

# DMU02

## Six Degrees of Freedom Dynamics Measurement Unit



The DMU02 combines MEMS angular rate and linear acceleration sensors to create a simple to use six-degrees-of-freedom dynamics measurement unit for complete motion sensing and control in three-dimensional space.

Using Silicon Sensing's proven MEMS ring gyro technology the DMU02 offers unsurpassed accuracy and reliability in an affordable and compact package. Angular rate and acceleration data is supplied by the DMU02 every millisecond to meet the needs of highly responsive control systems.

The DMU02 provides a cost effective solution for a wide range of applications requiring a complete six-degrees-of-freedom motion sensing module.

DMU02 is simple to mount via 2 screws, optional alignment dowels and an 8 pin connector.

### Key Features

- A compact six-degrees-of-freedom module, providing Roll, Pitch, Yaw angular rate plus Longitudinal, Lateral and Vertical translational acceleration
- Benchmark bias and scale factor performance
- Full scale dynamic range  $\pm 300^\circ/\text{s}$  and  $\pm 6g$
- Robust MEMS based strapdown system
- 1 cubic inch unit
- +5V supply
- Built In Test (BIT)
- 4 wire industry standard SPI interface

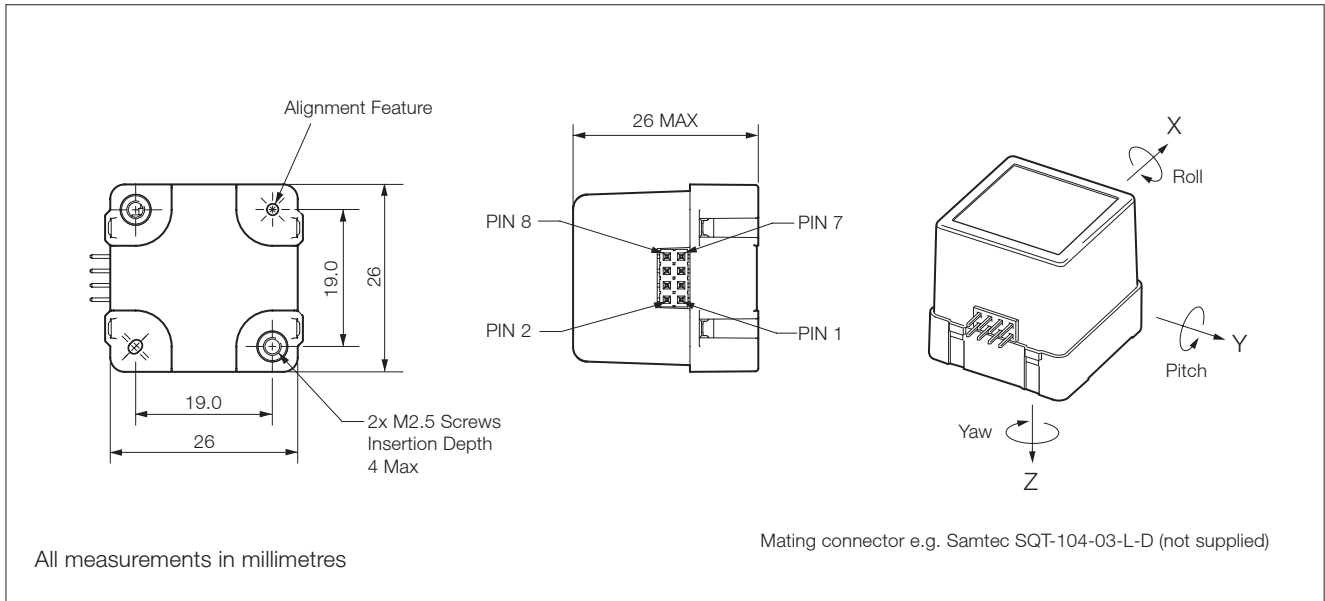
### Typical Applications

- Platform stabilisation & control
- Air, sea and land applications
- Robotics
- Antenna stabilisation
- Vehicle dynamic sensing
- Navigation aiding
- Autonomous vehicles (ROVs and UAVs)
- Laboratory
- Biomechanics



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### Typical Data

Output format	SPI
Default message format	Pitch, Y Acc; Roll, X Acc; Yaw, Z Acc
Supply voltage	5V
Operating temperature range	-40°C to +85°C
Start-up-time	< 1s
Weight	< 12gram

Angular Rate Function	
Rate range	$\pm 300^\circ/\text{s}$
Scale factor	0.03125°/s/bit (16bit)
Scale factor error over temperature	< $\pm 1.5\%$ (including nonlinearity)
Bias variation over temperature	< $\pm 0.5^\circ/\text{s}$
Bias instability (Allan Variance)	< $10^\circ/\text{hr}$
Angular Random Walk	< $0.5^\circ/\sqrt{\text{hr}}$
Bandwidth (-3dB)	> 45Hz
Rate noise (in band)	< $0.5^\circ/\text{s rms}$
g sensitivity	< $0.1^\circ/\text{s/g}$

Linear Acceleration Function	
Acceleration range	$\pm 6g$
Resolution	3.66mg/bit
Scale factor error over temperature	< 2%
Linearity	0.1% FS
Bias error over temperature	< $2.0 \text{ mg}/^\circ\text{C}$
Bandwidth (-3dB)	> 350Hz
Acceleration noise	20mg rms

<b>RoHS Compliant</b>	Yes
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### Pin Connections

<b>1</b>	+5V	Power supply
<b>2</b>	MOSI	SPI data input
<b>3</b>	MISO	SPI data output
<b>4</b>	CLK	SPI serial clock
<b>5</b>	GND	Power ground
<b>6</b>	Select S0	Pitch, Y Acc
<b>7</b>	Select S1	Yaw, Z Acc
<b>8</b>	Select S2	Roll, X Acc

USB-based development equipment is available.

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Printed in England 02/09

DMU02-00-0100-131 Rev 1  
DCR No. 617015