

MAX-6

u-blox 6 GPS Modules

Data Sheet

Abstract

Technical data sheet describing the ultra miniature u-blox 6 based MAX-6 series of GPS modules.

These compact u-blox6 GPS receivers provide high performance and a high level of integration capability in a tiny package. This makes them perfectly suited for end products with strict size and cost requirements.



10.1 x 9.7 x 2.5 mm

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Document Information

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Document status information

Objective Specification	This document contains target values. Revised and supplementary data will be published later.
Advance Information	This document contains data based on early testing. Revised and supplementary data will be published later.
Preliminary	This document contains data from product verification. Revised and supplementary data may be published later.
Released	This document contains the final product specification.

This document applies to the following products:

Name	Type number	ROM/FLASH version	PCN reference
MAX-6G	MAX-6G-0-000	ROM7.01	N/A
MAX-6Q	MAX-6Q-0-000	ROM7.01	N/A
MAX-6C	MAX-6C-0-000	ROM7.01	N/A

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1 Functional description

1.1 Overview

The MAX-6 module series brings the high performance of the u-blox 6 position engine in the ultra miniature MAX form factor. These receivers provide high performance and a high level of integration capability in a tiny package. This makes them perfectly suited for mass-market end products with strict size and cost requirements.

The 50-channel u-blox 6 positioning engine boasts a Time-To-First-Fix (TTFF) of under 1 second. The dedicated acquisition engine, with 2 million correlators, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppresses jamming sources and mitigates multipath effects, giving MAX-6 GPS receivers excellent navigation performance even in the most challenging environments.

1.2 Product features

Model	Type	Supply	Interfaces	Features					
	Standalone GPS Capture & Process Timing & Raw Data Dead Reckoning	1.75 V – 2.0 V 2.7 V – 3.6 V	UART USB SPI DDC (I ² C compliant)	Programmable (Flash) FW update	TCXO (KickStart)	RTC crystal	Antenna supply and supervisor	Configuration pins	Timepulse External interrupt / Wakeup
MAX-6G	•	•	•	•	•	•	o	1	•
MAX-6Q	•	•	•	•	•	•	o	1	•
MAX-6C	•	•	•	•			o	1	•

o = dedicated control pin (ANTON) allows control of active antenna

Table 1: Features of the MAX-6 Series



All MAX-6 modules are manufactured in ISO/TS 16949 certified sites.

1.3 GPS performance

Parameter	Specification		
Receiver type	50 Channels GPS L1 frequency, C/A Code SBAS: WAAS, EGNOS, MSAS		
Time-To-First-Fix ¹		MAX-6G/Q	MAX-6C
	Cold Start (Autonomous)	26 s	27 s
	Warm Start (Autonomous)	26 s	27 s
	Hot Start (Autonomous)	1 s	16 s
	Aided Starts ²	1 s	< 3 s
Sensitivity ³		MAX-6G/Q	MAX-6C
	Tracking & Navigation	-162 dBm	-162 dBm
	Reacquisition	-160 dBm	-160 dBm
	Cold Start (Autonomous)	-148 dBm	-147 dBm
Maximum Navigation update rate		5Hz	
Horizontal position accuracy ⁴	Autonomous	2.5 m	
	SBAS	2.0 m	
Timepulse signal	Accuracy	<60 ns ⁵	
	Configurable frequency range	0.25 Hz ... 1 kHz	
Velocity accuracy ⁶		0.1m/s	
Heading accuracy ⁶		0.5 degrees	
Operational Limits	Dynamics	≤ 4 g	
	Altitude ⁷	50,000 m	
	Velocity ⁷	500 m/s	

