

High Accuracy Three Axis Accelerometer

■ GENERAL DESCRIPTION

The M-A352 is a three axis digital output accelerometer featuring ultra-low noise, high stability, and low power consumption using fine processing technology of Quarts. Incorporating both high accuracy and durability, the versatile M-A352 is well suited to a wide-range of challenging applications such as SHM, seismic observation, condition monitoring for industrial equipment, and pose detection for industrial machinery (i.e. construction machinery/attachments, agricultural machinery/ implements, robots).

■ FEATURES

- **Ultra-low noise : 0.2 μ G/ $\sqrt{\text{Hz}}$ typ.**
- **Improved shock resistance: 1,200G**
- **Selectable output format: Acceleration / Tilt Angle**
- **Selectable interface: SPI / UART**
- **Programmable low-pass digital filters**
- **Low jitter external trigger function for synchronous sampling**
- **Solid Metallic Case (Size : 48mm x 24mm x 16mm, Weight: 25g)**



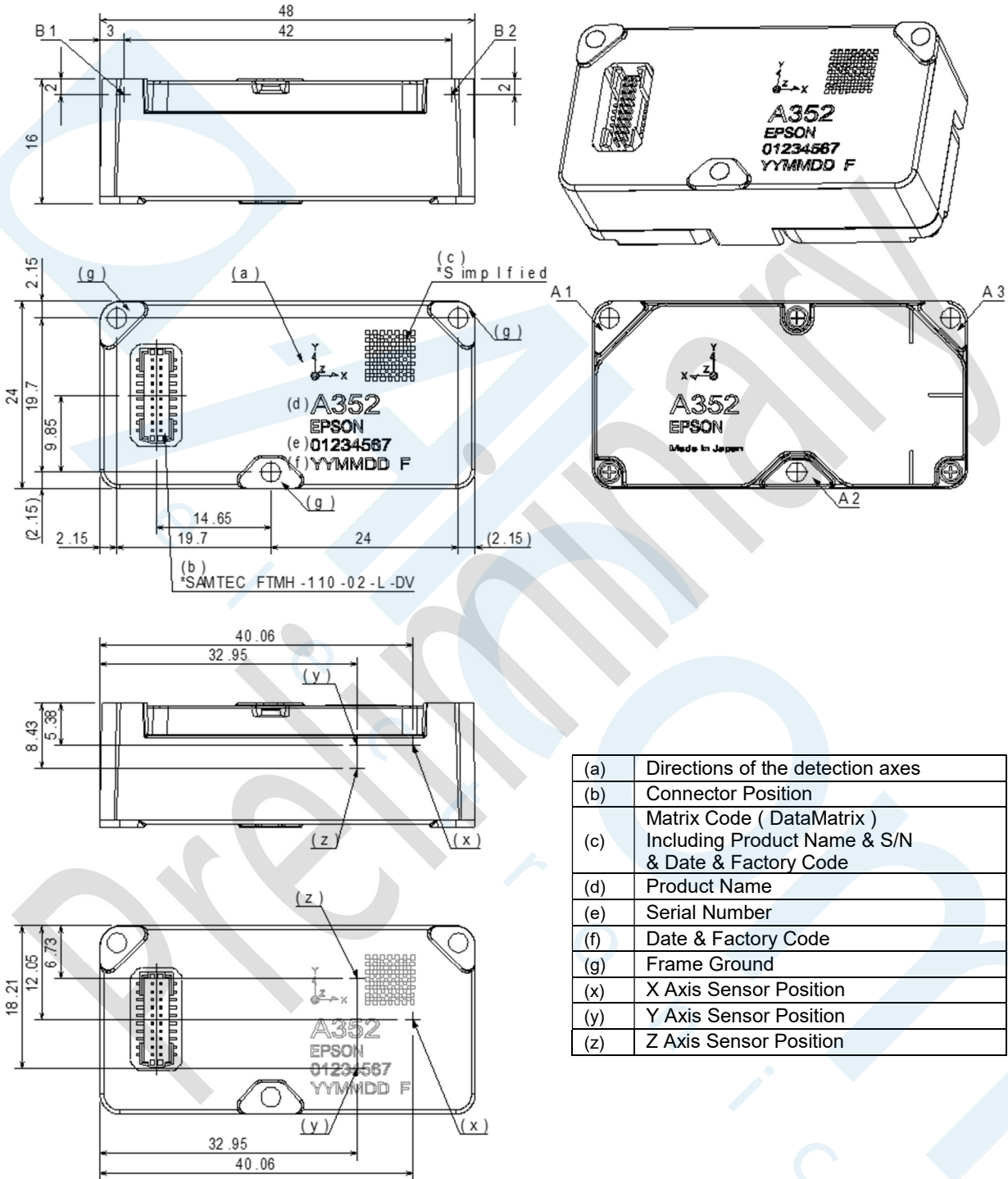
■ SPECIFICATION

T_A=-30°C to +85°C, VCC=3.15V~3.45V, $\leq \pm 1\text{G}$, unless otherwise noted.

