Microdis

Innovation & Reliability

WIRELESS TECHNOLOGIES

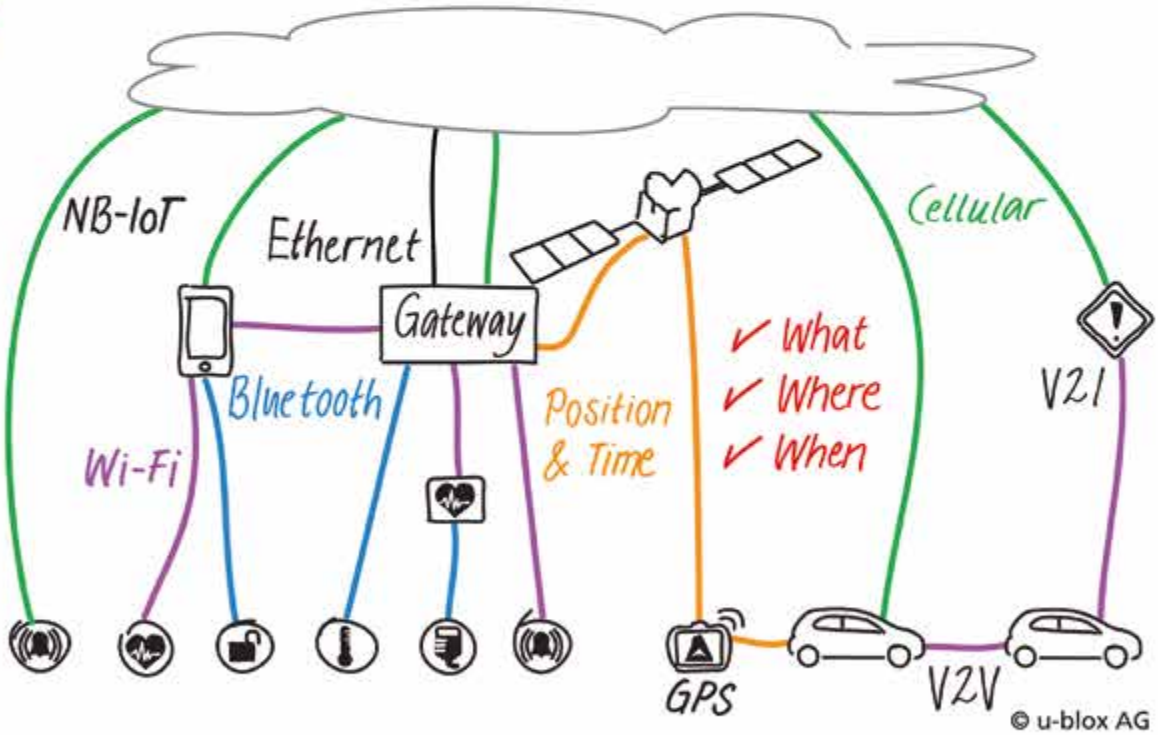
GPS/GALILEO/GLONASS/BEIDOU
IRIDIUM

GSM/GPRS/UMTS/CDMA
LTE/LTE Low Category
NBIoT (Narrow Band IoT)

V2V/V2X (vehicle-to-everything)

ISM (433MHz, 868MHz, 2.4GHz)
Wireless M-BUS (868MHz, 169MHz)
Bluetooth, WiFi
RFID
Antennas & accessories

IoT Connectivity



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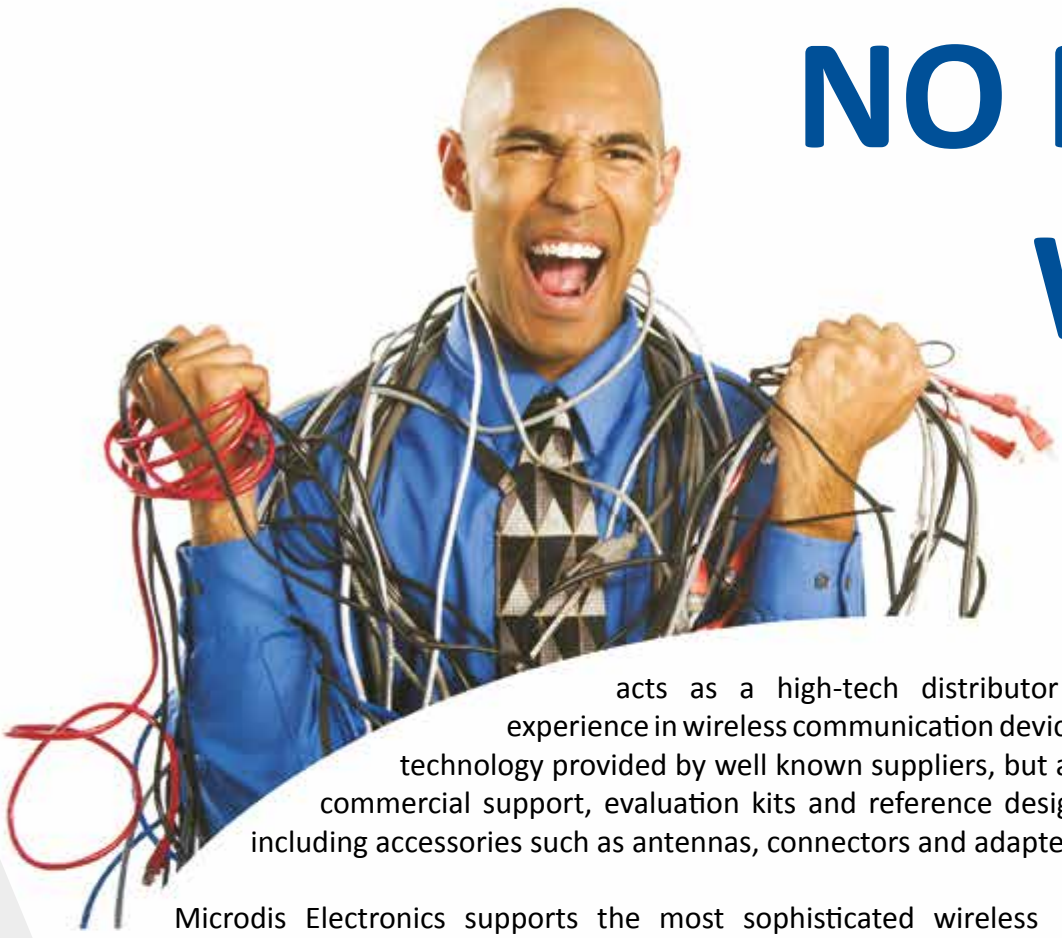


NO MORE WIRES

Microdis Electronics

acts as a high-tech distributor for many years, collecting experience in wireless communication devices. We offer not only the latest technology provided by well known suppliers, but also professional technical and commercial support, evaluation kits and reference designs, comprehensive deliveries including accessories such as antennas, connectors and adapters.

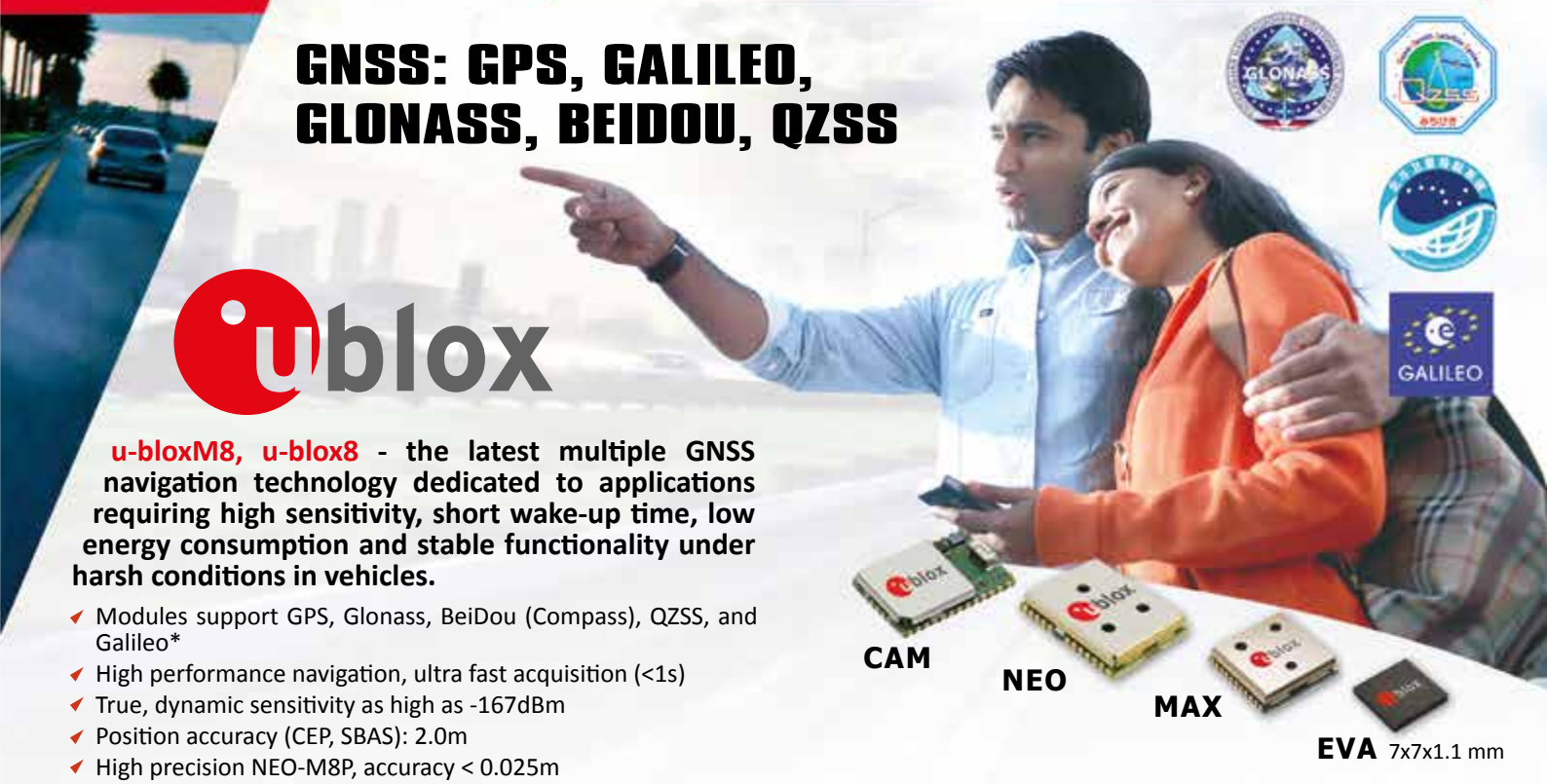
Microdis Electronics supports the most sophisticated wireless applications, like Emergency Call - eCall in Europe and Era Glonass in Russia. Both, based on the state of the art GPS/Glonass technology and dedicated GSM and UMTS features provided by u-blox, will save human lives in case of car accidents.

