3DMCV7

High Performance OEM IMU/AHRS

Parker

3DMCV7 Overview

The **3DM**CV7 Inertial Measurement Unit (IMU) and Attitude Heading Reference System (AHRS) offers tactical grade performance in the smallest and lightest OEM package yet. Each **3DM**CV7 sensor is individually calibrated for optimal performance over a wide range of operating conditions.

Parker's Auto-Adaptive Extended Kalman Filter has been designed from the ground up to deliver consistently reliable results in even the most challenging environments.
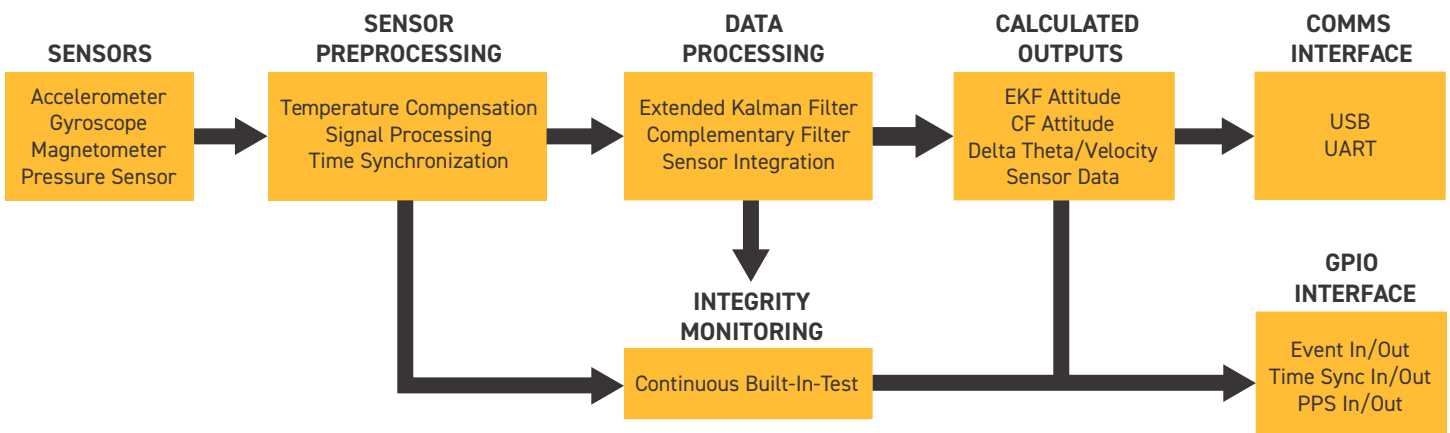
Cutting-edge orientation algorithms, advanced internal time management, and a flexible event triggering system put the **3DM**CV7 in a league of its own when it comes to price versus performance.
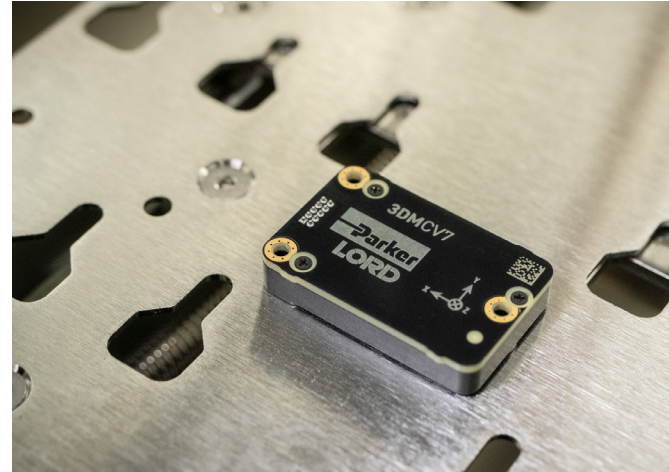
18% Thinner
20% Lighter
40% Less Power Consumption

1.5°/hr Gyro Bias Instability	Low Latency	Wide-Range Temperature Calibration
Superior Vibration Rejection	Extended Kalman Filter (EKF)	Adjustable Sampling Rates (Up to 1KHz)
Adjustable Range (Acccel & Gyro)	External Clock Synchronization	Custom Event Trigger System

