

# u-blox cellular module overview

Powerful, easy-to-integrate, comprehensive cellular modules optimize performance and cost while supporting seamless transition between 2G, 3G and 4G technologies



**SARA series**  
GSM/GPRS and UMTS/HSPA  
LGA modules  
16.0 x 26.0 x 3.0 mm



**LARA series**  
LTE single-mode  
LGA modules  
24.0 x 26 x 2.6 mm



**LISA series**  
UMTS/HSPA(+) and CDMA  
LCC modules  
22.4 x 33.2 x 2.6 / 2.7 mm



**TOBY series**  
LTE single and multi-mode  
LGA modules  
24.8 x 35.6 x 2.6 mm



**(M)PCI series**  
LTE single and multi-mode  
(mini) PCIe modules  
30.0 x 51.0 x 3.7 / 4.5 mm

## Product overview

u-blox offers a wide range of high-quality, scalable cellular modules perfectly suited for vehicle, industrial and M2M applications, as well as mass-market consumer products with demanding size, cost and quality requirements. For telematics applications, u-blox provides easily integrated GNSS positioning modules. (See GNSS compatibility table on page 3.)

This scalable module approach means u-blox cellular modules provide exactly the right product variant to deliver the performance, ease of integration, cost and size required by today's as well as tomorrow's demanding applications.

Different cellular technologies offer different levels of performance and cost benefits, and will co-exist for a long time. So it is essential to develop M2M products that can easily be retrofitted with modules that support other cellular technologies – with virtually no additional development cost.

All u-blox cellular modules that support different cellular technologies are pin/pad compatible, allowing customers to develop a single PCB that can host each module simply as an assembly option.

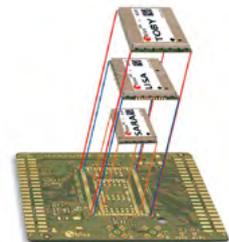
This insures a smooth transition from / to different technology designs, as well as between product variants, to keep redesign costs minimal. This product philosophy enables lower R&D costs and protects the customer's investment.

## Key features and benefits

- u-blox products are available in three grades optimized for our primary market sectors: automotive, industrial (professional) and consumer (standard).
- Support of all available cellular technologies: GSM/GPRS, UMTS/HSPA(+), CDMA and LTE cat. 3 & 4
- u-blox cellular modules provide an extensive set of features accessible via AT commands to ease development of sophisticated applications
- Flexible variants to meet performance and cost requirements (e.g. global and regional variants, different feature sets)
- Seamless operation with u-blox GNSS positioning modules
- Globally available, free-of-charge and network operator independent, the CellLocate® cellular location service supports indoor positioning
- All u-blox modules are qualified according to the in-vehicle ISO16750 standard and are manufactured at ISO-TS16949 certified sites
- All u-blox LGA/LCC modules are pin/pad compatible through u-blox' nested design concept
- Global, highly skilled technical staff provide top class support
- Comprehensive set of worldwide certifications to minimize customer's cost when accessing global markets

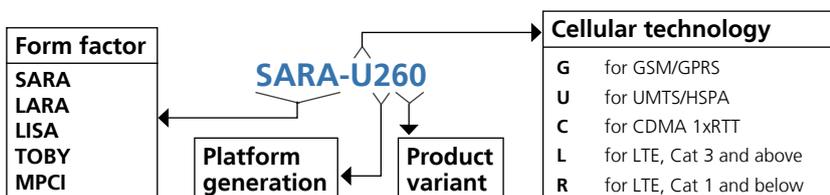
## Nested design

With the u-blox nested design concept, alternate modules can be mounted on the same PCB space as assembly options. This allows a single PCB design to be retrofitted with GSM, HSPA, CDMA or LTE u-blox technologies, thus enabling a straightforward migration between cellular technologies and module generations. This in turn protects the customer's development investment. The u-blox nested design application note provides detailed, accurate information and design guides to implement the nested design concept.



## Product selection

u-blox cellular modules are available in different form factors and variants to provide flexibility for scaling different cellular technologies to various application and geographical requirements, such as bands support, cost, performance and level of component integration.