ERA GLONASS

eCall

	u-blox	MAXTENA	AMBER WIRELESS	AEG ID
GPS/GALILEO/GLONASS/BEIDOU	●	●		
GSM/GPRS/UMTS/CDMA	●			
LTE/LTE CAT.1/LTE CAT.M1	●			
LTE CAT.NB (NARROW BAND IOT)	●			
V2V/V2X (VEHICLE-TO-EVERYTHING)	●			
IRIDIUM		●		
ISM (433MHZ, 868MHZ, 2.4GHZ)			●	
WIRELESS M-BUS			●	
BLUETOOTH, WIFI	●		●	
RFID	●			●

GNSS: GPS, GALILEO, GLONASS, BEIDOU, QZSS



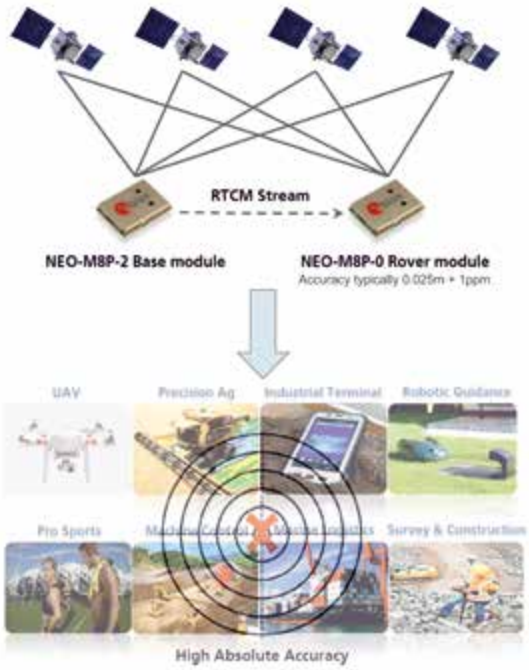
u-bloxM8, u-blox8 - the latest multiple GNSS navigation technology dedicated to applications requiring high sensitivity, short wake-up time, low energy consumption and stable functionality under harsh conditions in vehicles.

- Modules support GPS, Glonass, BeiDou (Compass), QZSS, and Galileo*
- High performance navigation, ultra fast acquisition (<1s)
- True, dynamic sensitivity as high as -167dBm
- Position accuracy (CEP, SBAS): 2.0m
- High precision NEO-M8P, accuracy < 0.025m
- Ultra low energy consumption (4.5mA / 3V, 1Hz tracking)
- Assisted positioning service for GPS, Galileo* and Glonass: Online, Offline (up to 35 days) and Autonomous
- Best in class jamming immunity
- Spoofing and Jamming detection
- Geofencing to warn when leaving defined area
- Built in sensors for navigation without sky view (NEO-M8L/U)
- Dedicated modules (NEO-M8T, LEA-M8F) for precise timing
- EVA – the smallest standalone, complete GNSS module
- Extremely small modules with built in antenna (CAM-M8x)
- Backward pin compatibility (ublox5/ublox6/ublox7 generations)
- Versions dedicated to cost sensitive applications
- **Easy to design, manufacture and integrate with various antennas**

*Galileo is supported by the latest FW

u-blox M8 high performance positioning - new platform combining advanced technology, sophisticated algorithms, true concurrent GNSS reception and multi GNSS aiding services. u-blox M8 sets the new benchmark for navigation in challenging environments.

In-band jamming immunity - the best on the market



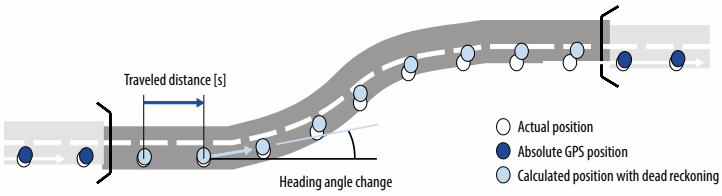
Cost optimized Precise Positioning based on NEO-M8P RTK platform

Fast, sensitive, power and cost optimized swiss made u-bloxM8 modules.

We offer Swiss made receivers, produced by a well-known u-blox company, to ensure superb technical parameters, the highest reliability, but also additional features and market leading technologies.

All modules are qualified for in-vehicle use (ISO16750)

3-Dimensional Dead Reckoning GNSS - the ability to calculate a position in the X, Y, and Z axis when satellites signals are blocked. Built in sensors (gyroscope, accelerometer) allow full coverage even without GNSS signal (tunnels, car parks).



Security - Spoofing detection indicates tries to forge a GNSS signal for false positioning, **Jammer detection** indicates the presence of GNSS jammer.

Multi GNSS support - u-bloxM8 is the new quality on the market, bringing real advantage of using for fix calculation few positioning systems in parallel. Multiple GNSS Assisted data (MGA) are available for all systems. Combined with high sensitivity it makes u-bloxM8 modules the best performance. Limitation to one system is possible, for energy saving.

Wrist mode - to filter out arm motion for wrist worn applications.

Odometer - provides ground distance using solely the position and Doppler-based velocity.

Geofencing - receiver reports (by command or I/O pin) if fix lies within defined area (up to 4 can be defined).

Multiple GNSS Assisted data (MGA) - using GPS, Galileo, Glonass, BeiDou and QZSS data from the u-blox' server to boost acquisition, or to be able to get fix despite weak signals and a harsh environment.
Available as Online, Offline (up to 35 days ahead) and Autonomous (calculated internally by the GNSS receiver, no access to ublox' server required, up to 6 days).

Precise Positioning - u-blox' PPP algorithm provides position accuracy better then 1.0m, under good sky visibility. RTK based system (NEO-M8P) offers **centimeter-level accuracy** (<0.025m).

GNSS ANTENNA SELECTION GUIDE

Choosing an antenna, and properly implementing it, is the second most important part of GNSS system design, right behind the module selection.

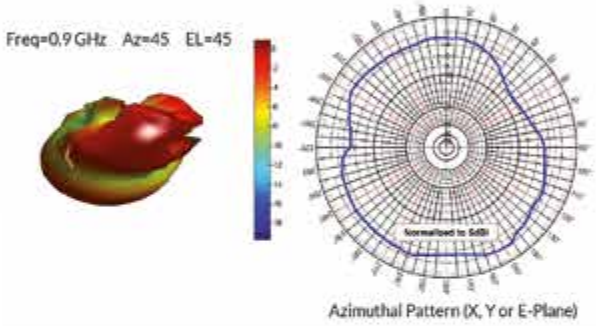
An antenna choice is a series of trade-offs that an engineer must take into account. Depending on the desired outcome this part of the system must be either power efficient, have high gain or have small size. These three are the main technological arguments, additional ones would be: polarization (linear polarization antennas tend to be more affected by reflected signals than RHCP), de-tuning resistance and ground plane dependence . A sum of six points that are important for antenna operation. Other arguments that must be considered are based on End-device requirements, and they may include: ease of installation, ease of servicing, robustness, visual design traits (embedded or external antenna) and one of the most significant - cost.

	Embedded				External		
	Passive patch (RHCP)	Active patch (RHCP)	Passive chip (linear polarization)	Passive Helical (tuned)	Active patch	Passive Helical	Active Helical
High gain	●●●	●●●●	●	●●●	●●●●●	●●●	●●●●●
Small size	●●●●	●●●	●●●●●	●●●●	●●	●●	●●
Power efficiency	●●●●●	●●●	●●●●●	●●●●●	●●●	●●●●●	●●●
Ground plane independence	●●	●●●●	●	●●●●●	●●●●	●●●●●	●●●●●
De-tuning resistance	●	●●●	●	●●●●●	●●●	●●●●●	●●●●●
Cost	●●●●●	●●●●	●●●●●	●●●	●●●	●●	●

Gain

Gain describes how well the antenna converts radio waves arriving from a specified direction into electrical power or how well it converts input power into radio waves headed in a specified direction.

When no direction is specified, gain is understood to refer to the peak value of the gain. A plot of the gain as a function of direction is called the radiation pattern.



Azimuthal Pattern (X, Y or E-Plane)

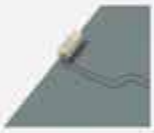
Passive or Active

Because of the weak GNSS signals using passive antennas that are additionally mounted via a long cable can be impossible. That is where active antennas are mostly used. An active antenna is a passive patch with an LNA, and the gain is mostly described as the LNA* gain. Such antennas need to be supplied from a power source, which makes the system less power efficient (**an active antenna can consume 10-20mA**), but for some applications it is necessary. External antennas are also very popular because there is very little design needed - just plug the antenna to the RF connector.

*Low-noise amplifier (LNA) is an electronic amplifier used to amplify possibly very weak signals (captured by an antenna). The LNA boosts the antenna signal to compensate for the feedline losses going from the (outdoor) antenna to the (indoor) receiver. It amplifies both noise and signal, so it does not affect the SNR.


25x25mm
Active antenna
module

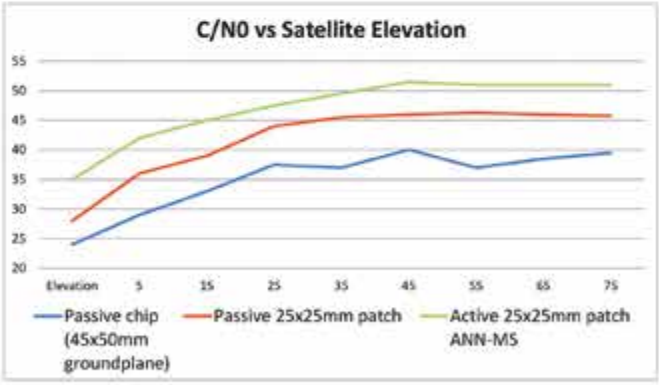

18x18mm
Passive patch
25x25mm groundplane


3.2x1.2mm
Passive chip
20x45mm groundplane

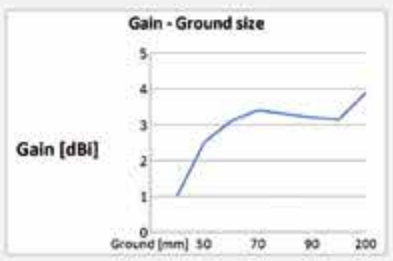
Patch, chip or helical

Deciding which antenna to use is directly connected to the end-device application. Some rules of thumb for the designer exist however:

- A power hungry antenna in a battery driven system is not desired.
- A ceramic patch or chip in a pocket application will detune due to human body proximity.
- A fixed system will work better with a big 25x25mm patch, with optimal ground plane, than with a helical or chip antenna.
- A small patch will never have optimal performance, it is a trade - acceptable performance with small size. The performance depends on groundplane size.
- A chip will be worse than a patch in almost all cases - exception: it will work better if the device is flipped upside down.
- A helical antenna has lower directional gain, but will work better inside a pocket and in a device position changing application.
- An external active antenna mounted on a i.e. car (metal) roof will have the best possible gain and may be used as a reference.



Example performance chart



Ground plane

A ground plane is the most important design issue to consider while developing a GNSS receiver system. A dependable antenna can lose all attributes (gain, polarization, center frequency) if a ground plane is small or non-existent.

In almost all cases the parameters stated in the datasheets are based on measurments done with the antenna placed on a optimal ground plane (i.e. 50x50mm), which is a very important point to remember when testing the antenna.

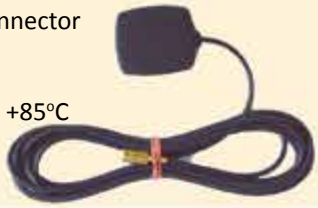
The distance to ground plane edge has a similar effect to the size of the ground plane.