Table 2: MAX-6 GPS performance

¹ All satellites at -130 dBm

² Dependent on aiding data connection speed and latency

³ Demonstrated with a good active antenna

⁴ CEP, 50%, 24 hours static, -130dBm, SEP: <3.5m

⁵ 99%

⁶ 50% @ 30 m/s

⁷ Assuming Airborne <4g platform

1.4 Block diagram

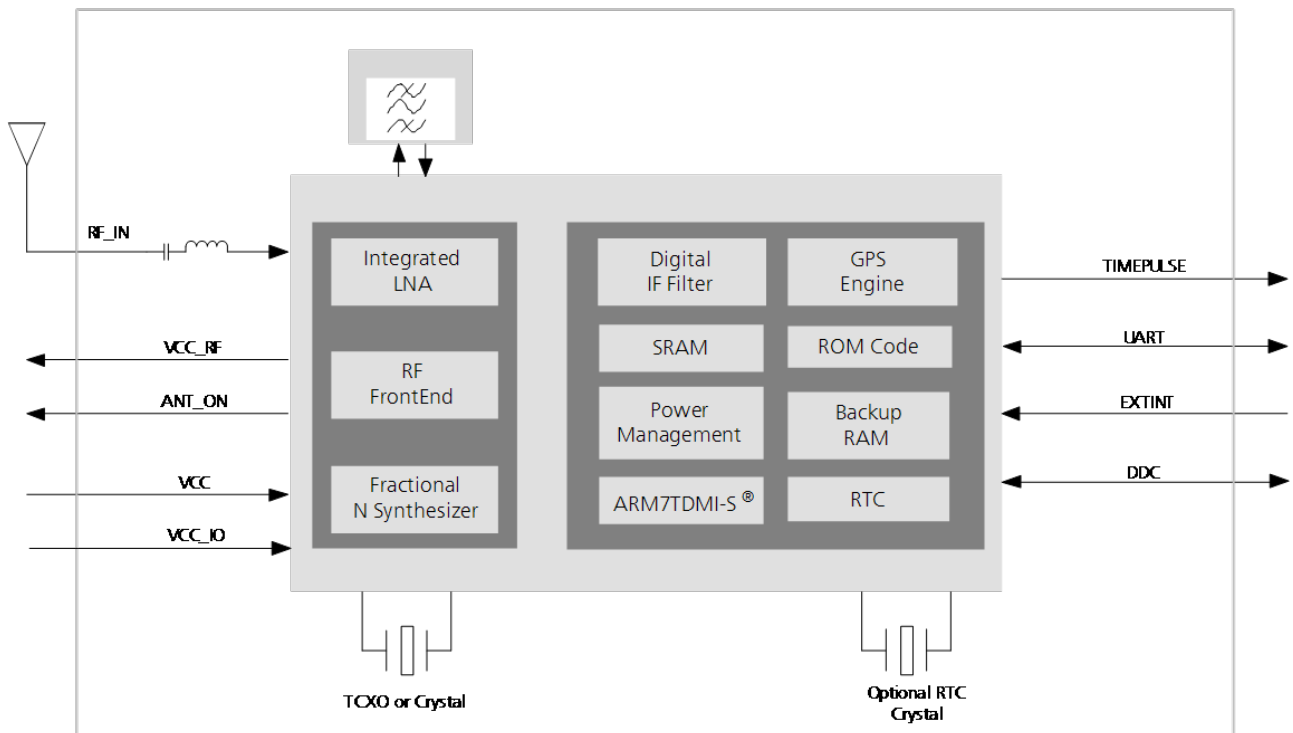


Figure 1: Block diagram (For available options refer to the product features table in section 1.2).

1.5 Assisted GPS (A-GPS)

Supply of aiding information like ephemeris, almanac, rough last position and time and satellite status and an optional time synchronization signal will reduce time to first fix significantly and improve the acquisition sensitivity. All MAX-6 modules support the u-blox AssistNow Online and AssistNow Offline A-GPS services⁸ and are OMA SUPL compliant.

1.6 AssistNow™ Autonomous

AssistNow Autonomous provides functionality similar to Assisted-GPS without the need for a host or external network connection. Based on previous broadcast satellite ephemeris data downloaded to and stored by the GPS receiver, AssistNow Autonomous automatically generates accurate satellite orbital data ("AssistNow Autonomous data") that is usable for future GPS position fixes. The concept capitalizes on the periodic nature of GPS satellites: Their position in the sky is basically repeated every 24 hours. By capturing strategic ephemeris data at specific times of the day, and initiating fixes at periodic and application-relevant time bands in the future, a much faster position can be determined based on the stored data. AssistNow Autonomous data can be reliable for up to 3 days after initial capture.

u-blox' AssistNow Autonomous benefits are:

- Faster fix in situations where GPS satellite signals are weak
- No connectivity required
- Compatible with AssistNow Online and Offline services (can work stand-alone, or in tandem with these services)
- No integration effort, calculations are done in the background, transparent to the user.

⁸ Requires external memory on the Host

For more details see the *u-blox 6 Receiver Description Including Protocol Specification* [2].

1.7 Oscillators

MAX-6 GPS modules are available in Crystal and TCXO versions. The TCXO allows accelerated weak signal acquisition, enabling faster start and reacquisition times.

