u-blox GNSS product overview

Optimized cost and performance combined with easy integration

Product diversity for all kinds of applications
u-blox is a leading provider in GNSS solutions that are tailored for every customer’s needs. Because we use our own silicon, we can offer controlled quality, high performance, quick support, and stable product life cycles. Our positioning modules, SiPs, chips, and smart antennas set the benchmark in performance and cost effectiveness, with quick delivery of accurate position data. Our wide portfolio includes standard precision, high precision, precise timing, and dead reckoning solutions. We are continually making innovative advancements in accuracy, anti-spoofing, power efficiency, small size, and low cost.

Technologies

Standard precision
- Meter-level accuracy
- Cost-efficient products
- Suitable for most needs
- Super-E low power mode
- High tracking sensitivity
- Low power consumption

Application areas:
- Asset tracking
- Telematics
- Navigation
- Wearables and camera

High precision
- Sub-meter down to centimeter-level accuracy

Application areas:
- Unmanned vehicles
- Navigation
- Automotive

Dead Reckoning
- 100% positioning coverage even in parking garages, tunnels, and urban canyons

Application areas:
- Road-vehicle navigation
- Autonomous driving

Timing & Frequency
- Accurate clock and frequency generation based on satellite positioning technology

Application areas:
- Wireless communication
- Industrial
- Power distribution
- Financial applications

Services
AssistNow Online and AssistNow Offline are u-blox’s end-to-end A-GNSS services for OEM customers and their end users. These services boost GNSS acquisition performance for devices with or without network connectivity. AssistNow Online and AssistNow Offline can be used either alone or in combination.

AssistNow brings four key advantages:
1. Faster time-to-first-fix (TTFF)
2. Improved position availability
3. Improved position accuracy
4. Lower power consumption
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Product selection guide
u-blox products come in various integration levels catering to all kinds of needs, from low volume, ease of use scenarios to scalable solutions for customized applications. The product offering includes modules, SiPs, smart antennas, and chips. Modules and SiPs provide long-term sustainability using shared form factors and offer easy migration to High Precision, Dead Reckoning and Timing technologies. Smart Antennas, which integrate all the GNSS technology and antenna, are ideal for those with little GNSS know-how. SiPs (System in Package) are optimized for size, weight, and power. Chips are ideal for highest volumes and need expert GNSS know-how.

<table>
<thead>
<tr>
<th>Modules - LCC / LGA</th>
<th>Modules - SiP</th>
<th>Chips</th>
<th>Smart Antennas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highlights</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Form factor roadmap brings longest lifecycle (investment protection)</td>
<td>• Optimized for minimal size, weight, and power</td>
<td>• Economy of scale for highest volume opportunities</td>
<td>• Easy to design-in</td>
</tr>
<tr>
<td>• Minimal design efforts</td>
<td>• Minimal design efforts</td>
<td></td>
<td>• No radio frequency expertise needed</td>
</tr>
<tr>
<td></td>
<td>Easy migration between SPG, HPG, and DR receivers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product grade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive, Professional, and Standard</td>
<td>Professional and Standard</td>
<td>Automotive, Professional, and Standard</td>
<td>Professional</td>
</tr>
<tr>
<td>Minimum Order Quantity</td>
<td>250 to 500 pieces</td>
<td>500 to 1000 pieces</td>
<td>4000 pieces</td>
</tr>
<tr>
<td>Dominant market</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive, Industrial</td>
<td>Industrial, Consumer</td>
<td>Automotive, Industrial, Consumer</td>
<td>Industrial</td>
</tr>
</tbody>
</table>

Product grades
The u-blox product grades serve different application needs.

<table>
<thead>
<tr>
<th>Environmental conditions</th>
<th>Standard grade</th>
<th>Professional grade</th>
<th>Automotive grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>-20 °C to +65 °C</td>
<td>-40 °C to +85 °C</td>
<td>-40 °C to +85 °C or extended (up to +105 °C)</td>
</tr>
<tr>
<td>Product qualification</td>
<td>JESD47 (ICs)</td>
<td>AEC-Q100 (ICs)</td>
<td>AEC-Q100 (ICs)</td>
</tr>
<tr>
<td></td>
<td>Subset of ISO 16750 (modules)</td>
<td>ISO 16750 (modules)</td>
<td>Extended ISO 16750 (modules)</td>
</tr>
<tr>
<td>Process levels for design, manufacturing, and testing</td>
<td>100% outgoing test</td>
<td>100% automatic X-ray and optical inspection of modules</td>
<td>Professional grade, plus:</td>
</tr>
<tr>
<td></td>
<td>Product traceability</td>
<td></td>
<td>• PPAP</td>
</tr>
<tr>
<td></td>
<td>PCN process</td>
<td></td>
<td>• ISO/TS 16949 manufacturing</td>
</tr>
<tr>
<td></td>
<td>Failure analysis</td>
<td></td>
<td>• Automotive test flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Component traceability</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 8D failure reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Automotive PCN process</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Long product life cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• 0-ppm program</td>
</tr>
</tbody>
</table>

标准等级 普通等级 自动化等级

- 环境条件：消费者环境 工业环境 汽车环境
- 温度：-20 °C to +65 °C -40 °C to +85 °C -40 °C to +85 °C or extended (up to +105 °C)
- 产品认证：JESD47 (ICs) AEC-Q100 (ICs) AEC-Q100 (ICs)
- 设计、制造和测试流程：100%测试通过 100%自动X射线和光学模块检测
- 其他：PPAP ISO/TS 16949制造过程 汽车测试流程 成分可追溯性 8D故障报告 汽车PCN过程 长产品生命周期 0-ppm计划

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## Product selector table

Our form factor roadmap allows for easy migration from older to newer generations and for similar designs with different technologies or levels of precision.

