

↔ : Direction of acceleration detection

RoHS compliant

FEATURES

- High precision and high reliability:**
Offset temperature characteristics
 $\pm 38\text{mg}$ (Typical value)
- High sensitivity: 1 to 1.333V/g**
(VDD=5V)
- Product lineup covers range of operating voltage and acceleration detection.**

TYPICAL APPLICATIONS

- Car electronics**
 - Car navigation system (inclination detection)
 - Event data recorder
 - Car security systems (Theft prevention using slope and vibration detection)
- Equipments for shipping and special vehicles**
 - Devices for shipping, construction equipment, agricultural machinery, and vehicles for persons with special needs
- Other applications**
 - Theft prevention for all types of equipment and devices
 - Measuring instruments (levels, gauges)

ORDERING INFORMATION

	AGS	2	1			1
Number of detectable axis (Method)						
2: 2-axis Acceleration Sensor (Electrostatic capacitance type)						
Package type/Size						
1: Ceramic package/6.2 x 8.5 mm						
Detection sensitivity						
1: 1 V/g						
3: 1.333 V/g						
6: 0.6 V/g						
8: 0.8 V/g						
Operation power supply voltage/Output type						
3: 3 V DC/Analog output						
5: 5 V DC/Analog output						
Type						
1: Built-in ASIC						

TYPES

Product name	Operation power supply voltage	Acceleration detection range	Detection sensitivity	Part number
2-axis Acceleration sensor GS2	3V DC	$\pm 2\text{g}$	0.6V/g	AGS21631
		$\pm 1.5\text{g}$	0.8V/g	AGS21831
	5V DC	$\pm 2\text{g}$	1V/g	AGS21151
		$\pm 1.5\text{g}$	1.333V/g	AGS21351

Standard packing: Carton: 1,000 pcs.

ABSOLUTE MAXIMUM RATINGS

Item	Unit	Absolute maximum ratings			Remarks
		Min.	Typ.	Max.	
Max. applied voltage	V	-0.3	—	7	Ta=25°C 77°F
Storage temperature range	°C °F	-40 -40	—	85 185	
Operation temperature range	°C °F	-40 -40	—	85 185	
Anti-shock characteristic	g	—	—	5,000	

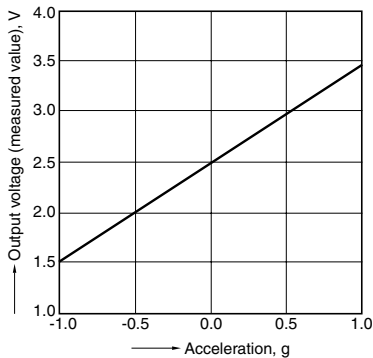
ELECTRICAL CHARACTERISTICS

Item	Unit	Performance												Remarks
		Min.				Typ.				Max.				
		AGS 21151	AGS 21351	AGS 21631	AGS 21831	AGS 21151	AGS 21351	AGS 21631	AGS 21831	AGS 21151	AGS 21351	AGS 21631	AGS 21831	
Acceleration detection range ^{Note 1)}	g	-2	-1.5	-2	-1.5	—				2	1.5	2	1.5	
Operation power supply voltage	V	4.75		2.85		5		3		5.25		3.15		-40 to +85°C -40 to +185°F
Current consumption	mA	—		—		2		1.8		5		5		0g, Ta=25°C 77°F
Sensitivity	V/g	0.975	1.3	0.585	0.78	1	1.333	0.6	0.8	1.025	1.366	0.615	0.82	Ta=25°C 77°F
Offset voltage (0 g)	V	2.44	2.42	1.464	1.452	2.5		1.5		2.56	2.58	1.536	1.548	Ta=25°C 77°F
Temperature sensitivity characteristic	%	-2				—				2				-40 to +85°C -40 to +185°F
Offset voltage temperature characteristic	mg	-55				—				55				-40 to +85°C -40 to +185°F
Other axis sensitivity ^{Note 2)}	%	-5				—				5				Ta=25°C 77°F
Non-linearity ^{Note 3)}	%FS	-1				—				1				Ta=25°C 77°F
Turn-on time ^{Note 4)}	ms	—				10				—				0g, Ta=25°C 77°F C1=220nF, C2=27nF
Frequency response ^{Note 5)}	Hz	DC				—				60				-3dB point, C2=27nF

