Microdis

Innovation & Reliability

WIRELESS TECHNOLOGIES

GSM/UMTS/CDMA/LTE
GPS/GLONASS/BEIDOU/GALILEO
ISM (433MHz, 868MHz, 2.4GHz)
6LoWPAN, Wireless M-BUS
Bluetooth
WiFi
RFID
Antennas & accessories

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 emergency response system

eCall

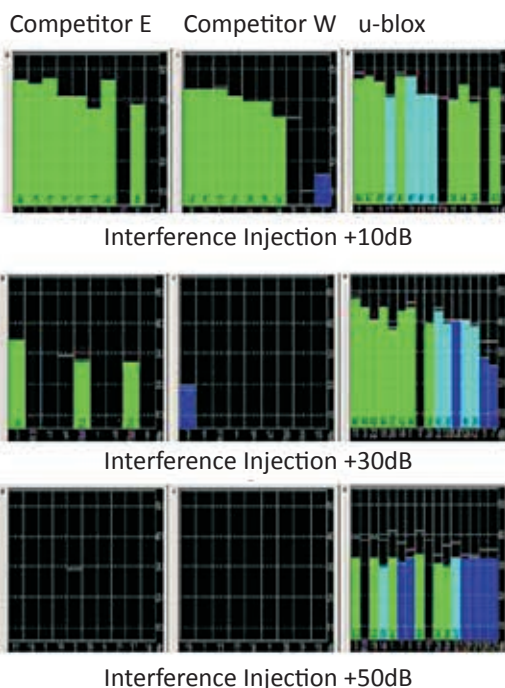|	MAXTENA	u-blox	AMBER WIRELESS	SIMCom	stollmann	AEG ID
GSM/UMTS/CDMA/LTE		●	●			
GPS/GLONASS/BEIDOU/GALILEO	●	●				
ISM (433MHZ, 868MHZ, 2.4GHZ)			●	●		
6LOWPAN, WIRELESS M-BUS			●			
BLUETOOTH		●	●		●	
WIFI		●				
RFID						●

GNSS (GPS, GLONASS)

u-blox

u-bloxM8 - 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.

- All u-bloxM8 modules support GPS, Glonass, BeiDou (Compass), QZSS, and are ready to work with Galileo
- High performance navigation, ultrafast acquisition (<1s)
- Dynamic sensitivity as high as -167dBm
- GPS & Glonass positioning with SBAS & RTCM corrections
- Position accuracy (CEP, SBAS): 2.0m
- Precise Point Positioning accuracy: < 1.0m
- Ultralow energy consumption (4.5mA / 3V, 1Hz tracking)
- Assisted GPS and Assisted Glonass support: Online, Offline (up to 35 days) and Autonomous (6 days)
- Best in class jamming immunity
- Jammer monitor/detection
- NEO-M8L – built in sensors for navigation without sky view
- Dedicated modules (NEO-M8T, LEA-M8F) for precise timing
- Industry smallest standalone GNSS module EVA-M8M
- Extremely small modules with built in antenna (CAM-M8Q)
- Backward pin compatibility (ublox5/ublox6/ublox7 generations)
- Versions dedicated to cost sensitive applications
- **Easy to design, manufacture and integrate with various antennas**

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

Competitor E   Competitor W   u-blox

Interference Injection +10dB

Interference Injection +30dB

Interference Injection +50dB
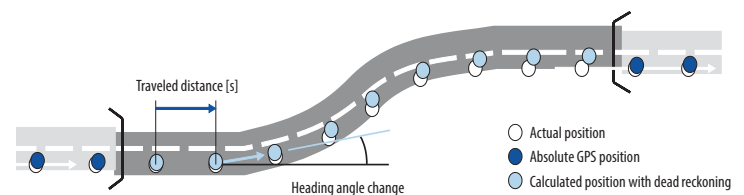
New!
CAM-M8Q

NEO

MAX

EVA 7x7x1.1 mm

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. Bulit in sensors (gyroscope, accelerometer) allow full coverage even without GNSS signal (tunnels, car parks).

Traveled distance [s]

Heading angle change

○ Actual position
● Absolute GPS position
○ Calculated position with dead reckoning

Enchanced Anti-Jamming
u-blox receivers withstands very strong interferer (50dB stronger than GPS signal), it's leading technology.

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. Assisted data (A-GNSS) are also available for both, GPS and Glonass. Combined with high sensitivity it makes u-bloxM8 modules the best performance. Limitation to one system is possible, for energy saving.

Jammer detection - indicates the presence of GNSS jammer.

Assisted GNSS (A-GNSS) - using **GPS and GLONASS** 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 Point Positioning
u-blox' PPP algorithm provides extremely high position accuracy (better then 1.0m) under good sky visibility conditions.

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.

Freq=0.9 GHz   Az=45   EL=45

Azimuthal Pattern (X, Y or E-Plane)
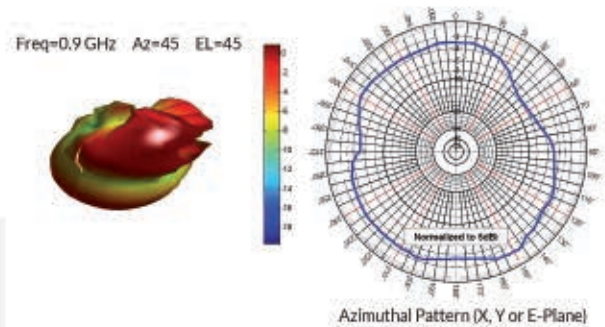
Passive or Active

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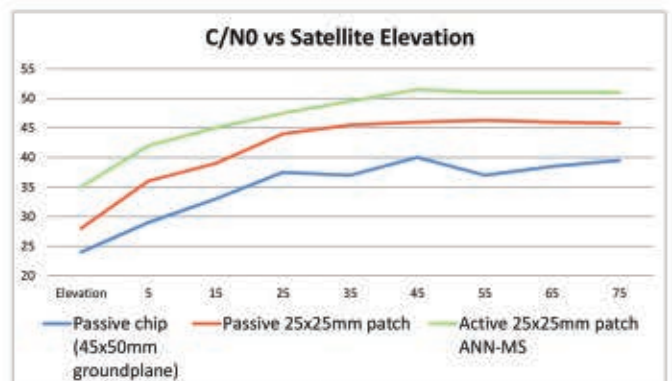
*Low-noise amplifier (LNA) is an electronic amplifier used to amplify possibly very weak signals (captured by an antenna). The LNA boosts the antenna signal to compensate for the feedline losses going from the (outdoor) antenna to the (indoor) receiver. It amplifies both noise and signal, so it does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

25x25mm Active antenna module

18x18mm Passive patch 25x25mm groundplane
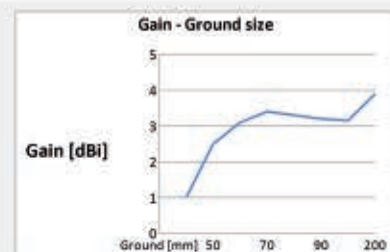
3.2x1.2mm Passive chip 20x45mm groundplane

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.