## Cellular technology selection

M2M applications are very diverse. The required data rate is a key factor when selecting a cellular module. The different cellular technologies provide very different data rates ranging from low data rate GSM/GPRS, well suited to applications requiring the periodic transmission of few kbytes of information, up to LTE, delivering extremely high data rates and very well suited to those applications requiring huge amounts of data transmission (video surveillance, industrial routers, etc.). The comprehensive portfolio of u-blox cellular modules provides the right option for your product development.

Modules	Technology	Uplink	Downlink	Category
SARA-G300, G310, G340, G350	<b>GSM/GPRS</b>	40 kbit/s	80 kbit/s	2G
LISA-C200, C210	<b>CDMA 1xRTT</b>	153 kbit/s	153 kbit/s	
LISA-U200, U201	<b>UMTS/HSPA</b>	5.76 Mbit/s	7.2 Mbit/s	3G
SARA-U260, U270, U280	<b>UMTS/HSPA+</b>	5.76 Mbit/s	21.1 Mbit/s	
LISA-U230	<b>UMTS/HSPA+</b>	5.76 Mbit/s	21.1 Mbit/s	
LARA-R202, R204, R211 TOBY-R201	<b>LTE CAT1</b>	5 Mbit/s	10 Mbit/s	4G
TOBY-L100, MPC1-L100	<b>LTE CAT3</b>	50 Mbit/s	100 Mbit/s	
TOBY-L200, L201, L210, L220, L280 MPC1-L200, L201, L210, L280	<b>LTE CAT4</b>	50 Mbit/s	150 Mbit/s	

## Form factor selection

The table below shows which cellular technologies are available with which form factors. The module types are shown in **bold** under the primary technology and in grey under the fall-back technology.

Form Factor	Cellular technology								
	G	C	U	U	R	L	L	L	
	GSM/GPRS	CDMA	HSPA	HSPA+	LTE Cat1	LTE Cat3	LTE Cat4		
<b>SARA</b> 	<b>G300, G310, U260, G340, G350, U270</b>		<b>U260, U270, U280</b>						
<b>LISA</b> 	U200, U201, U230,	<b>C200</b>	<b>U200, U201, U230</b>						
<b>LARA</b> 	R211			R202	<b>R202, R204, R211</b>				
<b>TOBY</b> 	L200, L210, L280			L200, L201, L210, L220, L280, R201	<b>R201</b>	<b>L100</b>	<b>L200, L201, L210, L220, L280</b>		
<b>MPC1</b> 	L200, L210, L280			L200, L201, L210, L280		<b>L100</b>	<b>L200, L201, L210, L280</b>		

## Geographical selection

Worldwide cellular bands are extremely diverse, in particular for the latest cellular technologies where different frequency bands are allocated in different countries and adopted by different operators. The u-blox cellular portfolio offers a selection of global and regional variants to enable customers to select the most appropriate product and cost point for the target deployment market.

Modules	EMEA				North America				S. America				APAC			
	G	U	R	L	G	C	U	R	L	G	U	R	L	G	U	L
SARA-G300, SARA-G340	•													Δ		
SARA-G310, SARA-G350	•				•					•				Δ		
SARA-U260					•		•									
SARA-U270	•	•												Δ	◆	
SARA-U280							•									
LISA-U200, LISA-U201, LISA-U230	•	•			•		•			•	•			Δ	◆	
LISA-C200							•									
LARA-R202							•	A			•					
LARA-R204								•								
LARA-R211	•		•													
TOBY-R201							•	•			•	•				
TOBY-L100, MPC1-L100									V							
TOBY-L200, MPC1-L200					•		•	•	•	•	•	•	•			
TOBY-L201							•	•			•	•				
TOBY-L210, MPC1-L210	•	•		•										Δ	◆	•
TOBY-L220															J	J
TOBY-L280, MPC1-L280										•	•	•	•	Δ	•	•

Key:

- = Supported
- = Supported in most, but not all, countries of the region
- A = AT&T / T-Mobile only
- V = Verizon only
- Δ = GSM/GPRS not supported in Japan or Korea
- ◆ = Special firmware version for Japan and Korea is available for some variants; refer to product documentation
- J = Japan only

## GNSS integration

u-blox' unrivalled core competence in cellular and GNSS (Global Navigation Satellite System) technologies brings strong synergies between the two subsystems, both often required together in today's sophisticated applications.