GNSS ANTENNAS

External

ME431MP / ME431GMP

- GPS 1575.42 MHz (ME431MP)/ /GPS+GLONASS 1572-1610 MHz (ME431GMP)
- Gain 26 dBi/3 V, 27 dBi/5 V
- magnetic version, sticker option
- RG174 cable with the type of connector upon request
- size 41 mm x 34 mm x 13.7 mm
- operating temperature -40°C to +85°C



ME9001

- GPS (1575.42 MHz) GLONASS (1592 - 1610 MHz)
- LNA Gain: 23dB at 3V, 24dB at 5V
- Operating temperature: -40°C to +85°C
- size 116.2 mm x 74 mm x 110 mm
- **Marine antenna**
- **Available with Tetra or AIS also as Iridium, and in black housing**

ME435MP

- GPS 1575.42 MHz
- Gain 26 dBi/3 V, 27 dBi/5 V
- RG174 cable with the type of connector upon request
- **size 21.2 mm x 28.2 mm x 13.2 mm**
- operating temperature -40°C to +85°C
- **Mini GPS Antenna**

Combo GPS+GSM

ME660B / ME664B

- AMPS/GSM/Bluetooth-Wifi 2.4 GHz/ GPS 1575.42 MHz
- available as Combo, or just GSM
- GNSS gain: 26 dBi/3 V, 27 dBi/5 V, GSM: 2.2 dBi max
- mounting in a hole with the screw
- vswr: < 2:1 for GSM, < 1.2:1 for GPS
- two cables RG174 with the type of connector upon request
- size 75 mm x 17.5 mm
- operating temperature -40°C to +85°C
- aluminium base

ME860B

- AMPS/900/1800/1900/2100 MHz / Bluetooth-Wifi 2.4 GHz / GPS /Glonass
- GNSS gain: 26 dBi/3 V, 27 dBi/5 V, GSM: 2.2 dBi max
- mounting in a hole with the screw
- vswr: < 2:1 for GSM, < 1.2:1 for GPS
- two cables RG174 with the type of connector upon request
- size 98 mm x 59.5 mm x 64 mm
- operating temperature -40°C to +85°C

Internal

MEM801F / MEM801GF

- GALILEO E1 (1575.42 MHz), GPS (1575.42 MHz), GLONASS (1592 - 1610 MHz)
- noise figure: 1.0 dB @ 2.7 V
- patch gain: 3.6 dBi, LNA Gain: 28 dB @ 2.7 V Size: 25mm x 25mm x 7.6mm
- current consumption: 9 mA @ 2.7 V
- to be mounted in the customers casing
- Mid-Filter
- cable and connector to be arranged
- small size version also available: 18.5 mm x 18.5 mm x 4.7 mm (MEM015)

ME408 / ME408G

- GPS 1575.42MHz (ME408) / GPS+GLONASS 1572-1610MHz(ME408G)
- Patch with groundplane
- Gain 26dB at 3V, 27db at 5V
- Size 35 mm x 35 mm x 6.3 mm
- Current consumption 15mA-25mA
- Cable and connector to be arranged
- Limiter diode (option)
- Operating temperature -40°C to +85°C

Microstrip GPS/GPS+GLONASS patch type antennas are offered by the American company Maxtena in several sizes, to fit almost any application. Starting from 10mm x 10mm destinated for very small GNSS receivers and ending with 25mm x 25mm. Engineering kits (tuning kits) contain the antennas with different resonance frequencies (with a 2MHz interval) which allows a selection of an antenna tuned to a particular environment (housing and other components have a major impact on the efficiency of GNSS antennas).

MAXTENA

HELICAL GNSS ANTENNAS

MAXTENA

For embedded helical antennas Maxtena offers the possibility to use a tuning kit. Similar as the patch antenna solution this tuning kit is an inexpensive, quick and effective way to determine the correct GPS antenna to use inside a device. The tuning kit contains five standard samples optimized for a range of different loading conditions commonly encountered in devices requiring an embedded antenna configuration. The tuning kit was designed to empower engineers responsible for devices requiring an embedded antenna configuration. The tuning kit allows for both quick and easy antenna selection and removes the need for a lengthy and costly custom antenna integration process.

M1575HCT-22P

Passive embedded antenna
Tuning kit for the best performance to eliminate the effect of frequency shifts

24.3x12.85mm, **2 grams**

Frequency 1575 Mhz
Polarization RHCP
Antenna element peak gain -0.5 dBic (typical)
Efficiency 25% (typical)
Bandwidth (-1dB) 20 Mhz

Axial Ratio 1 dB (typical) / 1.5 dB (max)
VSWR 1.5 (max)
Impedance 50 Ohm
Operating temp. from -40°C to 85°C
RF connector 3 pin

M1575HCT-22P-SMA

Passive external GPS antenna waterproof after mounting

38x18.5mm, 11 g, IP67

Frequency 1575 Mhz
Polarization RHCP
Antenna element peak gain -0.5 dBic (typical)
Efficiency 25% (typical)
Bandwidth (-1dB) 20 Mhz

Axial Ratio 1 dB (typical) / 1.5 dB (max)
VSWR 1.5 (max)
Impedance 50 Ohm
Operating temp. from -40°C to 85°C
RF connector SMA (M)

M1227HCT-A2-SMA

Active external antenna GPS+Glonass and military band (L2)

51x30mm, 24 g,
L1/L2 GPS-GLONASS bands

Frequency Bands 1217-1250 MHz (L2), 1565-1610 MHz (L1)
Polarization RHCP
Passive Peak Gain 2 dBic @ 1227Mhz (typical)
2 dBic @ 1575 MHz (typical)
Total Gain **30 dBic @ 1227 MHz (typical)**
28 dBic @ 1575 MHz (typical)
28 dBic @ 1602 MHz (typical)

Out-of-Band Rejection >50 dB
Current Drain 25 mA (typical)
Voltage 3-12 V
Noise Figure 1.5 dB (Typical)
RF Interference Rating 50 V/m. out of band
Operating temp. from -40°C to 85°C
RF connector SMA (M)

M1575HCT-15A-SMA

Smallest active antenna
Only 10.6 grams
Ground plane independent

42x18.5mm, IP67

Frequency 1575.42 MHz (GPS)
Polarization RHCP
Total active gain 28 dBic (typical) @ 3.3 V
Passive gain -2.5 dBic (typical)
Beamwidth 140° (both axes)
Axial ratio 1 dB (max) @ zenith
Input P1dB -31 dBm

Noise figure 0.8 dB (typical) LNA chain only
Supply voltage 1.5 - 3.7 V
DC current 30 mA (typical) @ 3.3 V
Filtering >30 dB rejection @1575 +/- 100 MHz
Operating temp. from -40°C to 85°C
Weight 10.6 grams (typical)
RF connector SMA

M1516HCT-P

Passive external GPS +Glonass antenna

48x18.5mm, 10 g, L1+Glonass

Frequency 1575 MHz (GPS)
1602 MHz (GLONASS)
Polarization RHCP
Antenna element peak gain 1.5 dBic (GPS)
1.5 dBic (GLONASS)

Axial Ratio 0.5 dB (typical) / 1 dB (max)
VSWR 1.5 (max)
Operating temp. from -40°C to 85°C
RF connector SMA (M)

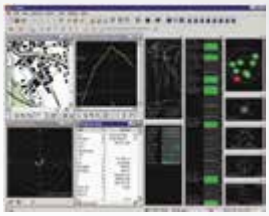
GNSS TOOLS

Hardware and software **evaluation kits**, tools and reference designs created by u-blox to make evaluation and design efforts as simple as possible.

Evaluation kits EVK-M8x, EVK-8x

C94-M8P RTK application board

u-blox offers Reference Designs - ready projects with complete information (including PCB design file in Gerber) to be used in different applications. The example on the picture demonstrates the integration of EVA-M8M with 18x18 ceramic patch antenna, and USB + UART interfaces. Can be used as ready OEM product, or to simplify and speed up customers' design. For information about available Reference Designs please ask your local Microdis office, or application support at marketing@microdis.net.



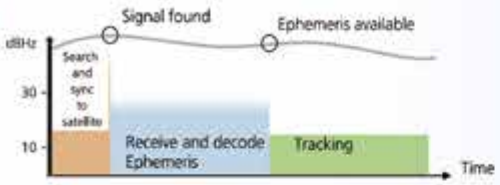
u-center GNSS evaluation software provides a powerful tool for testing, performance analysis and configuration of u-blox GNSS receivers. U-blox GNSS receivers can be configured using the u-center evaluation software with a highly flexible platform to test GNSS products and visualize the collected GNSS data. It supports NMEA as well as a u-blox UBX binary protocol, calibrated map files and data recording with a u-center mobile. Debugging of a target application is also possible.

ASSISTING SERVICES FOR POSITIONING APPLICATIONS

The expectations of modern applications that use GNSS positioning are very demanding. Devices must be low power, small size, and able to calculate position under difficult conditions.

Small size means degraded performance of antenna, as size is very important factor of the GNSS antenna performance.

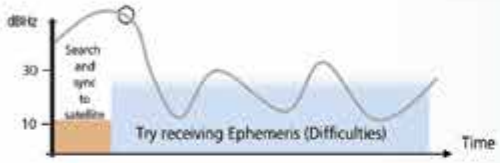
Difficult conditions – weak, reflected and corrupted signal due to small antennas, or bad sky visibility due to pocket design, indoor navigation, or urban canyons.



Cold Start - **strong, stable signal**

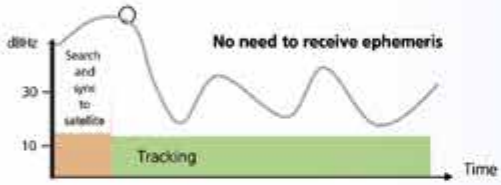
Under **good signal conditions Acquisition** process (cold start) takes appx. 30s, consisting with 2 stages.

Searching and synchronization with satellites (SVs) – takes short time. Receiving orbital position data (called Ephemeris) from minimum 4 (3D fix) SVs takes appx. 30s and the receiver starts to navigate (Tracking). Tracking does not need a signal as strong and stable as acquisition.



Cold Start - **poor signal**

Under **poor signal conditions Acquisition** takes much more time, or is not possible at all. Collecting Ephemeris from 4 SVs needs uninterrupted good quality signal from each SV for appx. 30s. Under adverse signal conditions, it can take minutes, hours or even fail altogether.



Aided Cold Start - using **MGA** data provided by u-blox

u-blox is the leader, and pioneer, in **MGA (Multiple GNSS Assistance) technology**, which accelerates calculation of position by delivering satellite data such as Ephemeris, Almanac, accurate time and satellite status to the GNSS receiver via wireless networks or the Internet. This aiding data enables a GNSS receiver to compute a position within seconds, even under poor signal conditions. Assisted GPS was introduced by u-blox in previous generations of the receivers, and is already a market proven technology. The latest implementation includes also Assisted Glonass, Galileo, BeiDou and QZSS data, significantly improving the performance, so is called Multi GNSS Assistance (MGA), or A-GNSS.

The system is very simple in configuration, and makes applications using GNSS receivers really shining among the competitive units on the market.

With **A-GNSS Online** – GNSS device downloads data (real ephemeris, time, etc.) from u-blox' server. It's the most helpful way to get position under difficult conditions, but must be triggered every time when position is necessary (validity of data is 2-4 hours). Usually used in personal trackers (in case of emergency like heart attack of the user), theft protection systems etc.

A-GNSS Offline - Differential Almanac Correction Data downloaded from u-blox' server , which is valid for up to 35 days. It needs 10kB (1 day file) .... up to 125kB (35 days file) memory to be stored. GNSS module uses the data whenever the signal conditions are poor – which improves navigation performance of the unit. It's used in all kind of applications, also to decrease power consumption (A-GNSS makes acquisition – the most power demanding process - shorter).

A-GNSS Autonomous does not need any data exchange with external server. Orbit prediction data is calculated by the GNSS module himself, and valid for up to 6 days. Activation of this feature is highly recommended.

Although using A-GNSS is simple, u-blox GSM/UMTS modules (SARA, LISA, LEON, TOBY) offer a built in client handling Assisted GNSS features, and using own resources (flash memory).