Parameter	Test Conditions / Comments	Min	Typ	Max	Unit
SPECIFICATIONS					
Output Dynamic Range	*1			± 15	G
Scale Factor	2 ⁻²⁴ G/LSB		0.06		$\mu\text{G}/\text{LSB}$
Sensitivity Error	25°C, $\leq 1\text{G}$		± 500		$\times 10^{-6}$ (ppm)
Nonlinearity	$\leq 1\text{G}$, Best fit straight line, RT			± 0.03	% of FS
Misalignment	25°C			± 0.1	Deg
Initial Error	25°C			± 2	mG
Bias Repeatability	T _A =25°C and VCC=3.3V for one year after shipment		3		mG
Bias Temperature Error	25°C			± 2	mG
Noise Density	25°C, Avg, f = 0.5Hz ~ 6Hz		0.2	0.7	$\mu\text{G}/\sqrt{\text{Hz}}$, rms
Cantilever Resonance frequency	25°C, VCC3.3V		850		Hz
VRC	at 50Hz, 25°C, VCC3.3V			± 50	$\mu\text{G}/\text{G}^2$
Power Supply Current	Standard noise floor condition, 200Sps, Average		13.2	18.0	mA
	Reduced noise floor condition, 200Sps, Average		16.2	20.0	mA
	Sleep mode		1.3	2.0	mA
FUNCTION					
Built-in LPF Cut off	-6dB at 25°C, selectable	9		460	Hz
User LPF			4, 64, 128, 512		Tap
Output Data Rate		50		1,000	Sps
Ext.Trigger Input Cycle		1		20	ms
Ext.Trigger Jitter	ADC's completion to Ext.Trigger input	0		5	μs
RECOMMENDED OPERATING CONDITION					
VCC to GND		3.15	3.3	3.45	V
Operating temperature range	No condensation	-30		85	°C
ABSOLUTE MAXIMUM RATINGS					
Acceleration/Shock	Half-sine 0.2msec		1,200		G
MTBF	JIS-C5003, 60% reliability leve		87,600		Hour
Storage Temperature Range	No condensation	-40		85	°C

*1 This accelerometer is referenced to the standard gravity acceleration value. (9.80665m/s²)

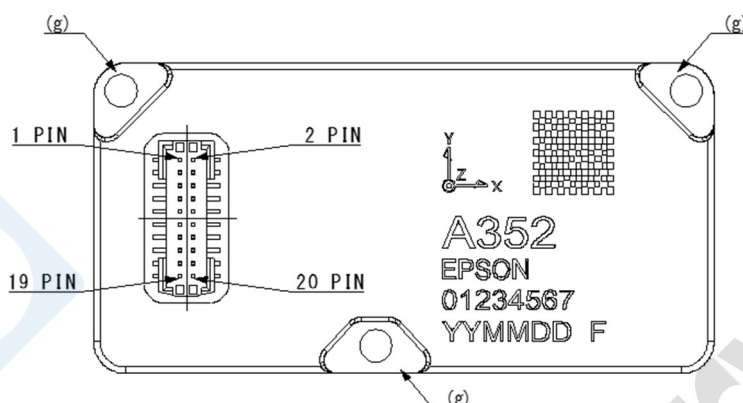
OUTLINE DIMENTIONS



(a)	Directions of the detection axes
(b)	Connector Position
(c)	Matrix Code (DataMatrix) Including Product Name & S/N & Date & Factory Code
(d)	Product Name
(e)	Serial Number
(f)	Date & Factory Code
(g)	Frame Ground
(x)	X Axis Sensor Position
(y)	Y Axis Sensor Position
(z)	Z Axis Sensor Position

- *1 This product is calibrated with reference to mounting points A1, A2, A3, B1, and B2.
- *2 It is recommended to fasten and mount to reference points A1, A2, and A3 on a solid flat surface using M2 screws to ensure the optimal performance.
- *3 The recommended socket connector on the host side is SAMTEC CLM-110-02-H-D.
Where necessary to ensure high connection reliability, use screws to fasten the pc board assembly (that contains the host side connector) to this product.