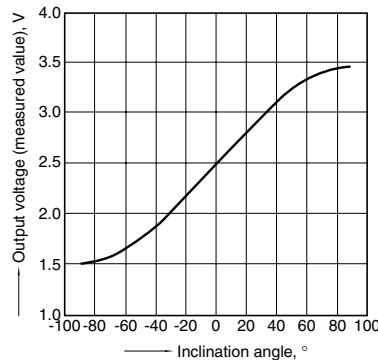
- Notes: 1. The acceleration unit "g" means 9.8 m/s².
 2. VDD typical value of each part number when nothing is specified.
 3. Maximum error from linear output that connects +2 g and -2 g output.
 4. "C1" is a ceramic capacitor installed between the VDD and GND terminals. "C2" is a ceramic capacitor installed between the Vout (X) and Ext-Cap (X) terminals. "C3" is a ceramic capacitor installed between the Vout (Y) and Ext-Cap (Y) terminals.
 5. The frequency characteristics can be changed depending on the C2 and C3 capacitance value. Please refer to "Recommended circuit diagram" on the following page. Note that the maximum frequency response is 60 Hz.

REFERENCE DATA

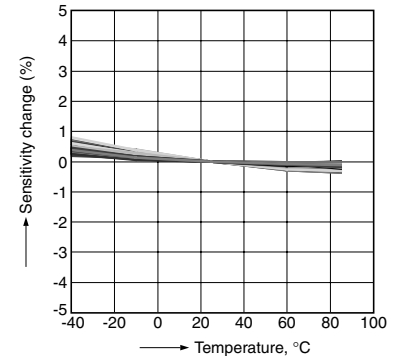
1. Output characteristics



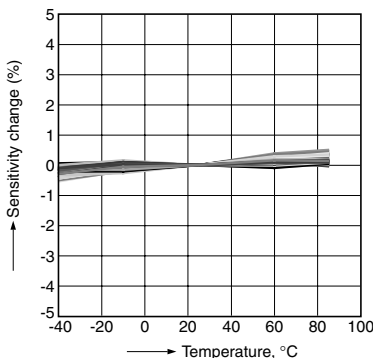
2. Inclination angle - Output voltage characteristics



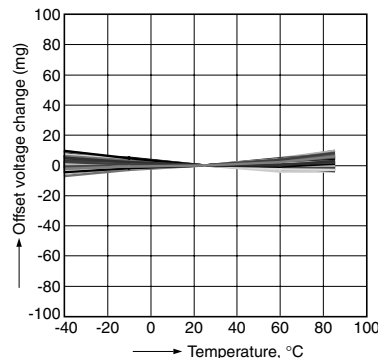
3.-1 Sensitivity temperature characteristics X-axis (VDD=5V)



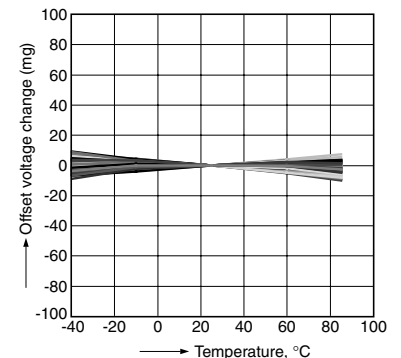
3.-2 Sensitivity temperature characteristics Y-axis (VDD=5V)



4.-1 Offset voltage temperature characteristics X-axis (VDD=5V)