	AssistNow Online	AssistNow Offline	AssistNow Autonomous
Data download frequency	At every startup	Once every X days	Never
Data retrieval at start-up	Data downloaded from server	Pre-downloaded data from local memory	Retrived from local memory
Aiding data type	Ephemeris, almanac, time, health	Differential almanac correction data	Automatically generated
Data validity period	2-4 hours	35 days	Up to 6 days
Size of downloaded data (example of one, GPS system)	1-3 kB	10 kB (1day) ... 125 kB (35 days)	N.A.
Acquisition (TTFF) performance	As low as 1 second	As low as 5 seconds	As low as 10 seconds

GPS/GLONASS/BEIDOU/QZSS/GALILEO MODULES

Development and Reliability

u-blox, continuously introducing new products, takes special care of their existing customers. New families of the modules are designed to keep pin compatibility with the previous ones (as u-blox7, u-blox6), which anyway will remain in production for a long time.

Quality

u-blox places extraordinary emphasis on delivering high-quality products, according to **Zero defect policy**. The company's quality control extends to all its manufacturing partners who comply to strict processes imposed by standards, such as ISO/TS16949. GNSS and wireless products are designed and tested to operate in a wide variety of applications, including in vehicle usage.

GPS/Glonass/BeiDou/QZSS/Galileo modules suggested for new designs

Model	Size lxwxh [mm]	Lowest Power DC/DC	GPS, Galileo*	Glonass, QZSS, BeiDou	Number of Parallel GNSS systems	Crystal / TCXO / VCTCXO	Geofencing*, Odometer	Spoofing detection*, Wrist mode*, Anti-jamming	Data Logger	UART	USB	SPI	DDC (I2C)	RAW data	Assisted: GPS (G), MULTI GNSS (M) Online, Offline, Autonomous	Precise Positioning: PPP/RTK	Dead Reckoning, built in sensors	Precision Timing	Frequency output	External Interrupt/Wakeup	Antenna supply, short detection & protection	Antenna power control	Extra LNA, SAW
EVA-M8M	7.0x7.0x1.1	○	○	○	3	C	○	○	E	○	○	○	○		M					○	O	P	
EVA-M8Q	7.0x7.0x1.1	○	○	○	3	T	○	○	E	○	○	○	○		M					○	O	P	
MAX-M8C	10.1x9.7x2.5	○	○	○	3	C	○	○		○			○		M					○	O	P	
MAX-M8Q	10.1x9.7x2.5	○	○	○	3	T	○	○		○			○		M					○	O	P	
MAX-M8W	10.1x9.7x2.5		○	○	3	T	○	○		○			○		M					○	○	○	
NEO-M8M	16x12.2x2.4	○	○	○	3	C	○	○		○	○	○	○		M					○	O		
NEO-M8Q	16x12.2x2.4	○	○	○	3	T	○	○		○	○	○	○		M					○	O	P	○
NEO-M8N	16x12.2x2.4	○	○	○	3	T	○	○	○	○	○	○	○		M					○	O	P	○
EVA-8M	7.0x7.0x1.1	○	○/-	○/-/-	1	C	○	○		○	○	○	○		M					○	O	P	
MAX-8C	10.1x9.7x2.5	○	○/-	○/-/-	1	C	○	○		○			○		M					○	O	P	
MAX-8Q	10.1x9.7x2.5	○	○/-	○/-/-	1	T	○	○		○			○		M					○	O	P	
GNSS modules with dedicated features																							
NEO-M8U	16x12.2x2.4	○	○	○	3	C	○	○	○	○	○	○	○		M		UDR**			○	O	P	
NEO-M8L	16x12.2x2.4	○	○	○	3	C	○	○	○	○	○	○	○		M		ADR**			○	O	P	
NEO-7P	16x12.2x2.4	○	○/-	○/○/-	1	C		-/-/○		○	○	○	○	○	G	PPP <1.0m				○	O	P	S
NEO-M8P	16x12.2x2.4	○	○/-	○	2	T	○	○	○	○	○	○	○	○	M	RTK <0.025m				○	O	P	○
LEA-M8F	22.4x17x2.4	○	○/-	○	2	V	-/○	-/-/○		○		○	○		M			○	○	○	○		○
LEA-M8T	22.4x17x2.4	○	○	○	3	T	○	○	○	○	○	○	○	○	M			○		○	O	○	S
NEO-M8T	16x12.2x2.4	○	○	○	3	T	○	○	○	○	○	○	○	○	M			○		○	O	P	○
GNSS modules with integrated antenna																							
CAM-M8C	14x9.6x1.95	○	○	○	3	C	○	○		○		○	○		M					○			○
CAM-M8Q	14x9.6x1.95	○	○	○	3	T	○	○		○		○	○		M					○			○

*** supported by the latest firmware O- requires external components P- control pin to handle active antenna E-External Flash required**
**** Navigation without sky view, based on sensors, needs information about speed of vehicle (ADR), or works without such information (UDR)**

Multi GNSS u-bloxM8 modules can work with several GNSS systems in parallel. For cost and power optimized solutions u-blox offers **u-blox8** modules, which are pin-to-pin compatible equivalents to u-bloxM8 ones. u-blox8 modules also support several GNSS systems, but must be configured to work with one of them.

All wheels are round,

but are they all the same?
There are also many GNSS receivers....

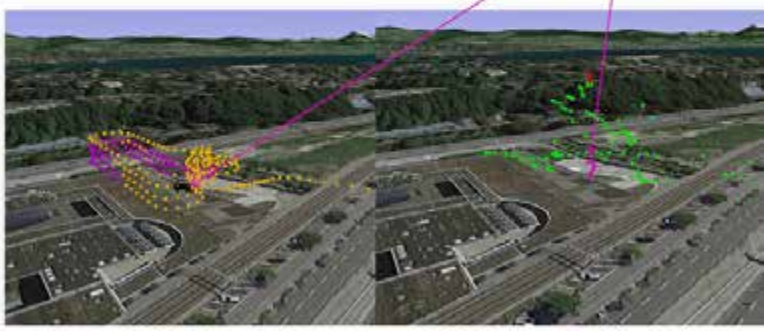
DEAD RECKONING – NAVIGATION WITHOUT THE SKY VIEW

Increasingly dense urban environments, park houses and multi-level interchanges pose a significant problem to navigation systems. Signal reflected from buildings makes position not accurate, vehicles are also more and more often used in areas where GNSS signal is blocked (tunnel, garage etc). Reduced size of antenna necessary in many applications also harms the positioning performance.

For applications like road pricing, fleet management, emergency services, navigation etc. reliable and uninterrupted positioning even when satellites signals are blocked is becoming critical.

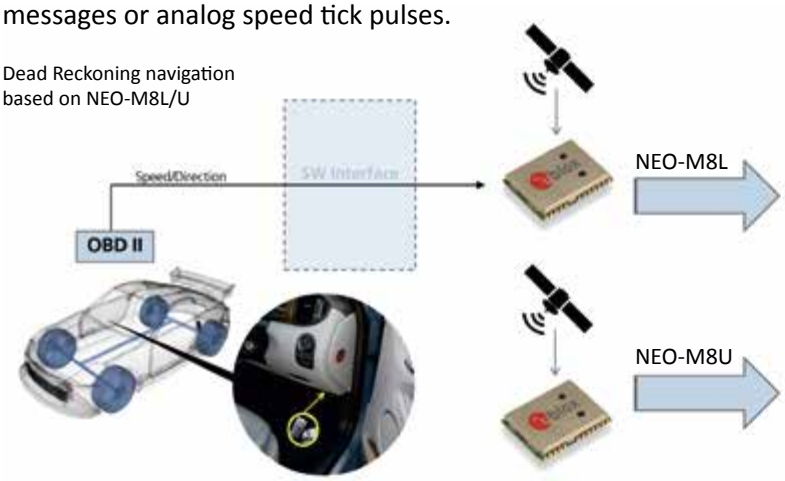
The latest NEO-M8L and NEO-M8U Dead Reckoning modules provide simple in implementation and convenient solution:

- leading GNSS platform u-bloxM8 optimized for the best performance with Dead Reckoning
- due to built-in sensors (gyro, accelerometer, temperature), NEO-M8U provides accurate 3D position even in case of reflections, or lack of GNSS signal. NEO-M8L requires distance provided by CAN messages or analog speed tick pulses.



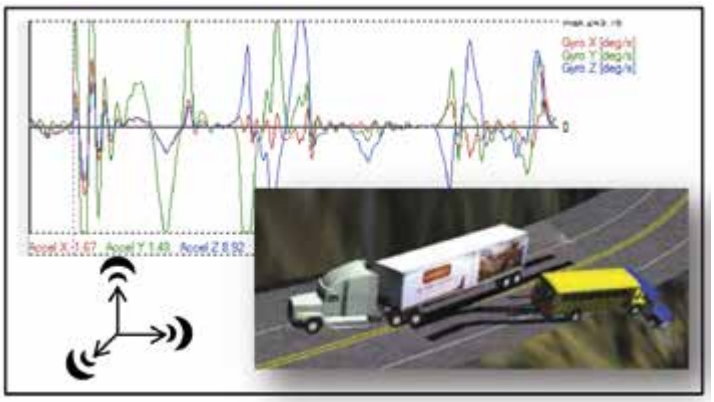
NEO-M8L Standard Multi-GNSS

Dead Reckoning navigation based on NEO-M8L/U



RAW sensor data

- information from sensors can be read (up to 100Hz) and used for example to register behaviour of vehicle during accident
- very precise information about fuel consumption
- simple integration and pin compatibility with the other NEO-M8 family modules for the fast time to market
- dedicated interface to connect u-blox cellular module (SARA, LARA, LISA, TOBY)



temperature, acceleration, angle reported by NEO-M8L/U during accident

GNSS ANTENNA MODULES

CAM-M8x needs ground plane, which can be used to mount not tall components

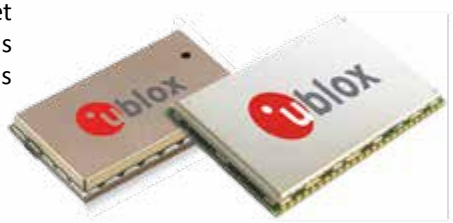
ultra compact CAM-M8x (9.6x14x1.95mm)

SAM-M8Q

Multi GNSS **modules with integrated antenna** simplifies design of the small units, where the usual problem was to integrate GPS antenna. Extremely small **CAM** module offers high sensitivity and navigation using multi GNSS mode. SAM-M8Q targets industrial applications, that require integration. Thanks to 18x18mm patch antenna, with RHCP polarization, not achievable with smaller patch antenna elements, brings maximum performance even in GPS-hostile environments.

GSM COMMUNICATION

u-blox cellular modules like TOBY, SARA, LARA, LISA and LEON are based on the LTE, UMTS/HSPA+ and GSM/GPRS standards. The modules are optimized for low-cost, mass market location-based applications requiring mobile connectivity such as mobile internet and VoIP routing, in-car multimedia systems, asset tracking, fleet management, road pricing, vehicle recovery and mobile emergency services such as eCall. They are also ideal as stand-alone embedded wireless communication solutions for M2M applications such as Automatic Meter Reading (AMR) and RMAC.
All modules are qualified according to ISO16750 for „in vehicle use".



The use of ublox' GSM, UMTS, LTE modules does not lead to consequences from infringement of patents and copyrights.

GSM/GPRS modules SARA, LEON	Form factor	Quad Band (Q), Dual Band (D)	Size lxw [mm]	UART	DDC (I2C) to GNSS module	GPIO	Analog / Digital audio	File system	DTMF support	Antenna detection	Jamming detection	Low power idle mode	TCP/IP, UDP	FTP, HTTP, SMTP	RIL	SSL	Assisted GNSS client	CellLocate	Smart temperature supervisor	in-band modem for eCall	FW update over AT (FOAT)
SARA-G300/310	LGA	D/Q	26.0x16.0	2								O			●						●
SARA-G340/350	LGA	D/Q	26.0x16.0	2	●	4	1/1	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SARA-G350 ATEX	LGA	Q	26.0x16.0	2	●	4	1/1	●	●	●	●	●	●	●	●		●	●	●	●	●
LEON-G100	LCC	Q	29.5x18.9	1	●	5	2/1	●	●	●	●	●	●	●	●		●	●	●	●	●

O- requires external 32kHz xtal

SARA, LEON, LARA, LISA and TOBY - selected features

Modules optimized for low power consumption, small size and cost saving.

