



## IMU (Inertial Measurement Unit)

## M-G355QDGO

- Small size & Light Weight: 24 x 24 x 10 mm<sup>3</sup>, 10 g
- Low-Noise, High-Stability
  - Gyro Bias Instability: 1.2 °/h
  - Angular Random Walk: 0.08 °/√h
- Calibrated Stability (Bias, Scale Factor, Axial Alignment)
- Interface: SPI / UART
- Calibration Temperature: -40 °C to +85 °C
- Power Supply Voltage: 3.3 V
- Standards: IEC 61508-1:2010, IEC 61508-2:2010, IEC 61508-3:2010  
(Conforms to SIL-1)

## Recommended Application

Support for functional safety

- Agricultural Machinery
- Construction Machinery
- Industrial Robot



Product Name and Number

M-G355QDGO: X2G000231000100



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## RECOMMENDED OPERATING CONDITION

Parameter	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage, V <sub>CC</sub>		3.15	3.3	3.45	V
Digital Input Voltage		GND	—	V <sub>CC</sub>	V
Digital Output Voltage		-0.3	—	V <sub>CC</sub> + 0.3	V
Calibration Temperature	Performance parameters are applicable	-40	—	+85	°C
Operating Temperature		-40	—	+85	°C

## SPECIFICATIONS

T<sub>a</sub> = 25 °C, V<sub>CC</sub> = 3.3 V, Angular rate = 0 °/s, ≤ ±1 G, unless otherwise noted.

Parameter	Test Condition / Comment	Min.	Typ.	Max.	Unit
<b>GYRO SENSORS</b>					
Sensitivity					
Output Range		—	±450	—	°/s
Scale Factor	16 bit, when 32 bit x 2 <sup>16</sup>	-0.2 %	66	+0.2 %	LSB/(°/s)
Nonlinearity	1σ	—	0.05	—	% of FS
Misalignment	1σ, Axis-to-axis, Δ = 90 ° ideal	—	0.01	—	°
<b>Bias</b>					
Initial Error	1σ, -40 °C ≤ T <sub>A</sub> ≤ +85 °C	—	360	—	°/h
Repeatability	1σ, Turn-on to Turn-on *3	—	36	—	°/h
Bias Instability	Average	—	1.2	—	°/h
Angular Random Walk	Average	—	0.08	—	°/√h
Noise Density	f = 10 Hz to 20 Hz	—	6.9	—	(°/h)/√Hz, rms
<b>Frequency Property</b>					
3dB Bandwidth		—	189	—	Hz
<b>ACCELEROMETERS</b>					
Sensitivity					
Output Range		—	±8 / ±16 *4	—	G
Scale Factor	16 bit, when 32 bit x 2 <sup>16</sup>	-0.1%	4(8G) / 2(16G)	+0.1%	LSB/mG
Nonlinearity	1σ, < 1 G	—	0.1	—	% of FS
Misalignment	1σ, Axis-to-Axis, Δ = 90 ° ideal	—	0.01	—	°
<b>Bias</b>					
Initial Error	1σ, -40 °C ≤ T <sub>A</sub> ≤ +85 °C	—	3	—	mG
Repeatability	1σ, Turn-on to Turn-on *3	—	3	—	mG
Bias Instability	Average	—	24	—	μG
Velocity Random Walk	Average	—	0.02	—	(m/s)/√h
Noise Density	f = 10 Hz to 20 Hz	—	50	—	μG/√Hz, rms
<b>Frequency Property</b>					
3dB Bandwidth		—	148	—	Hz
<b>TEMPERATURE SENSOR</b>					
Scale Factor *1,2	Output = 0 @ +25 °C	—	0.00390625	—	°C/LSB

\*1) This is a reference value used for internal temperature compensation. There is no guarantee that the value gives an absolute value of the internal temperature.

\*2) This is the temperature scale factor for the upper 16 bit (TEMP\_HIGH).

\*3) Turn-on to turn-on / Day by day, estimated variation during 5 consecutive days.

\*4) Selectable by register setting.