C/N0 vs Satellite Elevation

Passive chip (45x50mm groundplane) — Passive 25x25mm patch — Active 25x25mm patch ANN-MS

Example performance chart

Gain - Ground size

Gain [dBi]

Ground [mm]

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.
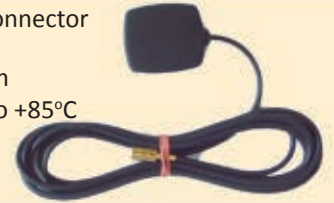
GPS/GLONASS ANTENNAS

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

ME4050S / ME4050GS

- GPS 1575.42 MHz (ME4050S) / /GPS+GLONASS 1575.42 MHz (ME4050GS)
- Gain 16 dB/5 V
- size 25 mm x 25 mm x 8.1 mm

- Current consumption 3 mA (1.8 V), 7 mA (3.3 V), 12mA (5V)
- to be mounted in the customers casing
- 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 GPS/GLONASS ANTENNAS

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
RF Interference Rating 50 V/m. out of band

Current Drain 25 mA (typical)
Operating temp. from -40°C to 85°C

Voltage 3-12 V   **Noise Figure** 1.5 dB (Typical)
RF connector SMA (M)

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)

GPS/GLONASS 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-7x

Evaluation kit EVK-M8QCAM for CAM-M8Q

Reference designs

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 a MAX GNSS receiver with an 25 x 25 mm ceramic patch antenna, wireless GSM (SARA-G3), UMTS (LISA-U2) or CDMA (LISA-C2) module, 2G/3G antenna, and USB + UART interfaces. Can be used as ready OEM product, or to simplify and speed up customers' design.
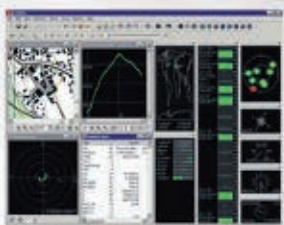

u-center GNSS evaluation software provides a powerful tool for testing, performance analysis and configuration of u-blox GNSS receivers. U-blox GNSS receivers can be configured using the u-center evaluation software with a highly flexible platform to test GNSS products and visualize the collected GNSS 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**
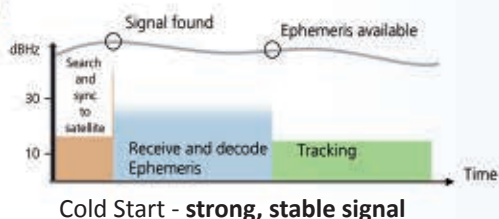
Under **good signal conditions Acquisition** process (cold start) takes appx. 30s, consisting with 2 stages.

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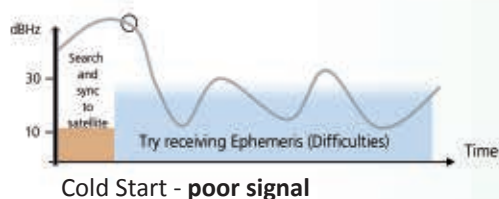
Under **poor signal conditions Acquisition** takes much more time, or is not possible at all. Collecting Ephemeris from 4 SVs needs uninterrupted good quality signal from each SV for appx. 30s. Under adverse signal conditions, it can take minutes, hours or even fail altogether.

Aided Cold Start – using **Assisted GNSS** data provided by u-blox
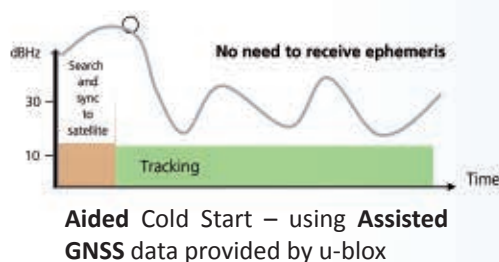
u-blox is the leader, and pioneer, in **Assisted GNSS (A-GNSS) technology**, which accelerates calculation of position by delivering satellite data such as Ephemeris, Almanac, accurate time and satellite status to the GNSS receiver via wireless networks or the Internet. This aiding data enables a GNSS 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 data, improving significantly the performance, and will be extended by Assisted Galileo and other systems– 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	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. The company's internal quality control process extends to all its manufacturing partners who comply to strict processes imposed by standards, such as ISO/TS16949. GPS and wireless products are designed and tested to operate in a wide variety of applications, including in vehicle usage.

Pin compatibility — 2005 LEA-4A, 2007 LEA-5A, 2010 LEA-6A, 2014 LEA-M8S

Newest technology — 2005 LEA, 2007 NEO, 2011 MAX, 2014 EVA

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

Model	Size lxwxh [mm]	Voltage range [V]	Lowest Power DC/DC	GPS	GLONASS, BeiDou, QZSS	Multi GNSS parallel mode	Crystal / TCXO / VCTCXO	Anti-jamming	Data Logger	UART	USB	DDC (I2C)	RAW data	Assisted: GPS (G), MULTI GNSS (M) Online, Offline, Autonomous	Precise Point Positioning	Dead Reckoning	Precision Timing	External Interrupt/Wakeup	Antenna supply, short detection & protection	Antenna power control	Extra LNA, SAW
MAX-M8C	10.1x9.7x2.5	1.65-3.6	●	●	●	●	C	●		●		●		M				●	O	P	
MAX-M8Q	10.1x9.7x2.5	2.7-3.6	●	●	●	●	T	●		●		●		M				●	O	P	
MAX-M8W	10.1x9.7x2.5	2.7-3.6		●	●	●	T	●		●		●		M				●	●	●	
NEO-M8M	16x12.2x2.4	1.65-3.6	●	●	●	●	C	●		●	●	●		M				●	O		
NEO-M8Q	16x12.2x2.4	2.7-3.6	●	●	●	●	T	●		●	●	●		M				●	O	P	●
NEO-M8N	16x12.2x2.4	2.7-3.6	●	●	●	●	T	●	●	●	●	●		M				●	O	P	●
LEA-M8S	22.4x17x2.4	2.7-3.6	●	●	●	●	T	●		●	●	●		M				●	●	●	S
EVA-M8M	7.0x7.0x1.1	1.65-3.6	●	●	●	●	C	●		●	●	●		M				●	O	P	