- **CellLocate** - localization using signals from BTS, not as accurate as GNSS, but very helpful and supplementary (i.e. in a car park, where
- a GNSS signal is unavailable). The GSM module becomes a very important supporting component for GNSS systems.
- **In-band Modem** - embedded modem for communication within eCall, the European security system, and Era Glonass (Russian system).
- **Pin compatibility between technologies** - common concept of the same SARA form factor for modules supporting GSM 2G (SARA-G3), UMTS 3G (SARA-U2), LTE low cat. (LARA-R2 uses the same pads as SARA), and future NBIoT. Reference PCB design to support SARA and TOBY (fast LTE cat. 4).
- **Low Power** - as low as 0.6mA IDLE (connected to the network), **2.9mA active mode**
- **Antenna Detection, SIM Detection, BIP** - simplifies control, BIP supports eSIM (embedded SIM)
- **Jamming detection** - detects and reports potential jamming
- **GNSS support** - cooperation with GNSS modules (check page 11 for details)
- **Smart Temperature Supervisor** - monitoring of the module board temperature, warning notifications
  or shutdown to prevent damage of the module
- **Dynamic DNS update** - allows to assign a domain name to a host that owns a dynamic IP address
- **TCP sockets always on** - automatic TCP direct link connection at each start up

LTE Cat.NB (Narrow Band IoT) - technology breaking point. u-blox is the leading company working on this new way of communication with „things", that require small amounts of data, over long periods, in hard to reach places.

- excellent coverage (based on current 3G/4G infrastructure), with -20dB better penetration then GSM, to perform well fe. under the ground.
- very low power consumption (10 years on battery)
- low cost
- high data rate is not necessary

U-blox offers modules based on well known SARA platform to simplify migration to this new technology.

	Form factor	Size lxw [mm]	Europe+EMEA(EU), APAC (AP), N.America (NA), S.America(SA)	LTE bands	LTE FDD category	Downlink/ Uplink (Mb/s)
SARA-N2xx*	LGA	26.0x16.0	ALL REGIONS	tbd*	NB	160kb

*Detailed specification of the new LTE Cat. M1 modules is under verification

SARA-U2: family of the smallest, low power and cost optimized UMTS/HSPA modules, pin compatible with GSM/GPRS SARA-G3, LTE low cat. LARA-R2, and NBIoT modules. Extremely small SARA-U201 covers all bands for the worldwide operation.

	Form factor	Size lxw [mm]	Europe+EMEA(EU), APAC (AP), N.America (NA), S.America(SA)	2G 850/1900 MHz	2G 900/1800 MHz	3G 850/1900MHz	3G 900/2100MHz	3G 800MHz	Downlink/Uplink (Mb/s)	GPIO	UART, USB 2.0 (480Mb/s)	SPI (HighSpeed)	DDC(I2C) to connect GNSS module	Digital audio	Antenna supervisor	Jamming detection	Assisted GNSS client, CellLocate	TCP/IP, UDP, FTP, HTTP	SSL	eCall / ERA Glonass
SARA-U201	LGA	26.0x16.0	ALL	●	●	●	●	●	7.2/5.76	9	●		●	1	●	●	●	●	●	●
SARA-U201 ATEX	LGA	26.0X16.0	ALL	●	●	●	●	●	7.2/5.76	9	●		●	1	●	●	●	●	●	●
SARA-U270	LGA	26.0x16.0	EU,AP		●		●		7.2/5.76	9	●		●	1	●	●	●	●	●	●
SARA-U270 ATEX	LGA	26.0x16.0	EU,AP		●		●		7.2/5.76	9	●		●	1	●	●	●	●	●	●
SARA-U260	LGA	26.0x16.0	NA	●		●			7.2/5.76	9	●		●	1	●	●	●	●	●	
SARA-U280	LGA	26.0x16.0	NA			●			7.2/5.76	9	●		●	1	●	●	●	●	●	

u-blox offers LISA-U2xx family, modules in LCC form factor, with features analogue to SARA-U2xx. Please contact the nearest Microdis office if more details are requested.

LISA-U230	LCC	33.2x22.4	ALL	●	●	●	●	●	21.1/5.76	14	●	●	●	2	●	●	●	●	●	

LTE Low Category – the latest proposal for IoT customers looking not for the highest speed, but for price reasonable successor of retiring 2G/3G technology. LTE Low Cat. offers long availability of network, with price significantly lower then high speed versions. LARA-R2, compatible with SARA, supports LTE Cat. 1. SARA-R4 supports the latest, cost optimized LTE Cat.M1

	Form factor	Size lxw [mm]	Europe+EMEA(EU), APAC (AP), N.America (NA), S.America(SA)	2G Quad Band (Q), Dual Band (D)	3G 850/1900MHz	3G 900/2100MHz	LTE bands	LTE FDD category	Downlink/Uplink (Mb/s)	GPIO	UART, USB 2.0 (480Mb/s)	HSIC	SPI (High Speed), SDIO	DDC(I2C) to connect GNSS module	Digital audio	Antenna supervisor	Jamming detection	Assisted GNSS client, CellLocate	TCP/IP, UDP, FTP, HTTP, SSL	VoLTE
SARA-R404M	LGA	26.0x16.0	NA				13	M1	375kb	6	●		●	●	1	●	●	●	●	●
LARA-R211	LGA	26.0x24.0	EU	D			3,7,20	1	10/5	10	●	●	●	●	1	●	●	●	●	●
LARA-R204	LGA	26.0x24.0	NA				4,13	1	10/5	10	●	●	●	●	1	●	●	●	●	●
TOBY-R200	LGA	35.6x24.8	3G ALL LTE NA	Q	●	●	2,4,5,12*	1	10/5	9	●		-/●	●	1	●	●	●	●	●
TOBY-R201	LGA	35.6x24.8	NA		●		2,4,5,12*,13	1	10/5	9	●		-/●	●	1	●	●	●	●	●
TOBY-R202	LGA	35.6x24.8	NA		●		2,4,5,12*	1	10/5	9	●		-/●	●	1	●	●	●	●	●

*LTE band 12 is a superset that includes band 17

LTE – the fastest cellular technology supported by u-blox' TOBY modules and MPCI - mini PCI Express cards. Reference PCB design available to make application ready for SARA/LARA modules, and fast LTE Cat. 4 TOBY.

TOBY-L210	LGA	35.6x24.8	3G ALL LTE EU, AP	Q	●	●	1,3,5,7,8,20	4	150/50	14	●		-/●	●	1	●	●	●	●	
TOBY-L200	LGA	35.6x24.8	3G ALL LTE NA	Q	●	●	2,4,5,7,17	4	150/50	14	●		-/●	●	1	●	●	●	●	
TOBY-L201	LGA	35.6x24.8	NA		●		2,4,5,13,17	4	150/50	14	●		-/●	●	1	●		●	●	
TOBY-L220	LGA	35.6x24.8	AP		●/-	●	1,3,5,8,19	4	150/50	14	●		-/●	●	1	●		●	●	
TOBY-L280	LGA	35.6x24.8	SA,AP	Q	●	●	1,3,5,7,8,28	4	150/50	14	●		-/●	●	1	●	●	●	●	

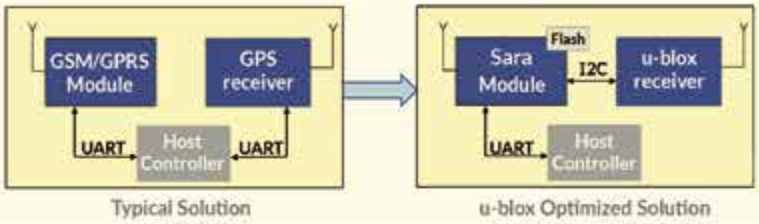
MPCI-L2xx	PCIe	51.0x30.0

MPCI-L2 mini PCI Express cards are based on TOBY-L2 modules
Some features are supported only by new FW release

SMART AND EFFICIENT COOPERATION
WIRELESS (GSM, UMTS, LTE) + GNSS (GPS, GLONASS , GALILEO,..)

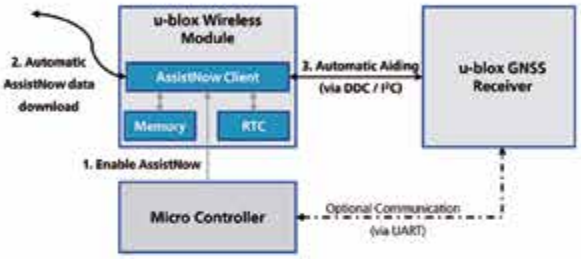
There are many modern applications on the market that require two technologies: GNSS positioning and 2G/3G/4G communication. Expectation is to have a small, low power, and highly integrated solution.

Since GSM/GPS combo modules are not a flexible solution, and do not fit into the market, u-blox has implemented special features to ease the design effort required for such integration.

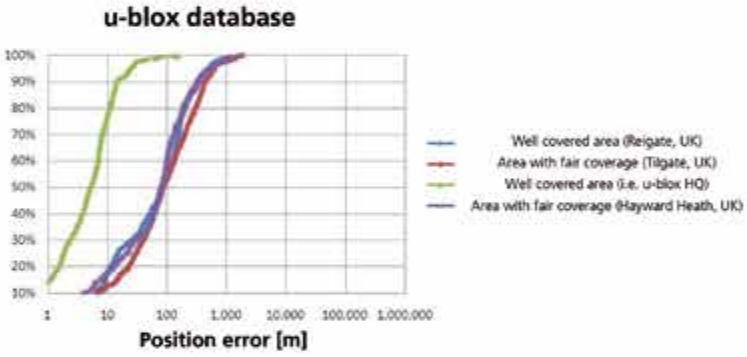


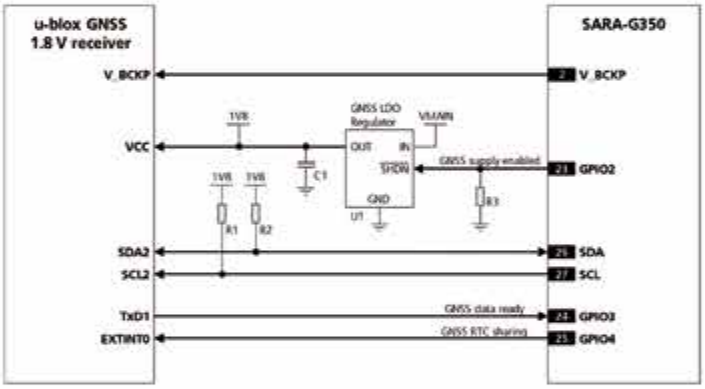
For example, connecting u-blox' wireless and GNSS modules together simplifies design (one UART is enough), allowing full access to GNSS module via the wireless modem. It is also possible to use very useful features built in GSM/UMTS module like:

- GNSS power control with AT commands (GNSS supply enable)
- Assisted GNSS client built in GSM module, handling of A-GNSS data exchange and storage (Flash memory built in GSM module)
- time synchronization between modules (GNSS RTC sharing)
- GNSS data ready – optimizes the wireless module power consumption, since it wakes-up only when there is data ready from the GNSS receiver



Full cooperation between u-blox' wireless and GNSS modules is possible with very simple hardware design, presented on picture.