3DMCV7 System Architecture

SENSORS	SENSOR PREPROCESSING	DATA PROCESSING	CALCULATED OUTPUTS	COMMS INTERFACE
Accelerometer Gyroscope Magnetometer Pressure Sensor	Temperature Compensation Signal Processing Time Synchronization	Extended Kalman Filter Complementary Filter Sensor Integration	EKF Attitude CF Attitude Delta Theta/Velocity Sensor Data	USB UART

INTEGRITY MONITORING
Continuous Built-In-Test

GPIO INTERFACE
Event In/Out
Time Sync In/Out
PPS In/Out

*Percentage improvement comparisons are relative to the **3DM**CV5.

3DMCV7 Key Features

Precision Timing

- Extensive time synchronization optimization for time alignment with external sensors, such as cameras or LiDAR
- Precision data timestamping and low latency output optimized for time-critical control applications
- 1 KHz output data rate for all channels

Extended Kalman Filter for Orientation Estimation

- Integrated vibration identification and rejection
- IMU bias error tracking improves performance over traditional complementary filters
- Reduces attitude error due to linear acceleration
- Integrated magnetometer allows for absolute heading tracking

IMU

- Tactical grade gyro (1.5°/hour bias instability)
- User-adjustable gyro and accel ranges
- Calibrated over full temperature range
- Complete digital calibration report available for each unit
- Continuous Built-In-Test for integrity monitoring

Integration

- Factory supported ROS1 and ROS2 driver
- Multi-language (C++, Python, Matlab, LabVIEW) software communications library simplifies custom software development
- Connectivity kit and USB support allows for rapid prototyping

SWaP-C

- Smaller size, lower power than previous generations
- Optimized for low cost, volume production OEM applications
- Aluminum mounting frame improves performance over solder-down modules by isolating sensitive MEMS components from board stresses
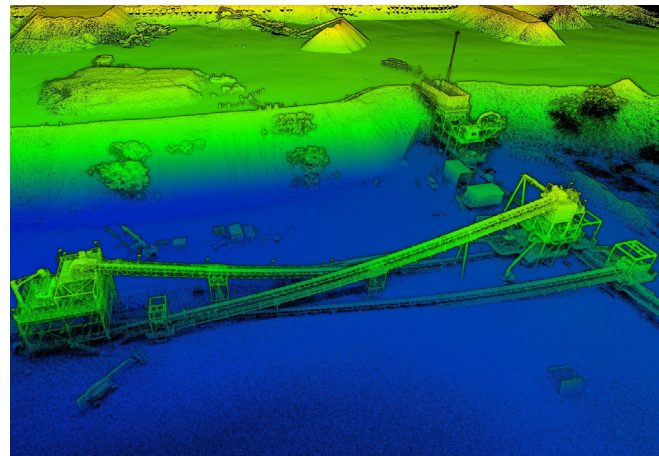
3DMCV7 Specifications - *PRELIMINARY*

IMU

	Accelerometer	Gyroscope
Range (user-selectable)	±: 4g, 8g, 16g	±: 250°/s, 500°/s, 1000°/s
Random walk	30 µg/√Hz	8.5°/h/√Hz
Bias instability	18 µg	1.5°/h
Gain temperature hysteresis	125 ppm	1000 ppm
Bias temperature hysteresis	0.6 mg	0.04°/s
Bias repeatability[1]	40 µg	0.004°/s

Interface

Connector	Samtec FTS-105 (2x5)
Communications interface	UART (TTL), USB
Data output rate	1 to 1000 Hz
I/O	4x GPIO
GPIO Functions	Event triggering, PPS input/output

Physical and Electrical

Weight	8.3g
Size	38 mm x 24 mm x 8.6 mm
Power Consumption	230mW (typical), 280mW (max)
Operating voltage	3.2 to 5.2 VDC
GPIO Voltage	3V (5V tolerant)
Operating Temperature	-40° to 85°C
MTBF	2,002,026 hours (Telcordia method, GM/35C)

Attitude Performance

Roll/pitch (static)	0.25°
Roll/pitch (dynamic)[2]	0.5°
Heading[3]	2°

[1]Turn on to turn on, <24 hours
[2]Automotive conditions, vehicle dynamics dependent
[3]Magnetic heading, with valid declination, magnetic environment, and hard/soft iron calibration