GNSS modules with dedicated features

NEO-M8L	16x12.2x2.4	2.7-3.6	●	●	●	●	C	●	●	●	●	●		M		●		●	O	P	
NEO-7P	16x12.2x2.4	2.7-3.6	●	●	●		C	●		●	●	●	●	G	●			●	O	P	S
NEO-M8T	16x12.2x2.4	2.7-3.6	●	●	●	●	T	●	●	●	●	●	●	M		●	●	●	O	P	●
LEA-M8T	22.4x17x2.4	2.7-3.6	●	●	●	●	T	●	●	●	●	●	●	M		●	●	●	O	●	S
LEA-M8F	22.4x17x2.4	3.0-3.6	●	●	●	●	V	●		●	●	●		M		●	●	●	●	●	●

GNSS modules with integrated antenna

PAM-7Q	22x22x8	2.7-3.6	●	●			T	●		●		●		G				●			●
CAM-M8Q	14x9.6x1.95	2.7-3.6	●	●	●	●	T	●		●		●		M				●			●

* firmware will support Galileo once system will be fully operational   O- requires external components   P- control pin to handle active antenna

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 based on the reception of extremely weak satellite navigation signals.

For many 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 Automotive Dead Reckoning (ADR) module is simple in implementation and convenient solution:

- leading GNSS platform u-bloxM8 optimized for the best performance with ADR

- due to built-in sensors (gyro, accelerometer, temperature), 3D ADR requires only information about distance/speed, provided by CAN messages or analog speed tick pulses (self calibrated)

NEO-M8L   Standard Multi-GNSS
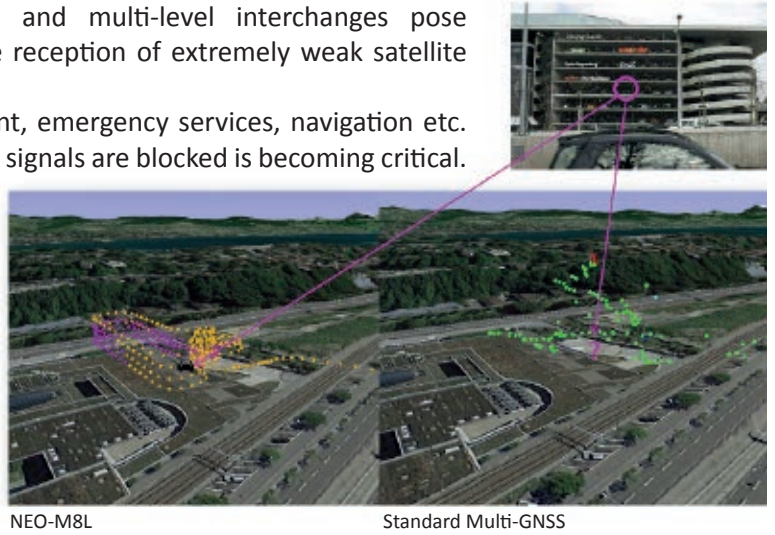
Dead Reckoning navigation based on NEO-M8L
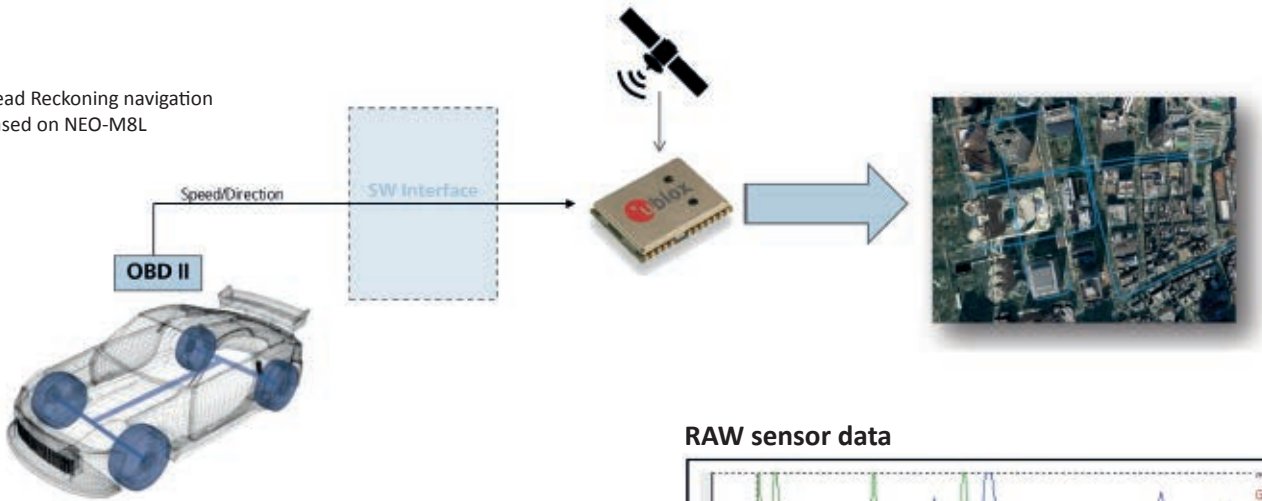
- information from sensors can be read (up to 100Hz) and used for example to register behaviour of vehicle during accident

- 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, LISA, TOBY)

RAW sensor data
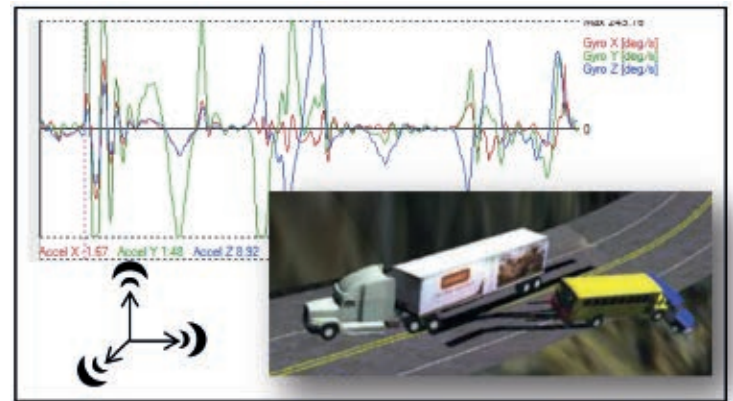
temperature, acceleration, angle reported by NEO-M8L during accident