Moreover, u-blox' GSM/UMTS modules offer additional service, **CellLocate**, making such GSM + GNSS tandem not only highly integrated and low power, but also an extremely functional solution, offering information about position even under poor or no sky visibility and no GNSS signal conditions, or jamming. Wireless module collects information from visible cells, and reports to ublox' server. CellLocate calculates position based on proprietary algorithm and database, and returns to the wireless module. CellLocate database is self learning structure, which continuously improves accuracy.

GSM TOOLS

The **EVK-G20/G31/G35** evaluation kit provides a simple, flexible and ready to use environment for evaluating u-blox' SARA and LEON wireless modules, as well as for designing and testing of wireless and GNSS applications (GNSS module on board). The kit is very user- friendly, and has both USB and RS232 interfaces for development, testing and tracing.
EVK-U20/U23/U26/U27 evaluation kits similar to EVK-G35, but dedicated to evaluation of SARA and LISA 3G cellular modules, and **EVK-L20/21/22/23** for 4G TOBY evaluation.

54 x 98 mm

C027 - Universal ARM mbed enabled wireless IoT kit, powered by Cortex-M3 processor
The compact C027 kit contains a u-blox SARA GSM or LISA UMTS/CDMA cellular and MAX GPS/GNSS positioning modules, an ARM 32-bit Cortex-M3 with 512k of Flash Memory and 64kB RAM, user programmable via USB. CAN bus and Ethernet interfaces, 22 GPIOs to access components via I2C, SPI, UART, and I2S digital audio. The C027 can be easily stacked with additional expansion boards. It is supported by the open-source ARM mbed platform (http://mbed.org) with free software libraries, hardware designs and online tools for prototyping of ARM-based designs.

The **m-center** wireless modules evaluation software from u-blox provides a powerful platform for evaluation, configuration and testing of u-blox' LEON, SARA, LARA, LISA, TOBY families of GSM/GPRS, UMTS/HSDP+ and LTE products. m-center is PC-compatible, and provides an intuitive, easy to understand and use graphical interface.

GSM ANTENNAS

ME500L

- 433 MHz, 824~894 MHz, GSM 900 / 1800, PCN 1.9 GHz UMTS 2.1 GHz Bluetooth 2.4 GHz
- gain: 2.2 dBi
- vswr < 2:1
- to be mounted on flat surfaces (eg. glass)
- RG174 cable with the type of connector upon request
- dimensions: 22 mm x 126.5 mm
- operating temperature: -40°C to +85°C

ME301M

- 824~894 MHz, GSM 900 / 1800 MHz, PCN 1.9 GHz, UMTS 2.1 GHz
- gain: 2.2 dBi
- max power: 30 W
- vswr < 2:1
- magnetic, mounting on metal surface
- RG174 cable with the type of connector upon request
- dimensions: 71.95 mm x 30.85 mm
- operating temperature: -40°C to +85°C

ME200GP

- 433 MHz, 824~894 MHz, GSM 900 / 1800, PCN 1.9 GHz UMTS 2.1 GHz Bluetooth 2.4 GHz
- Gain: 2.2 dBi Max
- VSWR: <2:1
- **Wall mount**
- cable and the type of connector upon request
- **Whip length: 290mm, diameter: 22mm**
- Operating temperature: -40°C to +85°C

ME010/ME020/ME030/ME040

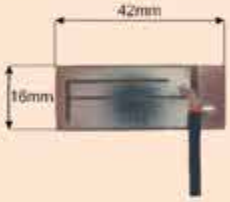
- 868 MHz, GSM / PCN / UMTS, Bluetooth 2.4 GHz
- 2 band (900/1800MHz) version available
- Gain: 2.2 dBi Max
- possible broadband version or tuned to specific frequencies
- SMA, FME connector in straight or angle version
- operating temperature: -40°C to +85°C

MEW0124

- 4G/LTE (699-960/1710-2690 MHz), GALILEO E1 (1575.42 MHz), GPS (1575.42 MHz), GLONASS (1592 - 1610 MHz)
- polarization: linear
- gain: 3dBi Ave
- SMA Male connector
- VSWR: <3:1 ; <5:1 at 2500-2690MHz
- operating temperature: -40°C to +85°C
- size: 196mm x 38mm x 13.8mm

MEMAS01/MEMAS01A

- 824-894 MHz, GSM 900 / 1800 MHz, PCN 1.9 GHz, UMTS 2.1 GHz, Bluetooth 2.4 GHz
- gain 0.0 dBi
- max power: 25 W
- vswr <2.5:1
- cable and the type of connector upon request
- operating temperature: -40°C to +85°C



ME664B

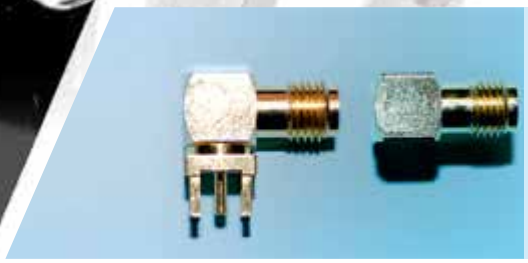
- 824-894 MHz, GSM 900 / 1800 MHz, PCN 1.9 GHz, UMTS 2.1 GHz, Bluetooth-Wifi 2.4 GHz
- gain 2.2 dBi
- mounting in a hole with the screw
- vswr: < 2:1 for GSM
- RG174 cable with the type of connector upon request
- dimensions: 70 mm x 15 mm
- operating temperature: -40°C to +85°C

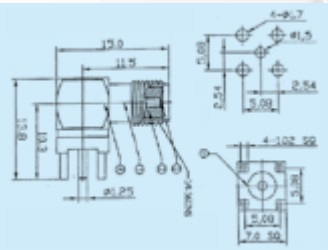
MEE03/MEE04

- 824-894 MHz, GSM 900 / 1800 MHz, PCN 1.9 GHz, UMTS 2.1 GHz
- **ceramic GSM antenna**
- vswr: <3.0:1
- size 24 mm x 5.5 mm x 4.4 mm
- gain max
  MEE03: AMPS 1.3 dBi / GSM 2.4 dBi / DCS 6.4 dBi / PCS 5.9 dBi / UMTS 4.8 dBi
  MEE04: AMPS 0.7 dBi / GSM 0.7 dBi / DCS 5.7 dBi / PCS 4.8 dBi / UMTS 4.6 dBi
- operating temperature -35°C to+ 85°C

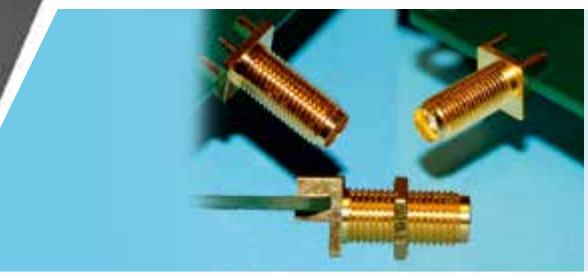
HF CONNECTORS AND ACCESSORIES

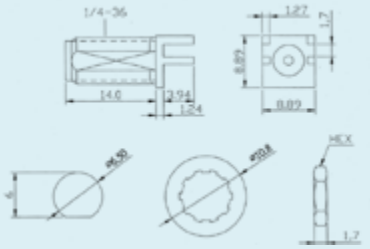
For many years Microdis Electronics has provided wireless products for customers in Eastern Europe. Including ISM solutions (Bluetooth, ZigBee), GSM/UMTS/CMDA modules, GPS/Galileo/Glonass modules.
Together with the wireless products Microdis can also offer a comprehensive range of accessories necessary to support wireless applications, including: antennas, HF connectors, HF adapter cables and SIM card holders.



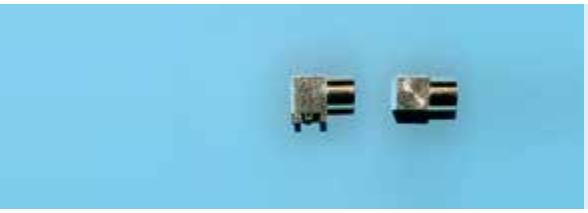


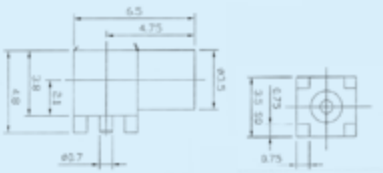
Right angle, SMA female, THT
SMA_FEMALE_PCB_ANGLE_LF



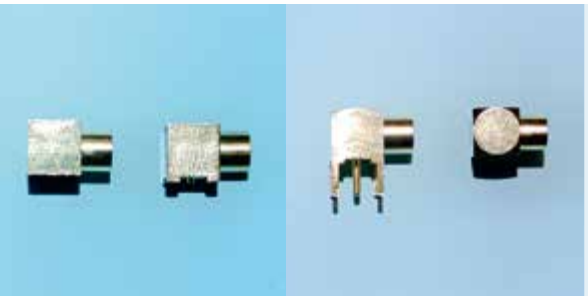


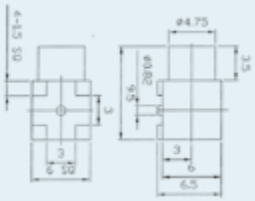
Right angle, SMA female, Edge mounted
SMA_FEMALE_PCB_THROUGH_SMD



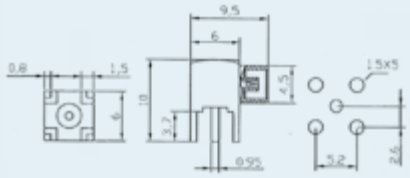


Right angle, MMCX female, SMD
MMCX_FEMALE_SMD_ANGLE_LF

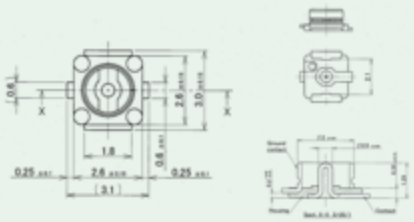




Right angle, MCX female, SMD
MCX_FEMALE_SMD_ANGLE_LF



Right angle, MCX female, THT
MCX_FEMALE_PCB_ANGLE_LF



Compatible with u.fl
I-PEX_FEMALE_SMD

The RF portfolio of Microdis Electronics consists also of customized pigtails, prepared according to the specifications sent by customers.

Global Connector Technology and Alps Electric portfolio includes Push-push SIMholders, Low-profile SIM holders, Combo SIM/ microSD memory card holders, Dual SIM holders and also many standard SIM holders.

These products are only a small fraction of the high frequency portfolio of Microdis Electronics.
The standard offer contains other connectors and adapters which are not presented here.

RADIO FREQUENCY IDENTIFICATION

AEG ID
INTELLIGENTIFICATION™

We have provided application support for RFID projects for over 10 years.
At this time we have gained tremendous experience and developed a range of components that work best on the market. They are both products of primary and cheaper technology, 125 kHz (popular products Unique and EM Marin) and more advanced systems for industrial applications (134.2 kHz) or logistics (13.56 MHz) and electronic billing (Mifare).

Access Control

Microdis offers a range of contactless ISO cards, key fobs and bracelets designed for corporate access control, time & attendance, ski-lift ticketing and event management applications. Prelaminated RFID inlays for contactless card production are also available. Furthermore Microdis is able to provide quality printed, graphically personalized cards.

Animal identification

The present Animal Identification uses widely transponders, injection implanters and RFID readers for livestock, pet, bird and fish identification and tracking applications. Tag form factors include glass-encapsulated tags, pigeon rings, ear tag inlays and boluses. Animal tracking applications based on AEG ID RFID technology enable end users to automatically record the origin and history of each individual animal.

Pet identification: hand readers, glass tubes, injectors and complete cannulas with barcode assigned to each transponder.

Life stock identification: hand readers, stationary readers with antennas, glass tubes, inlays and animal ear rings.

Pigeon identification: readers, and leg ring with a glass tube.

