSB}$
RELIABILITY					
MTBF ^{*3}	JIS-C5003 $T_A = +25^{\circ}\text{C}$	87,600			hour

*1) Please make sure that a vibration on this product around the resonance frequency does not exceed 100 mG. Please take an appropriate action (e.g. installing a damper mechanism) if it exceeds 100 mG.

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

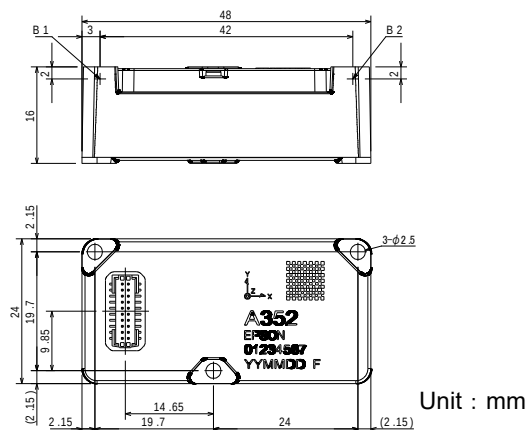
*3) The MTBF is an estimated value derived from the result of high temperature operation with a system requirement of $T_A = +25^{\circ}\text{C}$ and a 60% reliability level.

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.

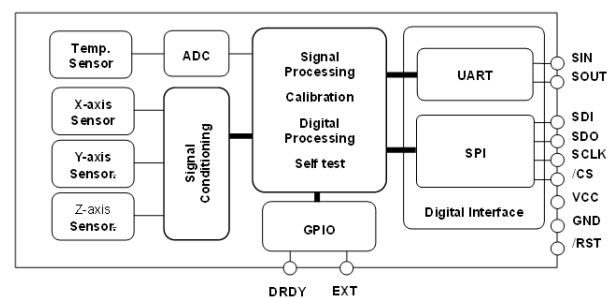
Note) The Max/Min value is the maximum/minimum value of the design or factory shipment examination, unless otherwise specified.

Note) The calibrated standard 1G gravitational acceleration value is 9.80665 m/s²

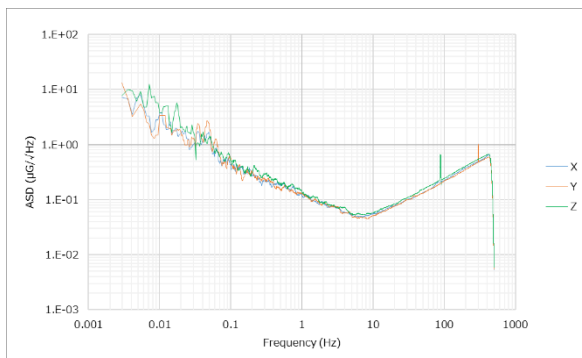
Outline Dimensions



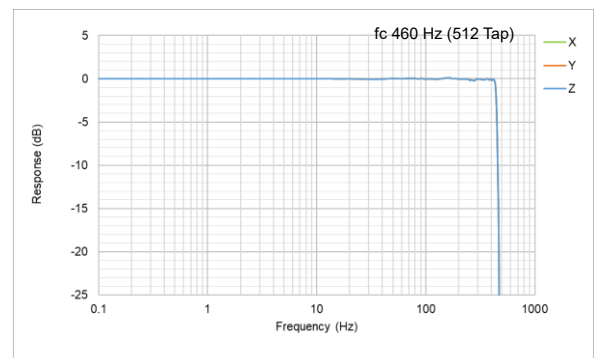
Block Diagram



Noise Density (Acceleration Output)



Frequency Response (Acceleration Output)



The product characteristics shown above are just examples and are not guaranteed as specifications

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