GNSS ANTENNA MODULES

CAM-M8Q needs ground plane, which can be used to mount not tall components

ultra compact CAM-M8Q (9.6x14x1.95mm)

PAM-7Q

Smart antenna the new family of Multi GNSS modules with integrated antenna, simplifies design of the small units, where the usual problem was to integrate very small GPS antenna keeping good performance. **CAM-M8Q**, extremely small smart antenna module, offers high sensitivity and navigation using multi GNSS (fe. GPS and Glonass) in parallel mode to enhance the position availability in harsh satellite visibility conditions. It's perfect choice for applications where small size is the priority. **PAM-7Q** targets industrial applications, that require small, low power, cost efficient and simple 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, 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	Embedded 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	1	4	1/1	●	●	●	●	●	●	●	●	●	●	●	●	●	●
SARA-G350 ATEX	LGA	Q	26.0x16.0	2	1	4	1/1	●	●	●	●	●	●	●	●			●	●	●	●
LEON-G100	LCC	Q	29.5x18.9	1	1	5	2/1	●	●	●	●	●	●	●	●			●	●	●	●

O- requires external 32kHz xtal

SARA, LEON, 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 modules** - common concept of SARA(GSM/UMTS), LEON(GSM), LISA (UMTS) and TOBY(LTE) makes it possible to prepare a PCB that allows to mount either of them, accordingly to the required parameters.

- **Low Power** - as low as 0.6mA IDLE (connected to the network), 2.9mA active mode

- **Antenna Detection, SIM Detection** - simplifies control

- **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
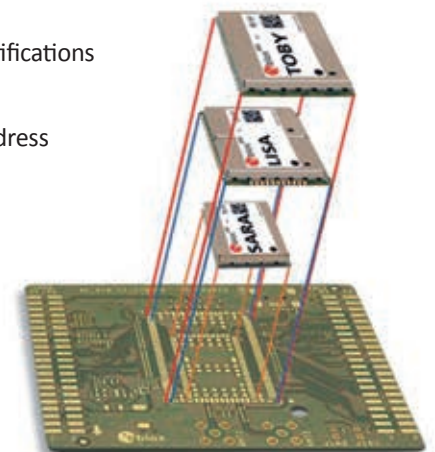
SARA-U2: family of the smallest, low power and cost optimized UMTS/HSPA modules, pin compatible with GSM/GPRS SARA-G3 modules.

	2G 850/1900 MHz	2G 900/1800 MHz	3G 850/1900MHz	3G 900/2100MHz	3G 800/1700MHz	Downlink (Mb/s)	Uplink (Mb/s)	GPIO	UART	USB 2.0 (480Mb/a)	SPI (HighSpeed)	DDC(I2C) to connect GNSS module	Digital audio	Antenna supervisor	Jamming detection	Assisted GNSS client	CellLocate	SSL	Embedded TCP/IP, UDP	FTP, HTTP	eCall / ERA Glonass	RIL
SARA-U260	●		●			7.2	5.76	9	1	1		1	●	●	●	●	●	●	●	●		●
SARA-U270		●		●		7.2	5.76	9	1	1		1	●	●	●	●	●	●	●	●	●	●
SARA-U280			●			7.2	5.76	9	1	1		1	●	●	●	●	●	●	●	●	●	●
SARA-U290				●		7.2	5.76	9	1	1		1	●	●	●	●	●	●	●	●	●	●

LISA-U2: comprehensive portfolio of UMTS/HSPA+ modules, all bands available in single module works worldwide on all WCDMA networks, high speed (21.1Mb/s) and eCall versions.

|	2G 850/1900 MHz	2G 900/1800 MHz	3G 850/1900MHz	3G 900/2100MHz	3G 800/1700MHz	Downlink (Mb/s)	Uplink (Mb/s)	GPIO	UART	USB 2.0 (480Mb/a)	SPI (HighSpeed)	DDC(I2C) to connect GNSS module	Digital audio	Antenna supervisor	Jamming detection	Assisted GNSS client	CellLocate	SSL	Embedded TCP/IP, UDP	FTP, HTTP	eCall / ERA Glonass	RIL
LISA-U200	●	●	●	●	●	7.2	5.76	14	1	1	1	1	2	●	●	●	●		●	●	●	●
LISA-U201	●	●	●	●	●/-	7.2	5.76	14	1	1	1	1	2	●	●	●	●		●	●	●	●
LISA-U210	●	●	●/-		●/-	7.2	5.76	14	1	1	1	1	2	●	●	●	●		●	●	●	●
LISA-U230	●	●	●	●	●	21.2	5.76	14	1	1	1	1	2	●	●	●	●		●	●	●	●
LISA-U260	●	●	●			7.2	5.76	14	1	1	1	1	2	●	●	●	●		●	●	●	●
LISA-U270	●	●		●		7.2	5.76	14	1	1	1	1	2	●	●	●	●		●	●	●	●
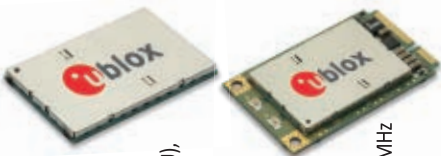
LTE – the latest cellular technology supported by u-blox' TOBY modules and MPCI - mini PCI Express cards. The same concept of product (AT commands, nested design, hardware requirements) simplifies design procedure for customers already used to u-blox' 2G (LEON, SARA-G3) or 3G (SARA-U2, LISA) modules.