Industrial & logistic applications

Tags and readers for RFID supply chain management and industrial automation solutions. These systems are used in the beverage and gas industries to track kegs and gas bottles, in the automotive industry for production control, in logistics to track cases and pallets, and in waste management to identify containers. Transponders for industrial use include durable plastic disc tags designed to withstand harsh environmental conditions, including humidity, aggressive chemicals and temperatures in the range from -40°C to +220°C.

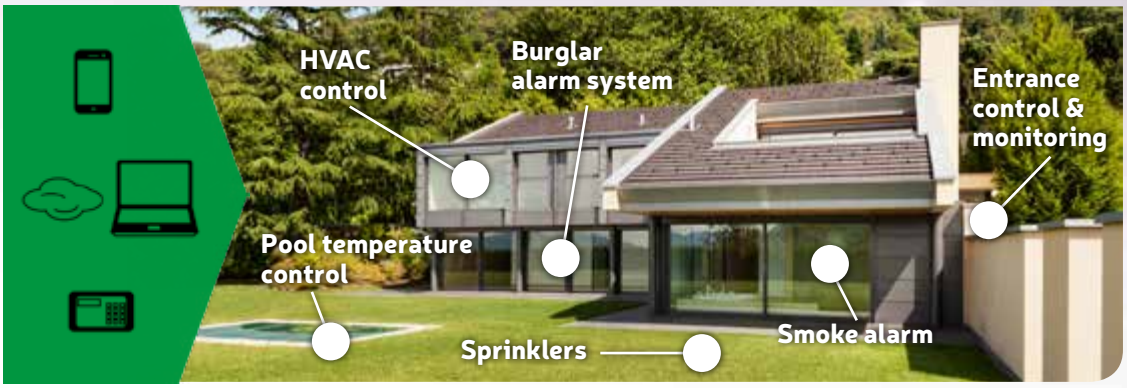
Container management: stationary readers with industrial grade antennas, hand readers, disc tags, special KEG tags (welded to metal) or moulded transponders.

Waste identification: hand and stationary readers, inlays and disc tags, special temperature resistant transponders.

WORLD OF IOT

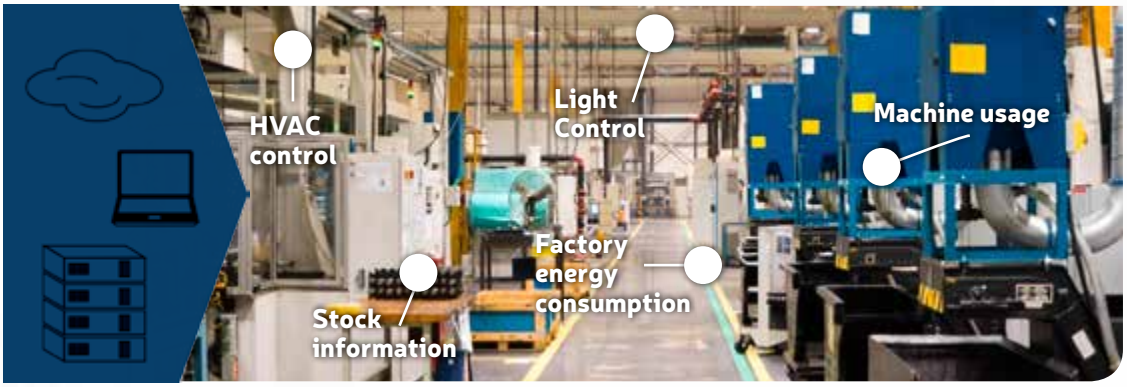
The Internet of Things (IoT) refers to the interconnectivity of uniquely identifiable devices within the existing internet infrastructure. IoT involves ubiquitous smart objects that communicate directly over the internet creating data without human intervention. With its potential to network devices with limited CPU, memory and power resources, IoT finds applications in nearly every field.

Building and home automation



WiFi
Bluetooth
GSM UMTS
LTE/Low Cat
ISM
Wireless M-Bus
NBIoT

Industrial automation & sensor networks



WiFi
Bluetooth
ISM
Wireless M-Bus
NBIoT

Smart grids & energy management

WiFi
Bluetooth
ISM
GSM UMTS
LTE/Low Cat
Wireless M-Bus
NBIoT

Vehicle oriented applications

WiFi+Cellular
Cellular+GNSS
Bluetooth
ISM
NBIoT
V2V / V2X*

*Vehicle to vehicle (V2V) and vehicle to infrastructure (V2I) wireless technology, collectively known as V2X, improves road safety, reduces traffic congestion and enhances the overall passenger experience.

WIFI, BT, V2X, ISM pre-certified modules for the Internet of Things

Classic Bluetooth v2.1/v3.0 – very robust communication, but needs time to connect, high data rates, older phones are equipped with this technology. To support iOS agreement with Apple must be signed, and dedicated version of modules used.

BLE - Bluetooth low energy (v.4.0-4.2) also known as Bluetooth Smart, low payload, but with fast negotiation and connection and very low power, most smartphones are equipped with this technology. BLE is not compatible with Classic.

Bluetooth dual-mode (BLE +Classic BT) modules are known as Bluetooth Smart Ready.

Stand-alone -CPU and stacks are on module

Host-Based - needs additional, external CPU with stacks.

Bluetooth

ublox

NINA-B112
10.0 x 14.0 x 3.7 mm

NINA-B111
10.0 x 10.6 x 2.1 mm

NINA-B1 BLE module, stand-alone

- Bluetooth Low Energy 4.2 (Bluetooth Smart)
  - Central or Peripheral role (concurrent)
- u-blox Low Energy Serial Port, GATT Services
- up to 8 connections
- State of the art antenna design
  - 300m range with built-in antenna
- Ultra low power consumption (5mA Tx/Rx)
- Powerful Cortex M4F for customer application
  - Nordic SDK or ARM mbed tools
- GPIO / SPI / I2C / I2S / UART / ADC / PWM
- Mesh, Multipoint (new FW release)
- Android and iOS support
- Output power up to 7 dBm
- Power supply: 1.7-3.6V

ublox

16.0 x 36.0mm

OBS421 BLE + Classic BT (+EDR) combo module, stand-alone

- High throughput 1.3Mbps
- u-blox Low Energy Serial Port Service
- Bluetooth profiles: SPP, DUN, PAN, GATT
- Advanced Multipoint capability, 7 slaves
- 250/300m range (built-in/ext. antenna)
- Extended Data Mode
- Android and iOS support
- Medical approval
- Output power up to 13 dBm
- Power supply: 3.0-6.0V

ublox

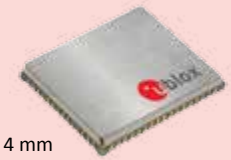
16.0 x 36.0mm

OBS418/419 Classic BT (+EDR) modules, stand-alone

- Bluetooth Classic 2.1 + EDR
- Throughput 1.0Mbps
- Bluetooth profiles: SPP, DUN, PAN
- Advanced Multipoint capability, 3 slaves
- Low power consumption (0.6mA IDLE)
- 75/150m range (built-in/ext. antenna)
- Extended Data Mode
- Android support, Medical approval
- Output power up to 8 dBm
- Power supply: 3.0-6.0V

V2X / V2V

ublox



30.0 x 40.0 x 4 mm

THEO-P1 V2X transceiver module, host-based

- Compliance with WAVE and ETSI ITS G5 for US and EU
- Frequency band 5.9GHz
- Single-channel 802.11p diversity
- Multi-channel operation
- Over 1km communication range
- Connection to host through USB
- 2 antenna pins for 5GHz antennas
- Output power up to 23 dBm
- Power supply: 3.3V and 5.0V

ISM

AMBER

17.0 x 30.8 x 4 mm

AMB2220 Long Range 2.4GHz module, stand-alone

- Various data transmission modes
- Frequency band 2.4GHz
- Single-channel 802.11p diversity
- Integrated AMBER RF stack with extensive functions
- Ultra low energy in Low Power Mode (<1uA)
- Up to 2km range @ 10mW output power
- Suitable for long distance applications
- Robust RF protocol stack
- Best-In-Class RF range
- Output power up to 10 dBm
- Power supply: 1.9V-3.6V

ISM Modules with integrated software / One form factor, pin compatible / UART, ADC, GPIO, SPI on request

Part No.	Frequency	Range	Output Power	Rx Sensitivity	Power Consumption	Supply Voltage (DC)	RF Data Rate (kbps)	Dimensions (mm)
AMB8426	868 MHz	700 m	11 dBm	max. - 112 dBm	Tx: typ. 38 mA Rx: typ. 24 mA Low Power: typ < 0.3 µA	2.2 - 3.6 V	up to 250	17x27x4
AMB8626	868 MHz	2 km	14 dBm	max. - 123 dBm	Tx: typ. 53 mA Rx: typ. 30 mA Low Power: typ 3 µA	2.0 - 3.6 V	up to 250	17x27x4
AMB4426	433 MHz	1.5 km	10 dBm	max. - 112 dBm	Tx: typ. 34 mA Rx: typ. 24 mA Low Power: typ 3 µA	2.2 - 3.6 V	up to 250	17x27x4
AMB3626	169 MHz	5 km	15 dBm	max. - 120 dBm	Tx: typ. 59 mA Rx: typ. 20 mA Low Power: typ < 10 µA	2.0 - 3.6 V	up to 200	17x27x4

WiFi + BLUETOOTH

14.8 x 22.3 x 3.0 mm
(ODIN-W260)
14.8 x 22.3 x 4.5 mm
(ODIN-W262)

ODIN-W2 WiFi + BLE + Classic BT (+EDR) combo module, stand-alone

- WiFi 802.11a/b/g/n*
  - 2.4GHz and 5GHz
- Bluetooth Low Energy 4.0 (Bluetooth Smart)
  - Central and Peripheral role
  - u-blox Low Energy Serial Port, GATT Services
- Bluetooth Classic 2.1 + EDR (7 slaves)
  - Profiles: SPP, DUN, PAN, GATT
- Truly parallel WiFi & Bluetooth operation
- Range up to 300m
- Powerful Cortex M4F for customer application
- ARM mbed tools
- WiFi Security, RMII, PPP
- WiFi Mini Access Point, BT/WiFi Repeater
- Output power up to:
  - Wi-Fi: 18 dBm
  - Bluetooth BR/EDR: 14 dBm
  - Bluetooth LE: 10 dBm
- Power supply: 3.0-3.6V (1.8V IOs supported)

ODIN-W1 WiFi + BLE + Classic BT (+EDR) combo module, host-based

- Connection to host through SDIO, SPI, UART
- Linux driver

13.8 x 19.8 x 2.5 mm

EMMY-W1 WiFi + BLE + Classic BT (+EDR) host-based modules for automotive

- WiFi 802.11a/b/g/n/ac
  - 2.4GHz and 5GHz, up to 433Mbps
- Bluetooth Low Energy 4.2 (Bluetooth Smart)
- Bluetooth Classic 2.1 + EDR
  - Profiles: HCI
- Parallel multiradio connections
- Connection to host through SDIO, UART
- PCM for Bluetooth audio
- Linux and Android drivers
- Output power up to:
  - Wi-Fi 802.11b: 18 dB
  - Wi-Fi 802.11a/g/n/ac: 16 dBm
  - Bluetooth BR: 10 dBm
  - Bluetooth EDR: 8 dBm
- Power supply: 3.0-3.6V (1.8V IOs supported)

14.8 x 14.8 x 2.5 mm

ELLA-W1 WiFi + Classic BT (+EDR, +HS) host-based modules for automotive

- WiFi 802.11a/b/g/n
  - 2.4GHz and 5GHz
- Bluetooth Classic 2.1 + EDR
- Bluetooth 3.0 + High Speed
- NFC
- Parallel multiradio connections
- Connection to host through SDIO
- PCM for Bluetooth audio
- Linux and Android drivers
- Output power up to:
  - Wi-Fi 802.11b: 18 dBm
  - Wi-Fi 802.11a/g/n: 15 dBm
  - Bluetooth: 10 dBm
- Power supply: 3.1-3.6V and 1.74-1.89V
- ELLA-W131 can be directly connected to TOBY-L2 LTE module for router application

WiFi

10 x 14 x 2.2 mm
(LILY-W131)
10.0 x 14.0 x 3.8 mm
(LILY-W132)

LILY-W1 WiFi module, host-based

- WiFi 802.11b/g/n
  - 2.4GHz, 72Mbps
- u-blox Low Energy Serial Port, GATT Services
- Simultaneous Station and Micro Access Point
  - for up to 8 clients
- range up to 200m
- WiFi Security and WAPI
- MAC and RF parameters in OTP memory
- Embedded LTE frequency filter
- Connection to host through SDIO or USB
- Linux and Android drivers
- Output power up to 19dBm
- Power supply: 3.0-3.6V (1.8V IOs supported)

SHORT RANGE RADIO TOOLS

WiFi / Bluetooth **evaluation kits**, software tools and reference designs provided by u-blox make evaluation and design efforts faster and more simple.