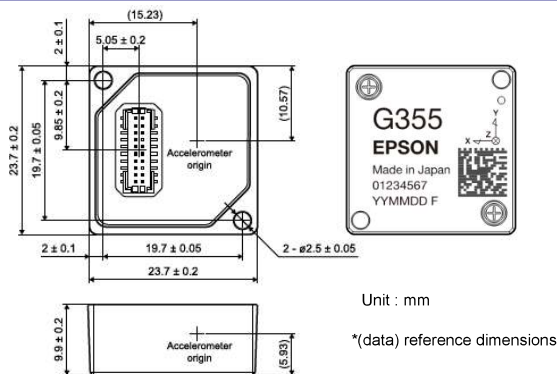
Note) The values in the specifications are based on the data calibrated at the factory. The values may change according to the way the product is used.

Note) The Typ. values in the specifications are average values or 1σ values.

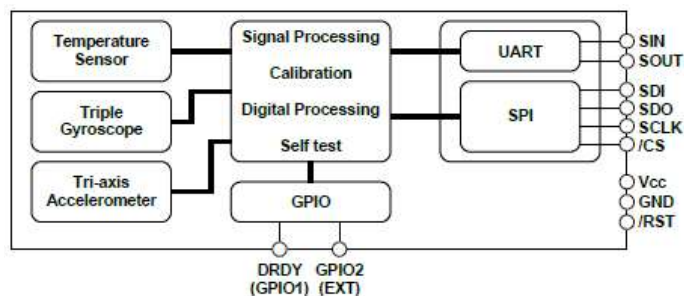
Note) Unless otherwise noted, the Max. / Min. values in the specifications are design values or Max. / Min. values at the factory tests.

Note) Acceleration characteristics do not depend on the output range.

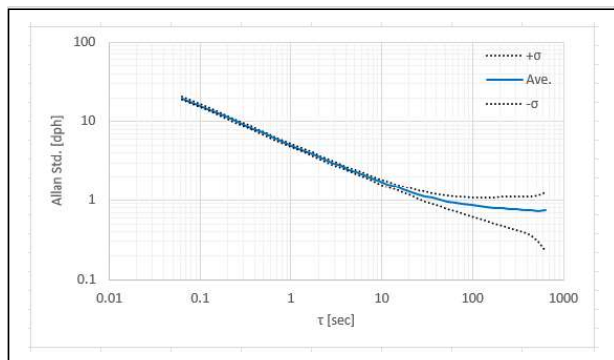
## Outline Dimensions



## Block Diagram

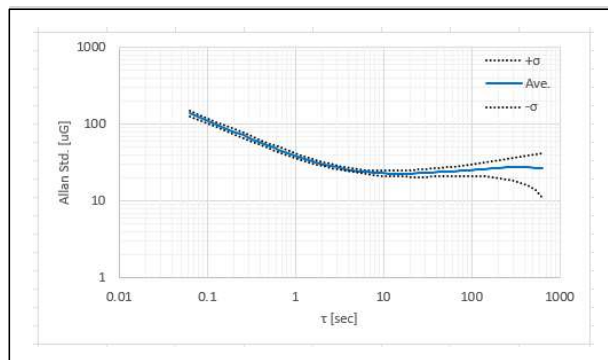


## Typical Performance Characteristics



Gyro Allan Variance Characteristic

## Typical Performance Characteristics



Accelerometer Allan Variance Characteristic

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

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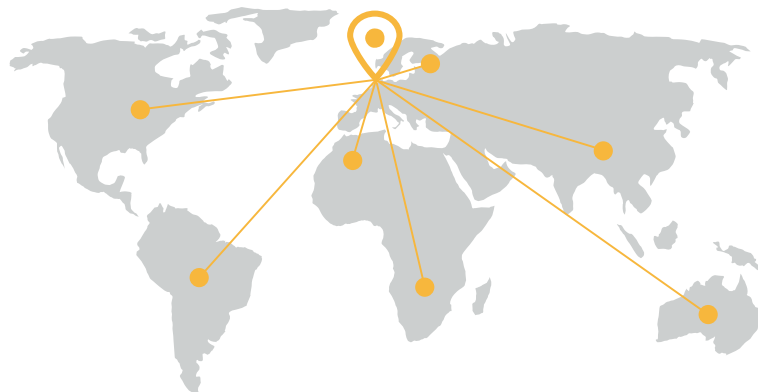
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