A u-blox GNSS module can be connected to the cellular module via a dedicated I<sup>2</sup>C port. All the GNSS-related commands are tunneled, allowing the host processor to fully control both subsystems through a single serial interface and user friendly AT commands.

In addition, u-blox cellular modules come with the integrated u-blox AssistNow client, giving the application access to the free u-blox assisted GNSS service without any integration effort on the host processor.

The immediate benefits for customers are:

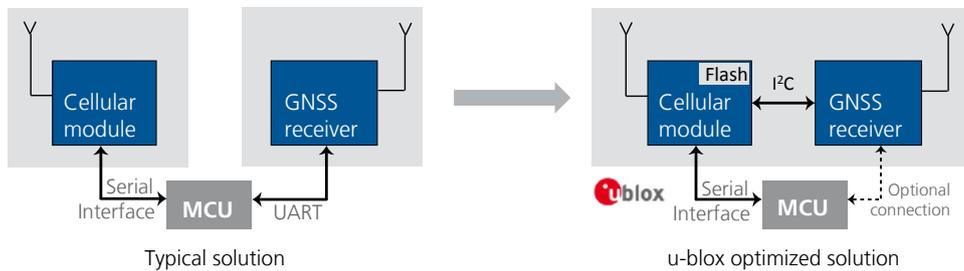
- Better GNSS performance and faster TTFF
- No resources required on customer's microcontroller
- No software integration on microcontroller required

The compatibility table shows u-blox cellular module synergies with GNSS modules.

Compatibility Table			
Model	u-blox 6	u-blox 7	u-blox M8
SARA-G300, G310			
SARA-G340, G350	•	•	•
SARA-U2xx	•	•	•
LISA-C2xx	•	•	•
LISA-U2xx	•	•	• <sup>1</sup>
LARA-Rxx	• <sup>2</sup>	• <sup>2</sup>	• <sup>2</sup>
TOBY-L1xx			
TOBY-L2xx	• <sup>1</sup>	• <sup>1</sup>	• <sup>1</sup>
TOBY-R201	• <sup>2</sup>	• <sup>2</sup>	• <sup>2</sup>
MPCI-Lxxx			

1) Firmware version 03

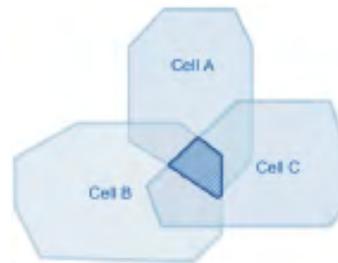
2) Future firmware version



## Cellular location: CellLocate<sup>®</sup>

Although GNSS is a widespread technology, GNSS positioning is not always possible, particularly in shielded environments such as indoors, enclosed park houses, or when a GNSS jamming signal is present. Augmenting GNSS receiver data with mobile network cell information provides a level of redundancy that can benefit numerous applications.

CellLocate<sup>®</sup> is u-blox' cellular augmentation solution, which is embedded in its cellular modules. This cellular positioning technology enables stand-alone location estimation based on surrounding GSM/CDMA/UMTS cell information in conjunction with GNSS positioning data to improve and augment positioning.



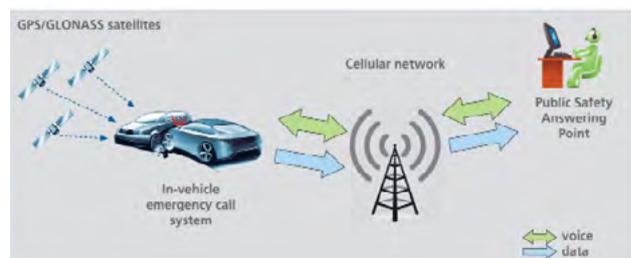
Hybrid positioning based on mobile cell visibility

## eCall / ERA GLONASS

All u-blox cellular modules operating in Europe are ready to fully support the eCall/ERA GLONASS service. u-blox provides know-how and ability to support design-in requirements of GPS/GLONASS and cellular subsystems, comprehensive software support, certification of the wireless modem, forward compatibility with future technologies, as well as the ability to deliver high-quality automotive-grade components in high-volume. u-blox cellular modules in combination with u-blox GPS/GLONASS receivers represent the ideal solution for the easy and fast development of eCall/ERA Glonass ready devices.

