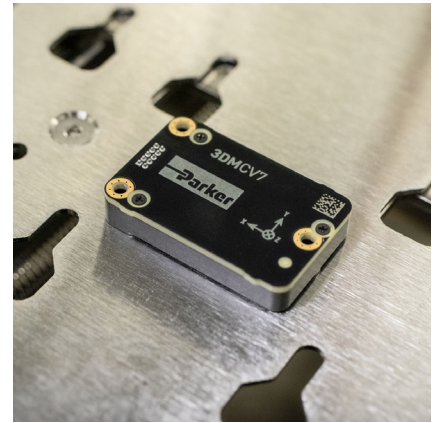


MicroStrain 3DM-CV7 Series

Tactical Grade Embeddable INS, IMU/AHRS, and IMU/VRU



Standout Performance in an Embeddable Package:

The 3DM-CV7 offers tactical grade inertial performance in the smallest and lightest OEM package yet. Each 3DM-CV7 is individually calibrated and features an Adaptive Extended Kalman Filter for optimal performance over a wide range of operating conditions.

All models in the 3DM-CV7 series feature cutting-edge orientation algorithms, advanced internal time management, and a flexible event triggering system. The INS model adds external position, velocity, and heading inputs as well as NMEA compatibility. With an unparalleled array of advanced features, the 3DM-CV7 sets the benchmark for value and performance in its category.

Features:

	AR	AHRS	INS
1.5°/h Gyro Bias Instability	●	●	●
Low Latency	●	●	●
Superior Vibration Rejection	●	●	●
Adjustable Sampling Rates Up to 1 KHz	●	●	●
External Clock Synchronization	●	●	●
Adaptive Extended Kalman Filter	●	●	●
Custom Event Trigger System	●	●	●
Integrated Magnetometer		●	●
External Position and Velocity Inputs			●
Industry-Standard NMEA Input Over AUX Port			●
Defense-Ready: Accepts Encrypted GNSS Receivers			●
Filter Body Frame Constraints			●
Body Velocity Inputs and Outputs			●



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ENGINEERING YOUR SUCCESS.

MicroStrain 3DM-CV7 Series Specifications

System Performance

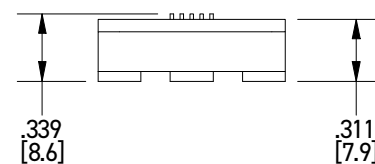
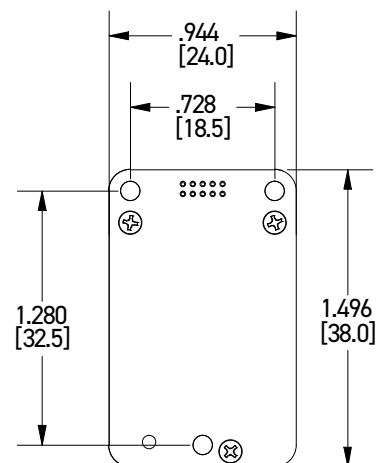
Attitude and Heading (-AR, -AHRS)		INS Accuracy ^[4]	
Roll, Pitch (static)	0.25°	Position	External GNSS
Roll, Pitch(dynamic) ^[1]	0.5°	Velocity	External GNSS
Heading (static, AHRS only) ^[2]	0.5°	Roll, Pitch	TBD
Heading (dynamic, AHRS only) ^[1,2]	2°	Heading	TBD or External GNSS

IMU

	Accelerometer	Gyroscope	Magnetometer	Barometer
Range	± 4g, 8g, 16g	± 250 °/s, 500 °/s, 1000 °/s	±8 Gauss	260 to 1260 mbar
Random Walk	30 µg/√Hz	0.14 °/√h	-	-
Bias Instability	18 µg	1.5 °/h	-	-
Noise Density	30 µg/√Hz	8.5 °/h/√Hz	-	-
Turn-on to Turn-on Bias ^[3]	40 µg	0.004 °/s	-	-
Bias Error Over Temperature	0.75 mg	0.03 °/s	-	-
Scale Factor Error Over Temperature	600 PPM	1000 PPM	-	-

Interface

Connector	Samtec FTS-105 (2x5)
Communications Interface	UART (TTL), USB
Output Data Rate (IMU and EKF)	1 to 1000 Hz
I/O	4x GPIO
GPIO Functions	Event triggering, PPS Input/Output
Protocols	MIP, NMEA ^[4]
Aiding Sensors	External Heading, Position ^[4] , Velocity ^[4]

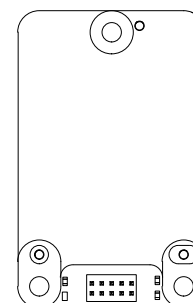


Physical and Electrical

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

Product Variants

Name	Part Number	Description
3DM-CV7-INS	6291-9960	Inertial Navigation System
3DM-CV7-AHRS	6286-9960	Attitude and Magnetometer-Aided Heading
3DM-CV7-AR	6287-9960	Attitude and Relative Heading