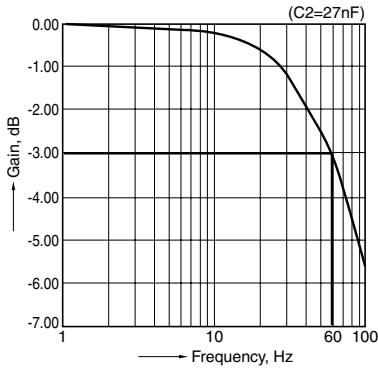


4.-2 Offset voltage temperature characteristics Y-axis (VDD=5V)



GS2 Sensor (AGS2)

5. Frequency characteristics

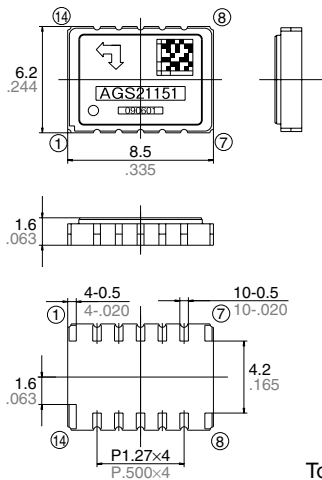


Note: The frequency characteristics can be changed depending on the C2 capacitance value. Please refer to "Recommended circuit diagram" on the following page.

DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

CAD Data

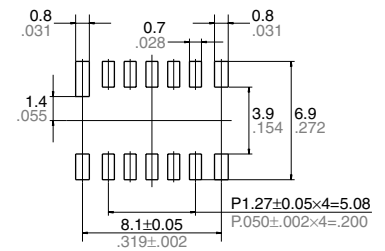


Terminal layout			
①	NC	⑧	NC
②	GND	⑨	VDD
③	NC	⑩	Ext-Cap (Y)
④	Vout (X)	⑪	Vout (Y)
⑤	Ext-Cap (X)	⑫	NC
⑥	GND	⑬	NC
⑦	NC	⑭	NC

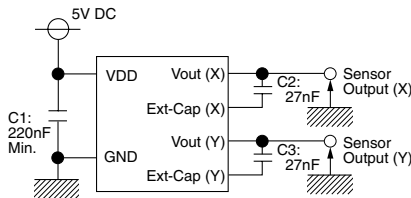
Leave terminal "NC (No. 1, 3, 7, 8 and 12 to 14)" unconnected.
The No. 2 and No. 6 terminals are connected internally.

Tolerance: ±0.2 ±.008

Recommended PC board pad



RECOMMENDED CIRCUIT DIAGRAM

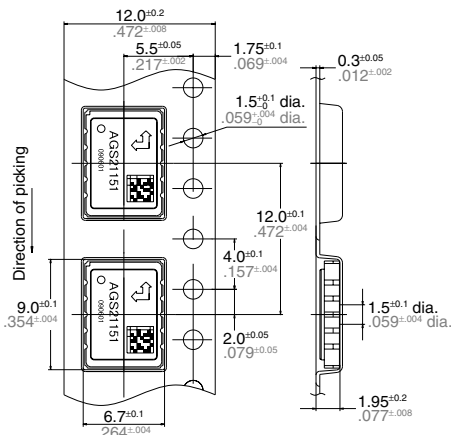


The frequency characteristics value can be changed depending on the C2 and C3 capacitance value.
-3dB bandwidth is expressed in the formula below.

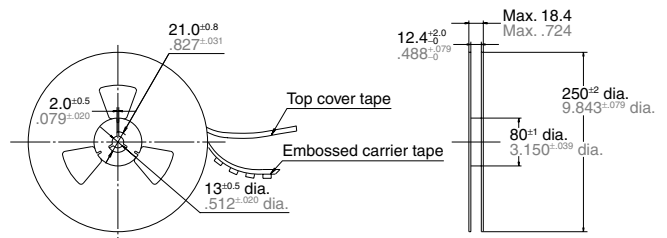
$$f_{-3dB} = \frac{1}{2\pi \times (100k\Omega) \times (C2 \text{ or } C3)}$$

PACKING FORMAT (Tape and reel) (mm inch)

Tape dimensions



Dimensions of tape reel



For NOTES.