IMU (Inertial Measurement Unit)
M-G355QDG0

RoHS Compliant

Product Name and Number
M-G355QDG0: X2G000231000100

- Small size & Light Weight: 24 x 24 x 10 mm^3, 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

RECOMMENDED OPERATING CONDITION

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

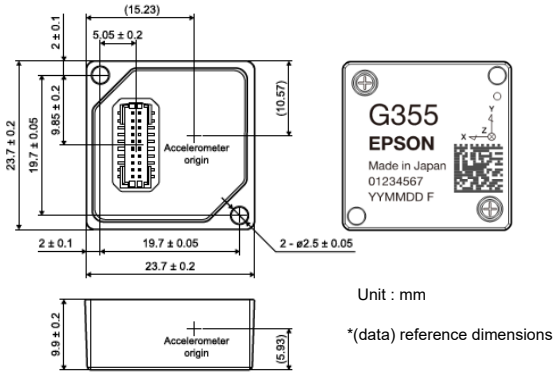
SPECIFICATIONS

T_a = 25 °C, V_{CC} = 3.3 V, Angular rate = 0 °/s, ≤ ±1 G, unless otherwise noted.

Parameter	Test Condition / Comment	Min.	Typ.	Max.	Unit
GYRO SENSORS					
Sensitivity					
Output Range		—	±450	—	°/s
Scale Factor	16 bit, when 32 bit x 2^{16}	-0.2 %	66	+0.2 %	LSB/(°/s)
Nonlinearity	1σ	—	0.05	—	% of FS
Misalignment	1σ, Axis-to-axis, Δ = 90 ° ideal	—	0.01	—	°
Bias					
Initial Error	1σ, −40 °C ≤ TA ≤ +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
Frequency Property					
3dB Bandwidth		—	189	—	Hz
ACCELEROMETERS					
Sensitivity					
Output Range		—	±8 / ±16 *4	—	G
Scale Factor	16 bit, when 32 bit x 2^{16}	-0.1%	4(8G) / 2(16G)	+0.1%	LSB/mG
Nonlinearity	1 σ, < 1 G	—	0.1	—	% of FS
Misalignment	1 σ, Axis-to-Axis, Δ = 90 °ideal	—	0.01	—	°
Bias					
Initial Error	1 σ, −40 °C ≤ T_A ≤ +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
Frequency Property					
3dB Bandwidth		—	148	—	Hz
TEMPERATURE SENSOR					
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 1 σ 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.

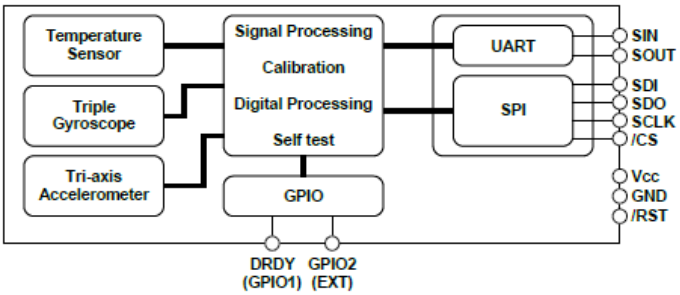
Outline Dimensions



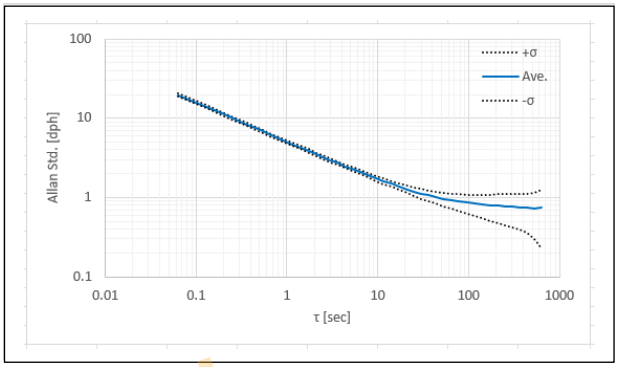
Unit : mm

*(data) reference dimensions

Block Diagram

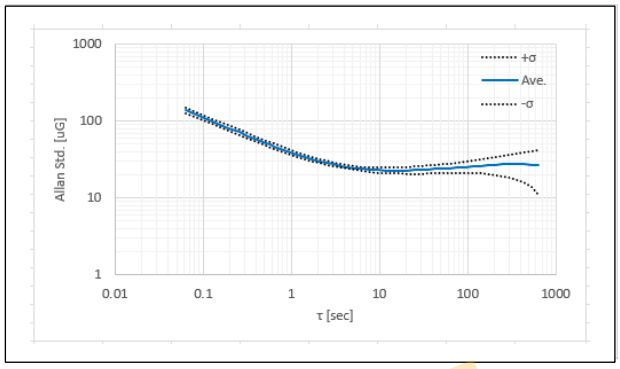


Typical Performance Characteristics



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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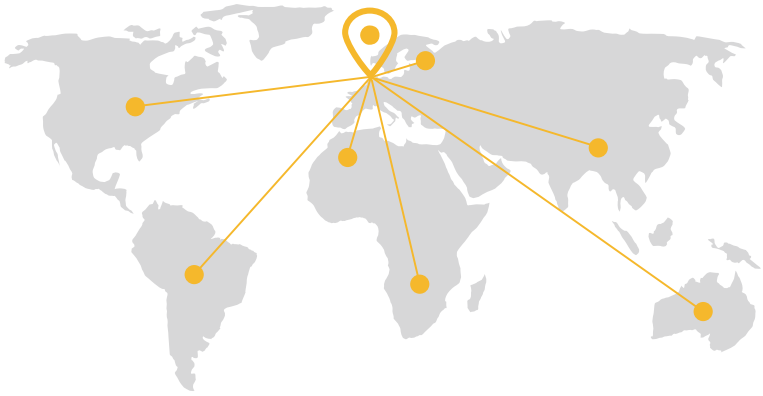

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