■ PIN LAYOUT AND FUNCTION



Pin No.	Mnemonic	Type*1	Description
1	SCLK	I	SPI Serial Clock *2
2	SDO	O	SPI Data Output *2
5	SDI	I	SPI Data Input *2
6	/CS	I	SPI Chip Select *2
7	SOUT	O	UART Data Output *2
9	SIN	I	UART Data Input *2
13	DRDY	O	Data Ready
14	EXT	I	External Trigger Input (Sleep Wakeup Input)
16	/RST	I	Reset
10,11,12	VCC	S	Power Supply 3.3V
3,4,8,15	GND	S	Ground *3
17,18,19,20	NC	N/A	Do Not Connect

*1 Pin Type I: Input, O: Output, I/O: Input/Output, S: Supply, N/A: Not Applicable

*2 Connect only one of the serial interfaces (SPI or UART) at a time. This product malfunctions when both SPI and UART are connected at the same time.

*3 Please connect (g) Frame Ground to any GND pin (No.3, 4, 8, 15).

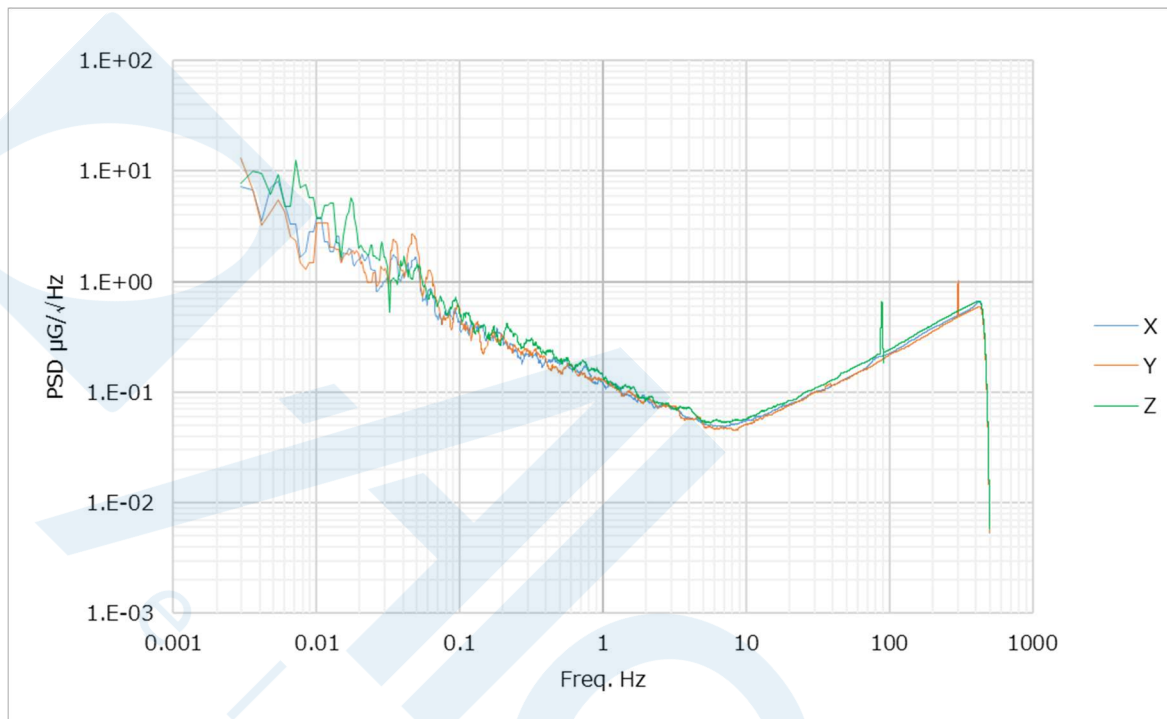
■ EVALUATION TOOLS

Evaluation tools can be provided for the M-A352. For details, contact our representatives.

Product Model Number	Product Name	Comments
E92E609041	M-G32EV041	USB Evaluation Board for M-A352AD10 *Works with Logger Software.
E92E609051	M-G32EV051	Relay board for M-A352AD10 *Combination with M-G32EV041 is possible.

■ Noise Density Data

Power Spectrum Density (Reduced noise floor condition)



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