	Region: Europe/APAC (EU), N.America (US)	GSM Quad band	3G /850/900/AWS/1900/2100MHz	3G /850/900/1900/2100MHz	LTE bands	LTE FDD category	Downlink (Mb/s)	Uplink (Mb/s)	GPIO	UART	USB 2.0 (480Mb/s)	SDIO	DDC(I2C) to connect GNSS module	Digital audio	Antenna supervisor	Jamming detection	Assisted GNSS client	CellLocate	SSL	Embedded TCP/IP, UDP	FTP, HTTP	eCall / ERA Glonass
TOBY-L200	US	●	●		2,4,5,7,17	4	150	50	10	1	1	●	●	●	●	●	●	●	●	●	●	●
TOBY-L210	EU	●		●	1,3,5,7,8,20	4	150	50	10	1	1	●	●	●	●	●	●	●	●	●	●	●
MPCI-L200	US	●	●		2,4,5,7,17	4	150	50					1				●		●	●	●	
MPCI-L210	EU	●		●	1,3,5,7,8,20	4	150	50					1				●		●	●	●	

some features will be supported in future FW release

SIM HOLDERS
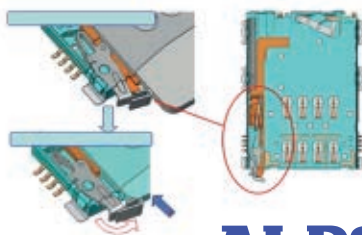
ALPS

GCT Global Connector Technology

Push-push SIM-Holder with a blockade
The SCGC1B03 SIM-Holder from Alps Electric is a one of a kind solution for connecting SIM Cards in applications with severe vibrations (i.e. automotive and mobile). The blockade does not allow the SIM Card to drop out from the connector, even under harsh conditions. Another advantage of the SCGC1B03 connector is its low profile - only 1.55mm. This unique solution is based on one of the most popular SIM-Holders in the portfolio of Alps Electric - the SCGC1B1, allowing a seamless upgrade.

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

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

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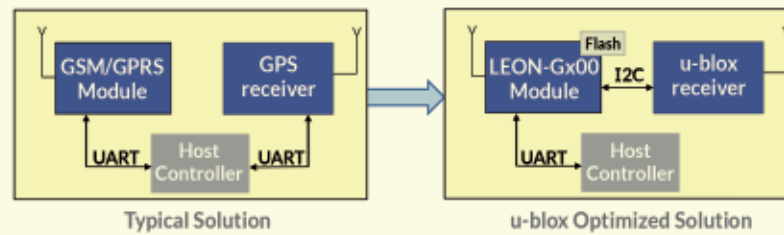
For example, connecting u-blox' wireless and GNSS modules together simplifies design (one UART is enough), allowing full access to GNSS module via the wireless modem. It is also possible to use very useful features built in GSM/UMTS module like:

◄ 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
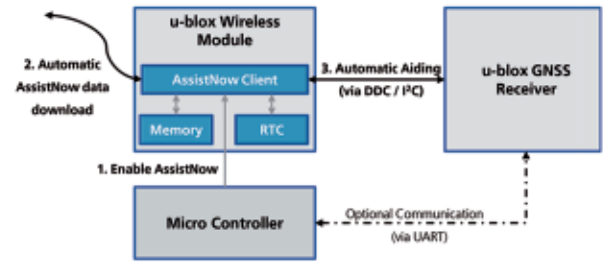
Full cooperation between u-blox' wireless and GNSS modules is possible with very simple hardware design, presented on picture.
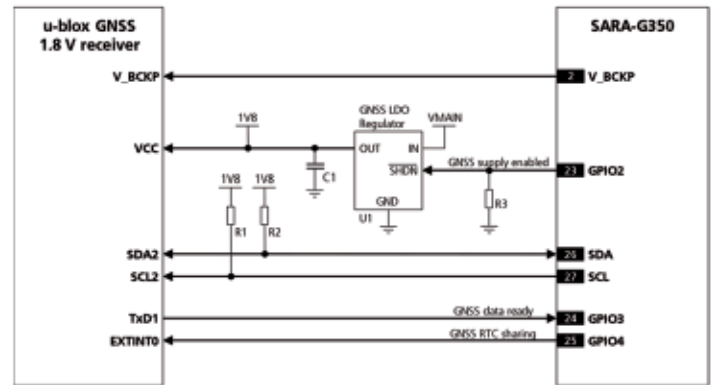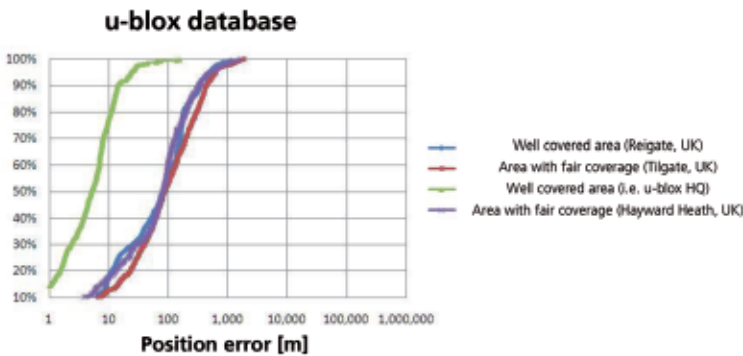
Moreover, u-blox' GSM/UMTS modules offer additional service, **CellLocate**, making such GSM + GNSS tandem not only highly integrated and low power, but also an extremely functional solution, offering information about position even under poor or no sky visibility and no GNSS signal conditions, or jamming. 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** for 4G TOBY evaluation.

The kits come with a built-in u-blox GNSS receiver module, giving designers the flexibility to either test GSM/GPRS functionality alone or to integrate it together with u-blox GNSS technology. For evaluating Assisted-GNSS (A-GNSS) a u-blox A-GNSS client is embedded in the firmware stack, providing users with the option of integrating and testing our license-free A-GNSS solutions.

The **m-center** wireless modules evaluation software from u-blox provides a powerful platform for evaluation, configuration and testing of u-blox' LEON, SARA, 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: -40ºC to +85ºC

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: -40ºC to +85ºC

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: -40ºC to +85ºC

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

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: -40ºC to +85ºC

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: -40ºC to +85ºC

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 -35ºC to+ 85ºC

HF CONNECTORS

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, THT
MCX_FEMALE_PCB_ANGLE_LF

Right angle, MCX female, SMD
MCX_FEMALE_SMD_ANGLE_LF

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

Cable type and length, attached connectors or stripping and tinning are all possible to request.