Cellular modules supporting eCall/ERA GLONASS:

- SARA-G340, SARA-G350
- SARA-U270
- LISA-U200, LISA-U201, LISA-U270
- TOBY-L200, TOBY-L201, TOBY-L210, TOBY-L220, TOBY-L280 with firmware version 03



Vehicle emergency call concept

# Why choose a u-blox cellular module?

## Module form factor consistency

When it comes to modules, u-blox adheres to a core design philosophy: maintain form factor and software compatibility between different cellular technologies to allow customers to easily upgrade their products or create product variants. The key benefit is simple: our customers can protect their investments by developing a single PCB that can host different cellular modules using the same footprint.

## Technology ownership

In-house cellular expertise at u-blox, as well as our end-to-end management of the entire module manufacturing processes and the availability of the protocol stack source code, give us full control over features, quality and production. This enables us to react quickly to customer requirements and to offer our customers exactly the right feature set, cellular technology options, smooth upgrade path, excellent and highly competent support, technology know-how, and a clearly defined and transparent product roadmap extending years into the future.

## First class technical support

u-blox provides effective customer support through all the stages of development. This is possible through our global technical support network with excellent and highly competent local support and our top class technical documentation. Software and hardware design review allow our customers to proceed smoothly through product development and deployment, thus achieving the shortest time to market.

## Automotive quality and reliability

- u-blox design-centers and manufacturing sites adhere to the industry's strictest standards: ISO/TS 16949, ISO 9001, ISO 14001 and ISO/IEC 80079-34 quality standards
- Stringent product change notification process with advanced notification. Smooth end-of-life
- In-house reliability and test equipment
- Our modules are ISO 16750 qualified, automotive end-of-life (ELV) compliant
- Zero defect strategy (e.g. testing of functions within tolerance, ongoing reliability tests, X-Ray inspection)
- Performance and component selection qualified across the full operating range

## u-blox is a reliable supplier

- Lowest ppm level during customer production and in the field
- Very short delivery lead time due to multiple well-stocked locations
- Flexible, responsive delivery for small, medium and high volume shipment
- Financially solid company
- Fast and convenient availability of samples and kits – samples and pre-production quantities can be purchased directly from our online shop:  
[www.u-blox.com/en/online-shop.html](http://www.u-blox.com/en/online-shop.html)

## Evaluation kits: take the next step!

u-blox provides comprehensive, easy-to-use evaluation kits and tools for gaining familiarity with cellular products, evaluating functionality, and performance. Each cellular evaluation kit also includes a u-blox GNSS module.

- **m-center**: powerful cellular module evaluation software for Windows; free-of-charge from u-blox
- **EVK-G35**: evaluation kit for SARA-G350/340 GSM/GPRS modules
- **EVK-G31**: evaluation kit for SARA-G310/300 GSM/GPRS modules
- **EVK-C20**: evaluation kit for LISA-C2 series CDMA 1xRTT modules
- **EVK-U26/U27**: evaluation kits for SARA-U2 series UMTS/HSPA/GSM/GPRS modules
- **EVK-U20/U23**: evaluation kits for LISA-U2 series UMTS/HSPA GSM/GPRS modules
- **EVK-L10**: evaluation kit for TOBY-L100 LTE module
- **EVK-L10M**: evaluation kit for MPCI-L100 LTE module
- **EVK-R2x**: evaluation kits for TOBY-R2 and LARA-R2 series LTE modules
- **EVK-L20/L21/L22/L23**: evaluation kits for TOBY-L2 series LTE/UMTS/HSPA/GSM/GPRS modules
- **C027**: Internet of Things evaluation kit with a LISA-U2, LISA-C2, or SARA-G3 cellular module and a MAX-M8Q GNSS module. Based on ARM Cortex-M3 CPU, supported by extensive ARM mbed resources.

## Contact us!

For more information, please contact the u-blox sales representative nearest you: [www.u-blox.com/en/contact-us.html](http://www.u-blox.com/en/contact-us.html)  
For support information, visit our website at [www.u-blox.com/en/support-section.html](http://www.u-blox.com/en/support-section.html)