[1] Automotive conditions, vehicle dynamics dependent

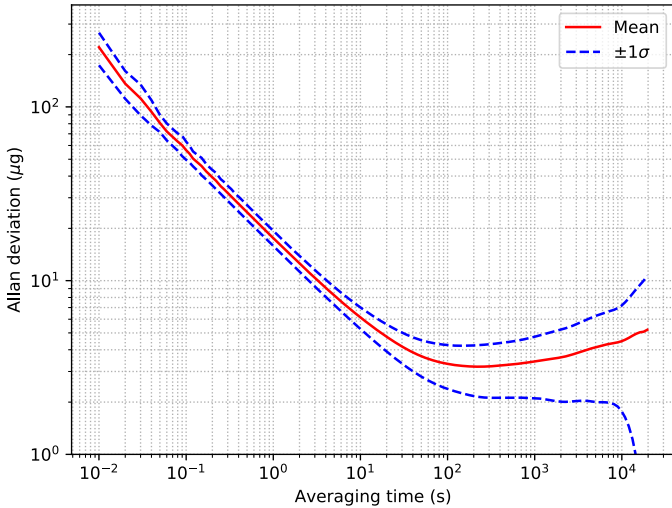
[2] Magnetic heading, with valid declination, magnetic environment, and hard/soft iron calibration

[3] Bias repeatability, <24 hours

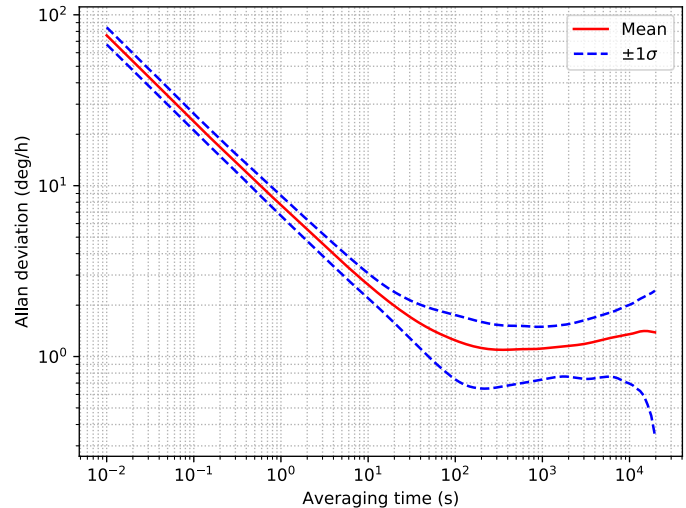
[4] INS model only

MicroStrain 3DM-CV7 Series Allan Variance (AVAR)

Accelerometer AVAR



Gyroscope AVAR



MicroStrain 3DM-CV7 Series Key Features

External Clock Synchronization ● Tighter synchronization with external sensors like LiDAR or cameras to improve state estimation

Tactical Grade Gyro ● Improved position accuracy during dead reckoning

Custom Event Trigger System ● Simplifies configuration of context-based events and frees up CPU on vehicle main board



User-Adjustable Gyro & Accel Range ● Range flexibility enables improved noise performance

Adjustable Sampling Rates ● Faster response to vehicle dynamics

Low Latency ● Reduces navigation errors from clock drift when combining with external aiding sensors

Calibrated Over Full Temperature Range ● Consistent and reliable performance over entire temperature range

Auto-Adaptive EKF

Adaptive Extended Kalman Filter (EKF)

More reliable than pre-configured vehicle dynamics model. Rejects the unexpected and auto-adapts its error model to dynamics in real-time

EKF for Orientation Estimation (-AR, -AHRS)

Adaptive EKF for Orientation

Reduces attitude error due to linear acceleration

IMU Bias Error Tracking

Improves performance over traditional complementary filters

Integrated Magnetometer

Allows for absolute heading tracking (-AHRS and -INS only)

EKF for Position, Velocity, Attitude Estimation (-INS)

External Position, Velocity, Heading Inputs

Improves position, velocity, attitude (PVA) estimate of standalone GNSS receiver

Industry-Standard NMEA Input Over AUX Port

Simplifies GNSS input by providing configurable AUX port on any of the 4 GPIO ports

Defense-Ready: Accepts Encrypted GNSS Receivers (SAASM or MCode)

Improves reliability of Position, Navigation, and Timing (PNT) solution during jamming and spoofing events

Filter Body Frame Constraints

Improves position accuracy for known dynamics

Vehicle Frame Velocity I/O

Allows users to input measurements in a non-global frame, enabling sensors like radar and vision as aiding sources (with preprocessing)