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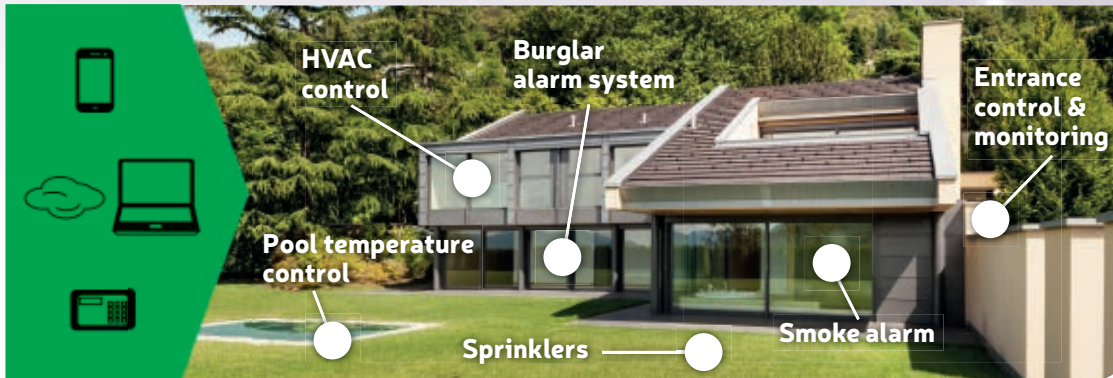
◄ Waste identification: hand and stationary readers, inlays and disc tags, special temperature resistant transponders.
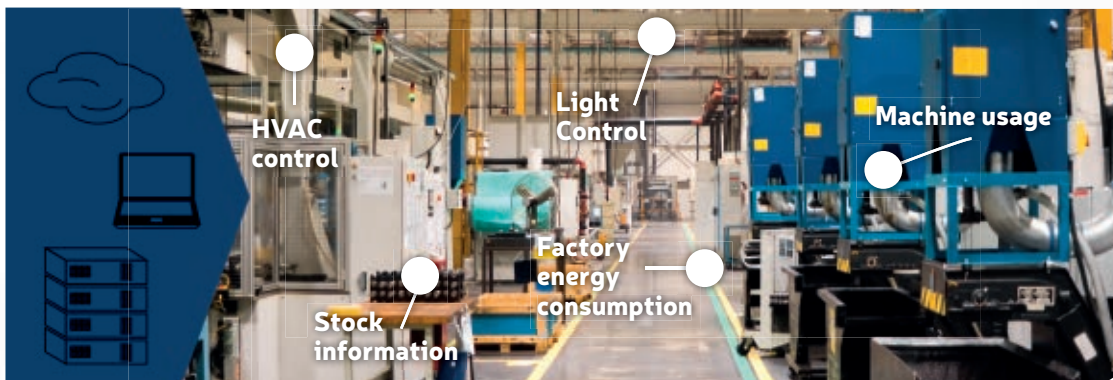
WORLD OF IOT

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.
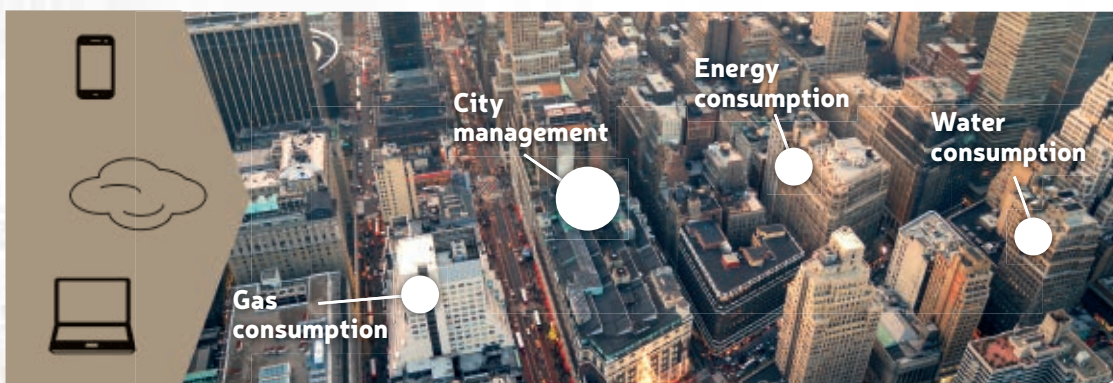
Building and home automation

HVAC control
Burglar alarm system
Entrance control & monitoring
Pool temperature control
Sprinklers
Smoke alarm

WiFi
Bluetooth
6LowPan
GSM/UMTS/LTE
ISM
Wireless M-Bus

Industrial automation & sensor networks

Light Control
Machine usage
HVAC control
Factory energy consumption
Stock information

WiFi
Bluetooth
6LowPan
ISM
Wireless M-Bus

Smart grids & energy management

Energy consumption
City management
Water consumption
Gas consumption

WiFi
Bluetooth
6LowPan
ISM
GSM/UMTS/LTE
Wireless M-Bus

Vehicle oriented applications

Navigation & road conditions information service
Toll booth
Fleet management
e-call & insurance data collection
Interior vehicle entertainment system
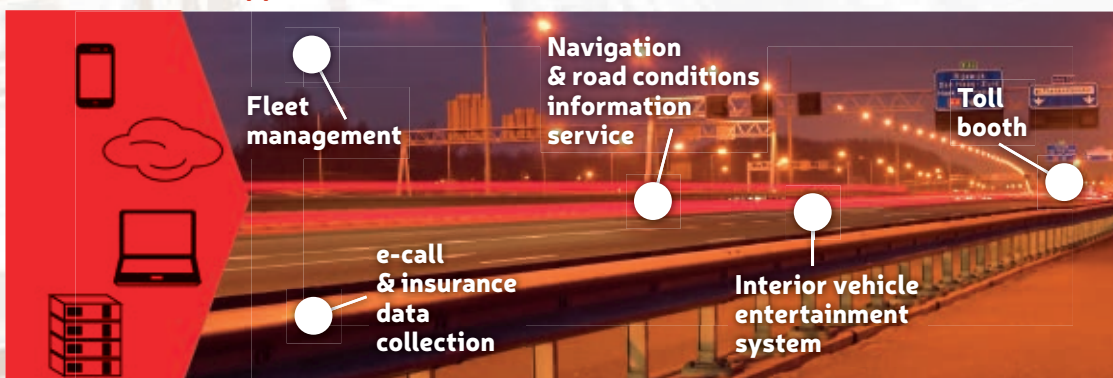
WiFi+Cellular
Cellular+GNSS
Bluetooth
ISM

WIFI, BT, 6LOWPAN 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. **BLE - Bluetooth low energy (v.4.0)** 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 BT, and iOS devices need modules certified by Apple. **Bluetooth dual-mode** (BLE +Classic BT) modules are known as Bluetooth Smart Ready. Multiradio – combination of wireless technologies . **Stand-alone** -CPU and stacks are on module/**Host-based** - Needs additional CPU and stacks outside.

