**Product description**

ZOE-M8G and ZOE-M8Q are u-blox’s latest, highly integrated System in Package (SiP) GNSS solutions based on the high performing u-blox M8 concurrent positioning engine. The new, record breaking ultra miniature form factor integrates a complete GNSS SiP, including SAW filter, LNA and TCXO. ZOE-M8 SiPs are targeted for applications that require a small size without compromising performance. For RF optimization, the ZOE-M8 SiPs integrate a front-end SAW filter and an additional front-end LNA for increased jamming immunity and easier antenna integration. A passive antenna can be used to provide a highly integrated system solution with minimal eBOM. Incorporating ZOE-M8 into customer designs is simple and straightforward thanks to the fully integrated design, single voltage supply (ZOE-M8G 1.8 V, ZOE-M8Q 3 V), low power consumption, simple interface, and sophisticated interference suppression that ensure maximum performance even in GNSS-hostile environments.

With its dual-frequency RF front-end, the ZOE-M8 SiPs are able to utilize concurrent reception of up to 3 GNSS systems (GPS/Galileo together with either BeiDou or GLONASS). In addition, the ZOE-M8 SiPs provide an SQI interface for optional external flash, allowing future firmware upgrades and improved A-GNSS performance.

Thanks to u-blox advanced algorithms and a complete GNSS solution, ZOE-M8 SiPs meet even the most stringent requirements in versatile industrial and consumer applications, such as UAVs, vehicles and assets tracking. The ZOE-M8 series also supports message integrity protection, anti-jamming, and anti-spoofing, providing reliable positioning in difficult environmental conditions as well as in security attack scenarios.

The ZOE-M8 S-LGA (Soldered Land Grid Array) packaging technology is easily integrated in manufacturing, which enables easier and more reliable soldering processes compared to a standard LGA package.

The ZOE-M8 SiPs are fully tested and qualified according to the JESD47 /ISO 16750 standard.

---

### Product Summary

**ZOE-M8 series**

**Ultra small u-blox M8 GNSS SiPs**

**Ultra small GNSS SiPs with superior performance**

- Ultra small size SiP (System-in-Package) 4.5 x 4.5 x 1.0 mm
- Fully integrated and complete solution, reducing total design efforts
- Ideal for passive antennas, due to built-in SAW and LNA
- High accuracy thanks to concurrent reception of up to 3 GNSS
- ~167 dBm sensitivity for reliable positioning in challenging conditions

**4.5 × 4.5 × 1.0 mm**

---

#### ZOE-M8G vs ZOE-M8Q

<table>
<thead>
<tr>
<th>Feature</th>
<th>ZOE-M8G</th>
<th>ZOE-M8Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Professional</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GNSS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPS/QZSS</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>GLONASS</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Galileo</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>BeiDou</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Number of concurrent GNSS</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Interfaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UART</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>USB</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SPI</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>DDC (I²C compliant)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Features</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programmable (Flash)</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Data logging</td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Additional SAW</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Additional LNA</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>RTC crystal</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Oscillator</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>Timepulse</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Power supply</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.71 V – 1.89 V</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>2.7 V – 3.6 V</td>
<td></td>
<td>•</td>
</tr>
</tbody>
</table>

**E = External Flash Required**  
**C = Crystal / T = TCXO**  
**o = Optional, or requires external components**
ZOE-M8 series

Features

- Receiver type: 72-channel u-blox M8 engine
  - GPS/QZSS L1/C/A, GLONASS L10F, BeiDou B1I, Galileo E1B/C
  - SBAS L1 C/A: WAAS, EGNOS, MSAS, GAGAN
- Max navigation update rate:
  - Single GNSS: up to 18 Hz
  - Concurrent GNSS: up to 10 Hz
- Accuracy: ±2.0 m CEP
- Acquisition:
  - Cold starts: 26 s
  - Aided starts: 2 s
  - Reacquisition: 1 s
- Sensitivity:
  - Tracking & Nav: −167 dBm
  - Cold starts: −148 dBm
  - Hot starts: −157 dBm
- Assistance GNSS:
  - AssistNow Online
  - AssistNow Offline (up to 35 days)
  - AssistNow Autonomous (up to 6 days)
- Oscillator: TCXO
- RTC crystal: Optional, can be connected to external RTC Clock
- DC/DC converter: Optional only in ZOE-M8Q for low power, requires external components
- Anti jamming: Active CW detection and removal, Extra onboard SAW band pass filter
- Memory: ROM
- SQI flash (optional): for FW update, AssistNow Offline, AssistNow Autonomous
- Supported antennas: Active and passive
- Raw Data: Code phase output
- Odometer: Integrated in navigation filter
- Geofencing: Up to 4 circular areas
- GPIO for waking up external CPU
- Spoofing detection: Built-in
- Signal integrity: Signature feature with SHA 256
- Data-logger: For position, velocity, time, and odometer data

Electrical data

- Supply voltage: 1.71 V to 1.89 V (ZOE-M8G)
  - 2.7 V to 3.6 V (ZOE-M8Q)
- Power consumption:
  - ZOE-M8G: 40 mA @ 1.8 V (Continuous)
  - ZOE-M8Q: 25 mA @ 3.0 V (Continuous)
- Backup Supply: 1.4 V to 3.6 V

Package

- 51 pin S-LGA (Soldered Land Grid Array): 4.5 x 4.5 x 1.0 mm, 0.04 g

Environmental data, quality & reliability

- Operating temp.: −40 °C to +85 °C
- RoHS compliant (lead-free)
- Qualification according to standard JESD47/ISO 16750
- Uses u-blox M8 chips qualified according to AEC-Q100
- Moisture sensitivity level 3

Interfaces

- Serial interfaces: 1 UART
  - 1 SPI (optional)
  - 1 DDC (I²C compliant)
  - 1 SQI interface (for optional flash)
- Digital I/O: Configurable timepulse
  - 1 EXTINT input
- Timepulse: Configurable 0.25 Hz to 10 MHz
- Protocols: NMEA, UBX binary, RTCM

Support products

- u-blox MB Evaluation Kits:
  - Easy-to-use kits to get familiar with u-blox M8 positioning technology, evaluate functionality, and visualize GNSS performance.
  - EVK-M8GZOE: u-blox M8 Concurrent GNSS Evaluation Kit, supports ZOE-M8G and ZOE-M8Q

Product variants

- ZOE-M8G: u-blox M8 concurrent GNSS SiP, 1.8 V, S-LGA, TCXO, ROM, SAW, LNA
- ZOE-M8Q: u-blox M8 concurrent GNSS SiP, 3.0 V, S-LGA, TCXO, ROM, SAW, LNA

Further information

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