

# UNPRECEDENTED PERFORMANCE AT YOUR FINGERTIPS.

The all new Tactical Embedded... the best just got smaller.

**0.05°-0.1°**

Dynamic Heading Accuracy  
(INS)

**0.15°**

Static Heading Accuracy  
(GNSS-Compass)

**Multi-band GNSS**

Integrated L1/L2/E1/E5b  
GNSS Receiver

**RTK and PPK**

Support for RTCM 3 and  
RINEX Data output

**0.015°**

Dynamic Pitch/Roll Accuracy  
(INS)

**Tactical-Grade IMU**

< 1°/hr Gyro In-Run Bias;  
< 10 µg Accel In-Run Bias

**External SAASM**

Support for external SAASM  
GPS (ICD-GPS-153)

**Low SWaP**

31 x 31 x 11 mm;  
< 15 grams; < 1.6 W

**VN-110E**

IMU/AHRS

**VN-210E**

GNSS/INS

**VN-310E**

DUAL GNSS/INS



Each VN-110E, VN-210E and VN-310E undergoes a robust calibration and acceptance testing process at VectorNav's AS9100 certified manufacturing facility. Performance specifications are based on comprehensive field testing and results from real-world applications, and are regularly tested to ensure continued conformance to such specifications.

<b>Attitude</b>	<b>VN-110E</b>	<b>VN-210E</b>	<b>VN-310E</b>
Heading (Magnetic) <sup>1</sup>	2.0° RMS	2.0° RMS	2.0° RMS
Heading (INS) <sup>2,3</sup>	-	0.05° to 0.1°, 1σ	0.05° to 0.1°, 1σ
Heading (GNSS-Compass) <sup>4</sup>			
0.5 m Baseline	-	-	0.3° to 0.6° RMS
1.0 m Baseline	-	-	0.15° to 0.3° RMS
2.0 m Baseline	-	-	0.08° to 0.15° RMS
Pitch/Roll (Static)	0.05° RMS	0.05° RMS	0.05° RMS
Pitch/Roll (INS) <sup>3</sup>	-	0.015°, 1σ	0.015°, 1σ
Heading Mounting Misalignment <sup>5</sup>	-	0.15°, 1σ	0.15°, 1σ
Pitch/Roll Mounting Misalignment <sup>5</sup>	-	< 0.05°, 1σ	< 0.05°, 1σ
Angular Resolution	-	0.001°	0.001°

<b>IMU</b>	<b>ACCELEROMETER</b>	<b>GYROSCOPE</b>	<b>MAGNETOMETER</b>
Range <sup>6</sup>	±15 g	±490°/s	±2.5 Gauss
In-Run Bias Stability (Allan Variance)	< 10 μg	< 1°/hr (0.4-0.7°/hr typ.)	-
Non-Linearity	< 150 ppm	100 ppm	< 0.1 % FS
Noise Density	< 0.04 mg/√Hz	5 °/hr /√Hz	140 μGauss/√Hz
Bandwidth	240 Hz	240 Hz	200 Hz
Cross-Axis Sensitivity	±0.05 °	< 0.05 °	±0.05 °

### GNSS Receivers<sup>7</sup>

Receiver Type.....	184 Channel, L1C/A, L10F, E1, B1I, L2C, L20F, E5b, B2I GNSS
Constellations <sup>8</sup> .....	GPS, GLONASS, Galileo, BeiDou, QZSS, SBAS
Time-To-First-Fix (Cold / Hot) .....	24 s / 2s
Altitude Limit .....	50,000 m
Velocity Limit.....	500 m/s

### Position & Velocity<sup>7</sup>

Horizontal Position Accuracy <sup>4</sup> .....	1.0 m RMS
Vertical Position Accuracy <sup>4</sup> .....	1.5 m RMS
RTK Position Accuracy <sup>10</sup> .....	0.01 m + 1 ppm CEP
Free Inertial Position Drift <sup>11</sup> .....	0.5 cm/s <sup>2</sup>
Velocity Accuracy .....	< 0.02 m/s

### Mechanical/Electrical

	<b>SIZE</b>	<b>WEIGHT</b>	<b>INPUT VOLTAGE</b>	<b>CURRENT DRAW<sup>12</sup></b>	<b>POWER<sup>12</sup></b>
VN-110E	31 x 31 x 11 mm	12 g	3.2 to 3.5 V	280 mA @ 3.3 V	< 1 W
VN-210E	31 x 31 x 11 mm	14 g	3.2 to 3.5 V	420 mA @ 3.3 V	< 1.5 W
VN-310E	31 x 31 x 11 mm	15 g	3.2 to 3.5 V	480 mA @ 3.3 V	< 1.6 W

1. With proper magnetic declination, suitable magnetic environment and valid hard/soft iron calibration.
2. Dependant on a number of factors, contact VectorNav to discuss expected performance in your application.
3. With sufficient motion for dynamic alignment.
4. Dependant on SBAS, clear view of GNSS satellites, good multipath environment, compatible GNSS antenna, and measurement duration period.
5. Constant on a per part basis. Can be calibrated out during system integration using boresighting or other alignment processes.
6. Contact VectorNav for Extended Range Gyro Option.

### Interfacing

Output Data Rate (IMU) <sup>9</sup> .....	up to 800 Hz
Output Data Rate (Position/Velocity <sup>7</sup> & Attitude).....	up to 400 Hz
Interface .....	(2) Serial TTL
GNSS PPS <sup>7</sup> .....	30 ns RMS, 60 ns 99%
Input.....	Sync-in
Output .....	Sync-out
Power & I/O Connectors.....	24-pin 1 mm pitch board-to-board
GNSS RF Connector(s) <sup>7</sup> .....	U.FL

### Environmental

Operating Temperature.....	-40° to +85° C
Storage Temperature.....	-40° to +85° C
MTBF.....	> 45,000 hours

7. VN-210E and VN-310E only.
8. Only GPS, Galileo and SBAS constellations used in VN-210 and VN-310 default configurations.
9. Contact VectorNav for higher IMU data output rates.
10. Dependant on atmospheric conditions, baseline length, GNSS antenna, multipath conditions, satellite visibility and geometry.
11. Typical rate of growth in error of position estimates after loss of GNSS signal, provided INS full alignment prior to loss.
12. Not including active antenna power consumption.