AMB8820 6LoWPAN module

17 x 35,28 x 4 mm

- Low power RF transceiver with 6LoWPAN stack to connect to the IPv6 (Internet) world
- Ideal for IOT applications
- Mesh networking topology
- Low-cost OEM radio module

- 868 MHz SRD frequency band UART, SWD, SPI, USB interfacing
- SMD or external antenna connection
- Conforms with EU R&TTE 1999/5/EC directive
- Available on Tape & Reel for SMT assembly

BlueMod+S/+SR combo BLE+Classic BT (+SR) or as pin-to-pin compatible BLE module (+S)

17 x 10 x 2.6 mm

- Integrated antenna or antenna pin
- Bluetooth 4.0 qualified
- Smart Ready (supports BR/EDR/LE)

- Profiles: SPP, GATT, Terminal I/O
- NFC Handover

## OBS421 combo BLE+Classic BT module

16.0 x 36.0mm

- Range: 250 m internal antenna, 300 m external antenna
- Output power: 11 dBm internal antenna, 13 dBm external antenna
- Throughput: Max 1.3 Mbps (Classic Bluetooth)

- Profiles: SPP, DUN, PAN, GATT
- Microprocessor capacity: 72 MHz, ARM® 32-bit Cortex M3 processor, 64 kB RAM & 384 kB flash
- Android connectivity
- iOS connectivity
- Medical electrical approval

OLS425/OLP425   BLE module with optional integrated sensors

14.8 x 22.3mm

- Serial port application firmware for UART serial data
- MCU for customer developed applications
- GPIO / SPI / I2C / UART interface
- u-blox Low Energy Serial Port Service
- Apple iOS and Google Android connectivity
- Sensors: 4 pcs through hole solder points for other sensors (2 GPIO or 1 ADC)
- Profiles: GATT

- Temperature sensor (optional):
    Accuracy 0.5°C (max) from 0°C to +65°C
    Accuracy 1.0°C (max) from -40°C to +125°C
- Accelerometer (optional): ±2g / ±4g / ±8g / ±16g dynamically selectable
- 2 independent programmable interrupt generators for free-fall and motion detection
- 6D/4D orientation detection
- Medical electrical approval
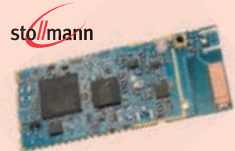
BlueMod+C11 Class 1 Classic BT Module

47.5x20x3.35 mm

- Industrial class serial Bluetooth module
- Class 1 (up to 1500 m, open-field, line of sight)
- Profiles: SPP

- Enhanced data rate (EN 300328 V1.8.1 compliant)
- Power: 19 dBm Class 1
- GPIO: up to 17

OBS418/OBS419 Simple Classic BT module

16.0 x 36.0mm

- Bluetooth: OBS418: v2.1 (Classic Bluetooth) OBS419: v2.1 + EDR (Classic Bluetooth)
- Range: 75 m internal antenna, 150 m external antenna
- Output power: 6 dBm internal antenna, 8 dBm external antenna

- Profiles: OBS418: SPP, DUN, OBS419: SPP, DUN, PAN
- Throughput: OBS418: 350 kbps OBS419: 950 kbps
- Max. number of slaves: OBS418: 1 OBS419: 3
- Medical electrical approval

BlueMod+P24/P25 Classic BT with optional profile (HDP) for medical applications

22.75x13.5x2.85 mm

- Bluetooth 3.0+EDR
- Range: up to 70 m
- RF-power (max): 4 dBm Class 2
- GPIOs up to 16
- Temperature range -40° to +85° C
- HDP Firmware with integrated IEEE 11073.

- Complete Continua certified system where the HDP and IEEE 11073 device specialization is running on the module. Available with:
    1. IEEE 11073-404 Pulse Oximeter
    2. IEEE 11073-407 Blood Pressure Monitor
    3. IEEE 11073-415 Weighing Scale
    4. IEEE 11073-417 Blood Glucose Meter

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.

54 x 98 mm

Internet of Things Wi-Fi modules

AMBW020 WiFi module

- 802.11b/g/n, Low energy
- Power saving modes and fast wake-up times
- Tx power savings and Low Power listen
- Sleep modes with low power consumption and optimal state transition times
- Integrated IPv4/IPv6 networking stack
- Integrated networking and security
- Full security support: WPS, WPA, WPA2, WEP, SSL security
- Integrated high-power, high-efficiency power amplifier
- HTTP, DNS services
- UART / SPI interface hosted
- integrated PCB antenna, U.FL connector or antenna pad

15x26x4 mm

ODIN-W16x   WiFi+combo BLE+Classic BT module

- Wi-Fi IEEE 802.11
- a, b, g, single-stream n (65 Mbps), d, e, h, i, k, r, s
  2.4 GHz channels: 1-13
  5 GHz channels: 36-165 (U-NII Band 1, 2, 2e, 3)
- Bluetooth
  v2.1+EDR (Classic Bluetooth)
  v4.0 (Bluetooth low energy)
- Output power: 19 dBm
- Open source Linux driver
- RF parameters & MAC address stored in EEPROM
- Fully certified with U.FL antenna connector Advanced power management
- Internal support for Wi-Fi and Bluetooth co-existence
- Android & iOS connectivity (Wi-Fi and Bluetooth low energy)

14.8 x 22.3 x 2.9 mm

ODIN-W26x WiFi+combo BLE+Classic BT module

- Wi-Fi IEEE 802.11
- a, b, g, n **, d, e, h, i
  2.4 GHz channels: 1-13
  5 GHz channels: 36-165 (U-NII Band 1, 2, 2e, 3)
- Wi-Fi 2x2 MIMO** (external antenna version only)
- Bluetooth: v4.0 (Bluetooth low energy and Classic Bluetooth with EDR)
- Internal antenna or dual U.FL connectors for external antennas
- Output power, Internal/external antenna:
  Wi-Fi: 16/19 dBm
  Classic Bluetooth: 10/13 dBm
  Bluetooth low energy: 7/10 dBm
- Embedded software:
  u-blox Wi-Fi driver
  u-blox Bluetooth stack
  Serial port application
  Combined IPv4 and limited IPv6* stack

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

EMMY-W16x WiFi+BLE+Classic BT+NFC, Host-based compact automotive module

- Wi-Fi Standards IEEE 802.11a/b/g/n/ac
- Support of Wi-Fi direct mode
- IEEE 802.11 PHY data rates of up to 433 Mbps
- Suitable for HD video streaming
- Concurrent multiradio connections
- Hardware encryption engine for 64/128-bit AES
- WAPI support
- Bluetooth v4.1 with Bluetooth low energy & Classic Bluetooth
- NFC
- PCM interface for audio
- Output power:
  Wi-Fi IEEE 802.11 b: 18 dBm
  Wi-Fi IEEE 802.11 a/g/n/ac: 15 dBm
  Bluetooth: 8 dBm
- Automotive qualification tests (climatic, mechanical, and operating life tests) according to VW 80000 / ISO 16750-4