.944 [24.0]
.728 [18.5]
1.280 [32.5]
1.496 [38.0]
.339 [8.6]
.311 [7.9]
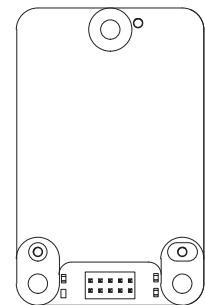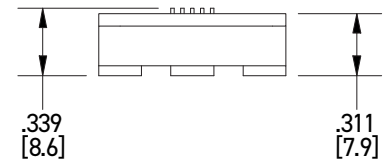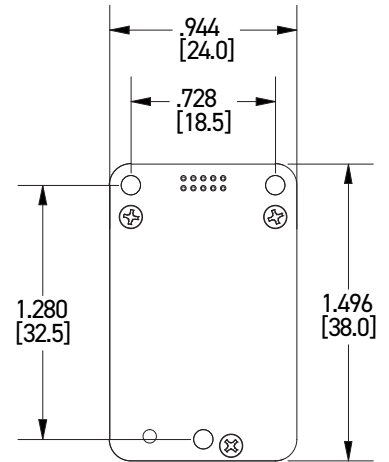
Actual Size

SensorConnect®

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.
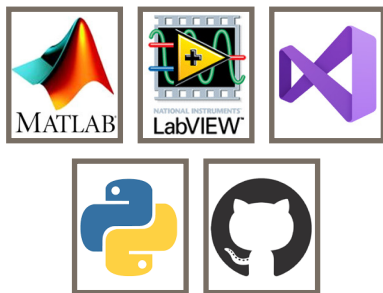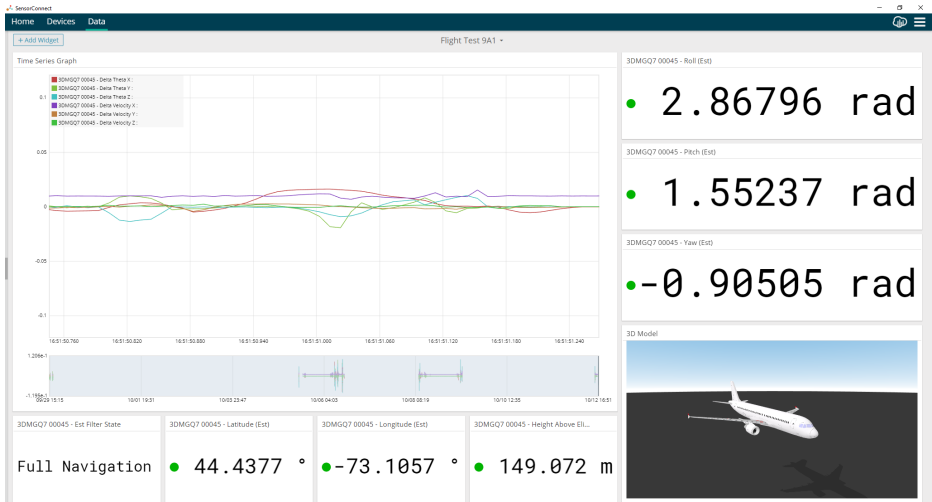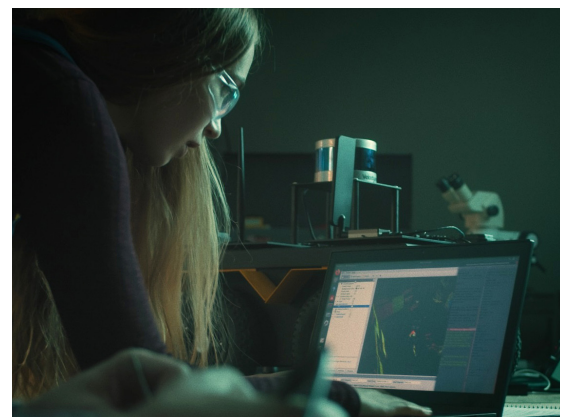

MSCL™ & APIs

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(UGVs) and simultaneous localization and mapping (SLAM).