EVK-NINA-B1

Blueprint B31

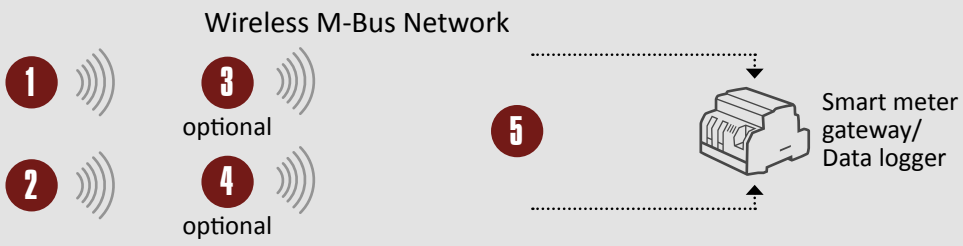
Blueprint B31 is a router functionality reference design provided by u-blox. It integrates TOBY-L2 fast LTE module (to access the internet / cloud), ELLA-W1 WiFi module connected directly to TOBY-L2 (to offer internet access over local WiFi network), and NEO-M8N GNSS module (for positioning).

The **s-center** Wi-Fi, Bluetooth and Bluetooth low energy module and configuration software is a powerful and easy-to-use tool for evaluating, configuring, and testing u-blox short range modules. It includes an intuitive, easy-to-understand and easy-to-use graphical interface.

AUTOMATED METER READING (AMR)

Amber wireless metering solutions fit on new and existing meters and dataloggers likewise, making the conversion of interfaces into wireless M-Bus as easy as it gets. Thus is allows utilities and meter operators to collect their metering data in a standardized, wireless form – with minimum installation expenditure. The wireless M-Bus modules and adapters support walk-by and drive-by applications at 868 and 169MHz.

Plug & Play metering solutions



1

AMB8568-M Pulse Meter adapter

Wireless M-Bus radio adapter for up to 4 meters with pulse output, 868MHz, battery operated, OMS compatible, transmission interval configurable, supports wM-Bus S,T and C modes, AES128 and CMAC encryption, IP65 (opt. IP68) housing.

2

AMB 8569-M Temperature & Humidity Sensor

Indoor sensor for temperature and humidity. Transmits data every 5 or 15 minutes via wM-Bus S or T mode, AES128 and CMAC encryption, battery operated. Also available as temperature sensor only.

3

AMB8466-M-RP1 Repeater (mains operated)

Single hop repeater to extend the range of wM-Bus networks, easy configuration and push button installation, supports wM-Bus S and T, up to 2km range, 868MHz, OMS compatible.

4

AMB8627-M-RP2 Repeater (battery operated)

Repeater to extend the range of wM-Bus networks, easy configuration and installation, supports wM-Bus S, T and C modes, up to 2km range, 868MHz, battery operated.

5

AMB8465-M, AMB8665-M, AMB8336-M Wireless M-Bus USB Adapter

Wireless M-Bus radio adapter for PCs, tablets and handhelds, 169 and 868MHz, up to 2km range (@169MHz), OMS compatible, EAS128 encryption, supports wM-Bus S, T, R, C and N modes. Also available with wM-Bus Analyzer software (AMB8465-AT, AMB8665-AT) – sniffer and parser.

ISM ANTENNAS

MEW031

- 433 MHz, 824~894 MHz
  GSM 900 / 1800, PCN 1.9 GHz
  UMTS 2.1 GHz Bluetooth 2.4 GHz
- WIFI(2.4 GHz, 5.1 - 5.9 GHz)
- gain: 3dBi Avg.
- VSWR: <2:1, type of connector upon request
- Ground Plane Independent
- max height: 114.6mm
- max diameter: 10mm
- operating temperature: -40°C to +85°C

ME0115

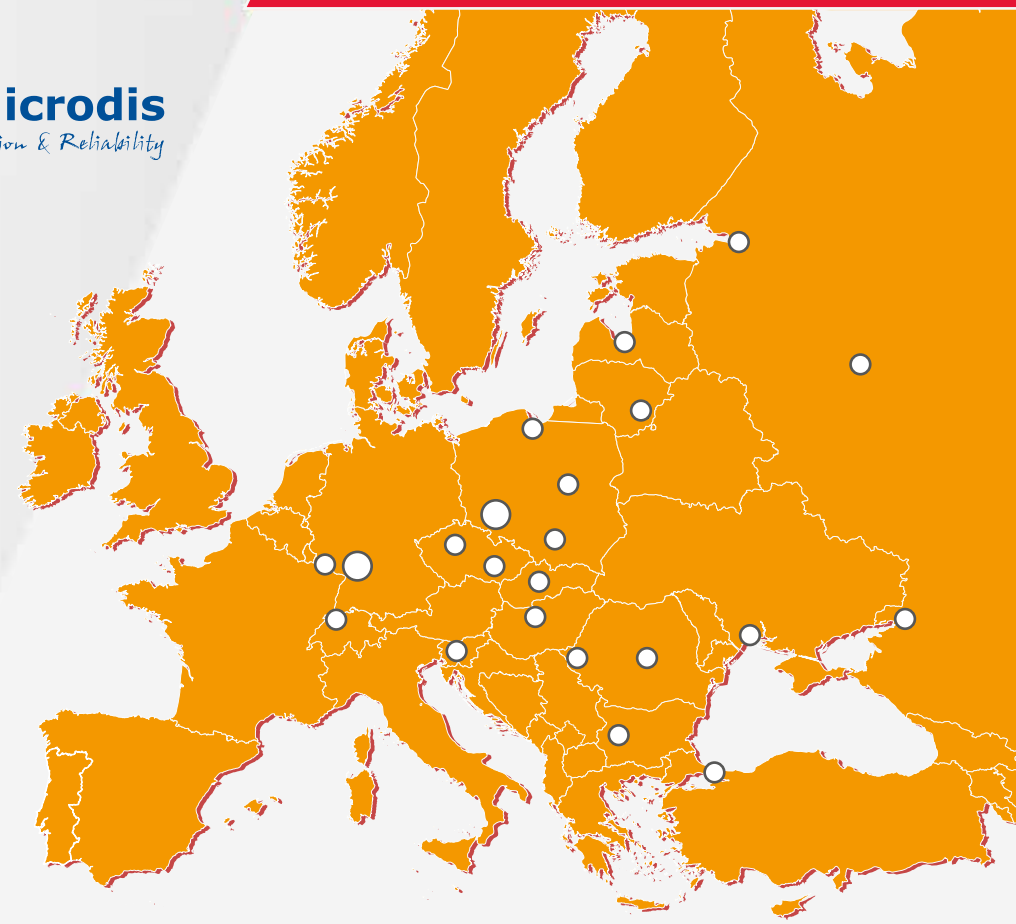
- ISM/TETRA (433 MHz)
  ISM (868 MHz)
  ISM (915 MHz)
- Polarization: Linear
- Gain: 0 dBi
- VSWR: <2:1
- Power handling: 25W
- Connector: SMA Straight, SMA male R/A

ME3015

- ISM (868 MHz)
- Polarization: VERTICAL
- Gain: 3 dBi, VSWR: <1.5:1
- Power handling: 25W
- Operating temperature: -40°C to +85°C
- Size: 93.8mm x 30.9mm

Bulgaria@microdis.net
Croatia@microdis.net
Czech@microdis.net
Estonia@microdis.net
Hungary@microdis.net
Latvia@microdis.net
Lithuania@microdis.net
Poland@microdis.net
Romania@microdis.net
Russia@microdis.net
Serbia@microdis.net
Slovakia@microdis.net
Slovenia@microdis.net
Turkey@microdis.net
Ukraine@microdis.net
microdis.de@microdis.net

Microdis
Innovation & Reliability



AAEON	Industrial computers and panels	www.aaeon.com
AEGID	RFID systems and transponders	www.aegid.de
ALPS ELECTRIC	Switches, encoders, potentiometers and printers	www.alps.com
AMBER WIRELESS	RF ISM, Bluetooth modules and transceivers	www.amber-wireless.de
ASROCK	Mini-ITX industrial boards	www.asrock.com
BRIGHTEK	Power, THT and chip LEDs and LED modules	www.brightekeurope.com
CAMDENBOSS	Interconnect components, electronic housings, 19” cabinets	www.camdenboss.com
EPSON	Crystals, oscillators, filters and sensors	www.epsontoyocom.co.jp
FISCHER CONNECTORS	Military, medical and industrial connectors	www.fischerconnectors.com
FISCHER ELEKTRONIK	Heatsinks, connectors, 19’’ and case technology	www.fischerelektronik.de
GLOBAL CONNECTOR TECHNOLOGY	SIM-Holders, memory card connectors, USB connectors	www.globalconnectortechnology.com
IIYAMA	Large Format Displays	www.iiyama.com
ISOCOM	Optocouplers, optoswitches	www.isocom.com
JST	Signal connectors	www.jst.de
LEAR	Automotive and white goods connectors	www.lear.com
MAXTENA	GPS, Galileo, Glonass, Iridium antennas	www.maxtena.com
MECAL	Machines and systems for wire crimping	www.mecal.com
MEDER	Reed switches, sensors and relays	www.meder.com
MEDIKABEL	UL/CSA/DIN certified, customized industrial cables	www.medikabel.de
METZ CONNECT	Terminal block connectors - screw, spring and pins	www.metz-connect.com
NEXCOM	Industrial computers and panels	www.nexcom.com
SEOUL SEMICONDUCTOR	LEDs - power, full color, 230AC	www.seoulsemicon.com
TAIWAN SEMICONDUCTOR	Semiconductor devices	www.taiwansemi.com
U-BLOX	GNSS, GSM, UMTS/HSPA/CDMA/LTE/NBIoT modules, WiFi, Bluetooth, NFC, V2V/V2X, antennas	www.u-blox.com
WEZAG	Hand tools for crimping, pneumatic presses	www.wezag.de

Currently the Microdis Group employs over 100 people, with a large number of electronic engineers, mostly involved in sales and marketing.

As a company with an extensive experience in the distribution of electronic components, and a purchasing center in Germany for many years, we are able to offer almost any product from a wide variety of electronic components. We offer also the production of cable harnesses and programming of crystal oscillators for a customised frequency. Cooperation with a catalogue distributor provides fast deliveries (2 days) of a wide range of catalogue products.

We have certificates of quality management DIN EN ISO 9001:2015 for the distribution of electronic components.

EN v.5.5