13.8 x 19.8 x 2.5 mm

ELLA-W1xx WiFi+BLE+Classic BT, Host-based compact automotive module

- Automotive grade
- Dual-band Wi-Fi 2.4 & 5 GHz
- Bluetooth v3.0 + HS
- High transmission power and sensitivity
- Simultaneous client and micro access point operation
- Low power consumption
- Driver support - Free of charge drivers for:
- Android 4.4,Linux 2.6.x,Linux 3.x
- Output power:
  Wi-Fi IEEE 802.11 b: 18 dBm
  Wi-Fi IEEE 802.11 a/g/n: 15 dBm
  Bluetooth: 8 dBm
- Wi-Fi operational modes:
  Station (STA): Infrastructure & ad-hoc mode
  µAP: Supports up to 8 stations
  Wi-Fi direct
  One single firmware for Wi-Fi STA,
  µAP and Bluetooth

14.8 x 14.8 x 2.5 mm

ISM MODULES Wireless Modules with RF Pad for antenna

Pre-certified RF Modules / integrated software / One form factor, pin compatible / UART interface/ A/D, GPIO, SPI on request

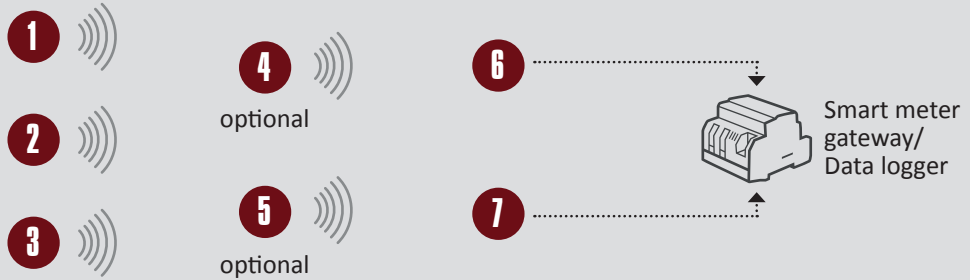| Part No.	Frequency	Range	Output Power	Rx Sensitivity	Power Consumption	Supply Voltage (DC)	RF Data Rate (kbps)	Dimensions (mm)
AMB8426	868 MHz	700 m	11 dBm	max. - 112 dBm	Tx: typ. 38 mA Rx: typ. 24 mA Low Power: typ < 0.3 µA	2.2 - 3.6 V	uo to 250	17x27x4
AMB8626	868 MHz	2 km	14 dBm	max. - 123 dBm	Tx: typ. 53 mA Rx: typ. 30 mA Low Power: typ 3 µA	2.0 - 3.6 V	uo 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	uo 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	uo to 200	17x27x4

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.

Wireless M-Bus Network

Plug & Play metering solutions

1)))   4))) optional   6 ┄┄┄┄►

2)))   Smart meter gateway/ Data logger

3)))   5))) optional   7 ┄┄┄┄►

1   AMB8466-M-GMM M-Bus Meter Adapter

Wireless M-Bus radio adapter for meters with wired M-Bus output, up to 2km range, up to 20m connectable (max. 3 load units), 868MHz, OMS compatible, supports wM-Bus S and T modes, AES128 encryption.

2   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.

3   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.

4   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.

5   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.

6   AMB8466-M-GMS M-Bus Data Logger Adapter

Wireless M-Bus radio adapter for data loggers and gateways with wired M-Bus interface, up to 2km range, administration of up to 50 devices, 868MHz, OMS compatible, AES128 encryption, supports wM-Bus S and T modes.

7   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.

AMB8465-M, AMB8626-M, AMB3626-M, AMB3636-M Embedded wireless M-Bus Modules

Compact surface mounted modules with wireless M-Bus firmware for rapid integration, 169 and 868HMz available, 25-500mW, up to 20km range, wM-Bus modes S, T, R, C and N, AES128 and CMAC encryption, low power consumption.

μ Microdis
Innovation & Reliability

U-BLOX	GPS/Glonass, GSM, UMTS/HSPA/CDMA/LTE modules, antennas	www.u-blox.com
SIMCOM	GSM, UMTS modules	www.sim.com
AMBER WIRELESS	RF ISM, Bluetooth, ZigBee modules and transceivers	www.amber-wireless.de
STOLLMANN	OEM modules: Bluetooth, ISDN	www.stollmann.de
AEGID	RFID systems and transponders	www.aegid.de
MAXTENA	GPS, Glonass, Iridium antennas	www.maxtena.com
AAEON	industrial computers and panels	www.aaeon.com
ASROCK	mini-ITX industrial boards	www.asrock.com
NEXCOM	industrial computers and panels	www.nexcom.com
IIYAMA	Large Format Displays	www.iiyama.com
MEDER	reed switches, sensors and relays	www.meder.com
GLOBAL CONNECTOR TECHNOLOGY	SIM-Holders, memory card connectors, USB connectors	www.globalconnectortechnology.com
FISCHER CONNECTORS	military, medical and industrial connectors	www.fischerconnectors.com
JST	signal connectors	www.jst.de
LEAR	automotive and white goods connectors	www.lear.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
MECAL	machines and systems for wire crimping	www.mecal.com
WEZAG	Hand tools for crimping, pneumatic presses	www.wezag.de
EPSON	crystals, oscillators, filters and sensors	www.epsontoyocom.co.jp
ALPS ELECTRIC	switches, encoders, potentiometers and printers	www.alps.com
FISCHER ELEKTRONIK	heatsinks, connectors, 19'' and case technology	www.fischerelektronik.de
BRIGHTEK	Power, THT and chip LEDs and LED modules	www.brightekeurope.com
SEOUL SEMICONDUCTOR	LEDs - power, full color, 230AC	www.seoulsemicon.com
STANLEY ELECTRIC	LEDs, LED modules	www.stanley-components.com
VISHAY	passive components and semiconductors	www.vishay.com
TAIWAN SEMICONDUCTOR	semiconductor devices	www.taiwansemi.com
ISOCOM	optocouplers, optoswitches	www.isocom.com

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 logistics 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 9001:2008 for the distribution of electronic components.

EN v.5.3

GSM/3G/LTE   GPS/GNSS   LED   Embedded   Passive   Semicon   Electromech