3DMGQ7-GNSS/INS
Complete RTK Navigation System
**3DMGQ7-GNSS/INS**

The 3DMGQ7-GNSS/INS is an all-in-one navigation solution featuring centimeter-level position accuracy. It is equipped with dual multiband GNSS receivers, low noise and low drift MEMS inertial sensors, and a robust adaptive Kalman filter.

**3DMGQ7 performance**

<table>
<thead>
<tr>
<th>Position</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Single point, horizontal</td>
<td>1.25 m</td>
</tr>
<tr>
<td>Single point, vertical</td>
<td>2 m</td>
</tr>
<tr>
<td>RTK [1,2]</td>
<td>2 cm</td>
</tr>
</tbody>
</table>

[1] 24 hour static, RMS
[2] 1cm + 1ppm, 2cm at 10km from the base station

<table>
<thead>
<tr>
<th>Attitude</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll, Pitch</td>
<td>.05°</td>
</tr>
<tr>
<td>Heading [1]</td>
<td>.25°</td>
</tr>
</tbody>
</table>

[1] Dual antenna required

<table>
<thead>
<tr>
<th>Dynamic</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Velocity</td>
<td>0.05 m/s</td>
</tr>
</tbody>
</table>

**System features**

- Dual antenna GNSS
- Centimeter-level accuracy with RTK
- Tactical Grade IMU
- Advanced tightly-coupled extended Kalman filter (EKF) for sensor fusion
- Low profile and lightweight at 78 grams
- Adjustable sampling rates up to 1 KHz
- <2 deg/hour gyro bias instability
**3DMRTK**

Cellular RTK correction modem

The 3DMRTK provides easy to use real time Kinematic (RTK) correction data to be utilized by the 3DMGQ7-GNSS/INS. It provides the simplicity of a cellular connection to our SensorCloud RTK base station network, replacing traditional radio-based stations. With RTK corrections the 3DMGQ7 can achieve centimeter-level positional accuracy. By removing the need for base station infrastructure the 3DMRTK minimizes the user’s required time to market.

SensorCloud RTK provides seamless cloud-based network RTK corrections without the need for customer-supplied base stations, and includes a cellular data plan and network RTK coverage.

The encrypted data stream secures position data and keeps it private.

Users can get started instantly with this commitment-free subscription service, available immediately after registration.

rtk.sensorcloud.com
MicroStrain offers an open source, license-free (MIT License) series of drivers specifically designed and tested for Robot Operating System (ROS).

Use ROS for building and simulating robotics applications, unmanned ground vehicles (UGV's) and simultaneous localization and mapping (SLAM).

SensorConnect is PC software for sensor configuration and data collection. Configure inertial parameters, device settings, data channels, and sample rates. Visualize massive amounts of data instantly using built-in intelligent data collection and graphing algorithms. Create immersive dashboards with rich data visualization.

**MSCL™ & APIs**

The MicroStrain Communication Library simplifies writing code to interact with our sensors. MSCL is our open-sourced API, readily available and fully-documented on GitHub, featuring valuable tools such as full documentation, example code, and a quick start guide.

Byte-level data communication protocols are available in the DCP section of our user manual.

**ROS**

MicroStrain offers an open source, license-free (MIT License) series of drivers specifically designed and tested for Robot Operating System (ROS).

Use ROS for building and simulating robotics applications, unmanned ground vehicles (UGV's) and simultaneous localization and mapping (SLAM).
### 3DMGQ7 Specifications

#### IMU

<table>
<thead>
<tr>
<th></th>
<th>Accelerometer</th>
<th>Gyroscope</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Range</strong></td>
<td>±8g</td>
<td>±300°/s</td>
</tr>
<tr>
<td><strong>Random walk</strong></td>
<td>20 μg/√Hz</td>
<td>8.75°/s/√Hz</td>
</tr>
<tr>
<td><strong>Bias instability</strong></td>
<td>0.05 mg</td>
<td>1.5°/h</td>
</tr>
</tbody>
</table>

#### Interface

- **Connectors**: 2 x Micro-D9
- **Communications interface**: 2 x RS-232, 2 x USB
- **GNSS antenna ports**: 2 x MMCX
- **Data output rate**: 1 to 1000 Hz
- **External aiding input**: RTCM 3.1, GNSS, odometer, heading
- **I/O**: 4 x GPIO
- **GPIO Functions**: Odometer, event triggering, PPS input/output

#### GNSS

- **Number of receivers**: 2
- **Channel count**: 184
- **Constellations**: GPS/QZSS, GLONASS, Galileo, BeiDou*
- **Frequencies**: L1C/A, L2C, L1OF, L2OF, E1B/C, E5b, B1, B2
- **Operational Limits**: Altitude 50,000 meters | Velocity 500 m/s

*BeiDou RTK support to be provided in a future firmware release.

#### Physical and Electrical

- **Weight**: 78g
- **Size**: 76 mm x 68.6 mm x 13.3 mm
- **Power Consumption**: 2.0W (typical), 2.5W (max)
- **Operating voltage**: 5 to 16 VDC
- **GPIO Voltage**: 5V
- **Operating Temperature**: -40° to 85°C
- **Antenna output voltage**: 3V
- **Antenna output current**: 100mA
- **MTBF**: 389,237 hours (Telcordia method, GM/35C)

### 3DmRTK Specifications

- **Data output rate**: 1 Hz
- **Interface**: Micro-D9, RS 232, USB
- **Protocols**: MIP, RTCM 3.1, NMEA
- **Cellular Network**: Cellular Coverage: Global*
- **Voltage**: 5 to 16 VDC
- **Power**: 1.0W (typical), 2.0W (max)
- **Weight**: 48g

*Some regional restrictions apply. Coverage only where LTE CAT-M1/2G deployment is available. Please see our [RTK webpage](#) for details.
Applications

3DMGQ7-GNSS/INS
Tactical Grade INS
Dual Antenna GNSS
RTK Enabled
Full Feature Navigation Solution

application video