<table>
<thead>
<tr>
<th>Product</th>
<th>Form</th>
<th>Precision</th>
<th>Technology</th>
<th>Interfaces</th>
<th>Multi-band</th>
<th>Upgradable</th>
<th>Automotive</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZOE</td>
<td>4.5 x 4.5 mm</td>
<td>meter level</td>
<td>SPG, Super-E</td>
<td>UART, SPI, DDC</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVA</td>
<td>7.0 x 7.0 mm</td>
<td>meter level</td>
<td>DR, SPG</td>
<td>UART, USB, SPI, DDC</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAX</td>
<td>9.7 x 10.1 mm</td>
<td>meter level</td>
<td>SPG</td>
<td>UART, DDC</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEO</td>
<td>12.2 x 16.0 mm</td>
<td>dm level, meter level</td>
<td>DR, HPG, SPG, Timing</td>
<td>UART, USB, SPI, DDC</td>
<td>Yes, Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZED</td>
<td>17.0 x 22.0 mm</td>
<td>cm level, nanoseconds</td>
<td>DR, HPG, SPG, Timing</td>
<td>UART, USB, SPI, DDC</td>
<td>Yes, Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEA</td>
<td>17.0 x 22.0 mm</td>
<td>nanoseconds, Timing</td>
<td></td>
<td>UART, USB, SPI, DDC</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAM</td>
<td>9.6 x 14.0 mm</td>
<td>meter level</td>
<td>SPG</td>
<td>UART, SPI, DDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAM</td>
<td>15.5 x 15.5 mm</td>
<td>meter level</td>
<td>SPG</td>
<td>UART, DDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47-pin WL-CSP</td>
<td>2.99 X 3.21 mm</td>
<td>meter level</td>
<td>SPG</td>
<td>UART, USB, SPI, DDC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40-pin QFN</td>
<td>5.0 X 5.0 mm</td>
<td>meter level</td>
<td>DR, SPG</td>
<td>UART, USB, SPI, DDC</td>
<td>Yes, Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Technology explanations:

- **DR** = Dead Reckoning
- **HPG** = High Precision GNSS (cm and dm level)
- **SPG** = Standard Precision GNSS (meter level)
- **Super-E** = Ideal balance between low power and good performance
- **Timing** = Precise timing and reference frequency

For a detailed view of our product offering, refer to our guided product selector: [www.u-blox.com/guided-product-selector](http://www.u-blox.com/guided-product-selector)
u-blox GNSS product overview

Advantages to using modules

<table>
<thead>
<tr>
<th>Icon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>🕒</td>
<td>Quick to market &amp; no design risk</td>
</tr>
<tr>
<td>🛡️</td>
<td>Future proof &amp; reduced supplier base</td>
</tr>
<tr>
<td>💰</td>
<td>Low engineering cost &amp; no capital investment</td>
</tr>
</tbody>
</table>

- **Variant**
  - B: Low power with Super-E mode
  - C: Crystal-based receiver
  - E: Untethered Dead Reckoning (UDR) receiver to use with external sensors
  - F: Time & frequency reference receiver, VCTCXO-based
  - G, Q: TCXO-based receiver
  - K: Integrated IMU sensors and decimeter-level positioning
  - L: Automotive Dead Reckoning (ADR) receiver with 3D inertial sensors
  - M: Crystal-based receiver and low backup battery current
  - N: TCXO-based receiver, upgradability (Flash)
  - P: High precision GNSS receiver
  - S, W: TCXO-based receiver with short-circuit detection (antenna supervisor)
  - T: Time sync receiver, TCXO-based
  - U: Untethered Dead Reckoning (UDR) receiver with 3D inertial sensors

- **Form factor**
  - ZOE
  - EVA
  - MAX
  - NEO
  - ZED
  - CAM
  - SAM

- **Platform/generation**
  - 8: u-blox 8
  - M8: u-blox M8
  - F9: u-blox F9

- **Variant**
  - ZED-F9P

u-blox values and promise

- Competent technical support worldwide
  - Over 20 years of R&D in GNSS technology
  - Lifetime support and maximum competence
- Quick time to market
  - Short and reliable delivery times
  - Module form factor consistency
- High quality
  - Global leader in positioning and wireless communication
  - In-house chip technology
- Broad spectrum of solutions
  - Strong synergies between technologies - Wi-fi, V2X, cellular, and positioning
  - Hardware, software, services, and solutions
- Security
  - Advanced spoofing and jamming detection
  - End-to-end trust of domain

Further information

For contact information, see www.u-blox.com/contact-us.
For more product details and ordering information, see the product data sheet.

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