1.8 Protocols and interfaces

Protocol	Type
NMEA	Input/output, ASCII, 0183, 2.3 (compatible to 3.0)
UBX	Input/output, binary, u-blox proprietary
RTCM	Input, 2.3

Table 3: Available protocols

Both protocols are available on UART and DDC. For specification of the various protocols see the *u-blox 6 Receiver Description including Protocol Specification* [2].

MAX-6 modules support a number of peripheral interfaces for serial communication. The embedded firmware uses these interfaces according to their respective protocol specifications. For specific applications, the firmware also supports the connection of external memories.

1.8.1 UART

MAX-6 modules include one configurable UART interface for serial communication (for information about configuration see section 7).

1.8.2 Display Data Channel (DDC)

The I²C compatible DDC interface can be used either to access external devices with a serial interface EEPROM or to interface with a host CPU. It is capable of master and slave operation. The DDC interface is I²C Standard Mode compliant. For timing parameters consult the I²C standard.

The DDC Interface is compatible with LEON DDC from version LEON-G100-05S/ LEON-G200-05S and above.



The maximum bandwidth is 100kbit/s.

1.8.2.1 External serial EEPROM

MAX-6 modules allow an optional external serial EEPROM to be connected to the DDC interface. This can be used to store Configurations permanently.



For more information see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

1.8.3 Data ready indication: TX Ready

With FW 7.01 u-blox 6 GPS modules include a data ready indication function for serial interfaces. The TX Ready signal indicates that the receiver has data to transmit at the specified serial interface.



For more information about configuration see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1] and the *u-blox 6 Receiver Description including Protocol Specification* [2].

1.9 Antenna

MAX-6 modules are designed for use with passive and active⁹ antennas.

Parameter	Specification	
Antenna Type		Passive and active antenna
Active Antenna Recommendations	Minimum gain	15 dB (to compensate signal loss in RF cable)
	Maximum gain	50 dB
	Maximum noise figure	1.5 dB

Table 4: Antenna Specifications for all MAX-6 modules

1.9.1 Active antenna control (ANTON)

The ANTON Pin can be used to turn on and off an external LNA or an active antenna. This reduces power consumption in Power Save Mode (Backup mode). See the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1] for more information.

1.10 Power Management

u-blox receivers support different power modes. These modes represent strategies of how to control the acquisition and tracking engines in order to achieve either the best possible performance or good performance with reduced power consumption.



For more information about power management strategies, see the *u-blox 6 Receiver Description including Protocol Specification* [2].

1.10.1 Maximum Performance Mode

During a Cold start, a receiver in Maximum Performance Mode continuously deploys the acquisition engine to search for all satellites. Once the receiver has a position fix (or if pre-positioning information is available), the acquisition engine continues to be used to search for all visible satellites that are not being tracked.

1.10.2 Eco Mode

During a Cold start, a receiver in Eco Mode works exactly as in Maximum Performance Mode. Once a position can be calculated and a sufficient number of satellites are being tracked, the acquisition engine is powered off resulting in significant power savings. The tracking engine continuously tracks acquired satellites and acquires other available or emerging satellites.

Note that even if the acquisition engine is powered off, satellites continue to be acquired.

1.10.3 Power Save Mode

Power Save Mode (PSM) allows a reduction in system power consumption by selectively switching parts of the receiver on and off.

1.11 Design-in

In order to obtain the necessary information to conduct a proper design-in, u-blox strongly recommends consulting the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

⁹ For information on using active antennas with MAX-6 modules, see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

2 Pin Definition

2.1 Pin assignment

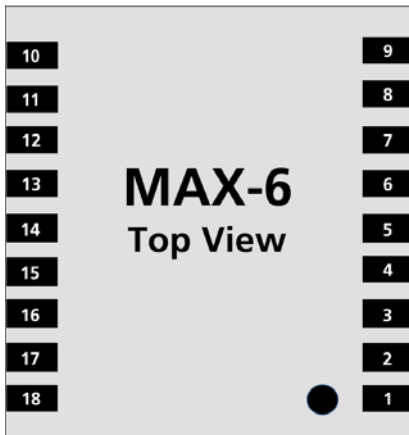


Figure 2 Pin Assignment

No	Module	Name	I/O	Description
1	All	GND		Ground
2	All	TXD1	O	UART, leave open if not used, Voltage level referred VCC_IO. Can be configured as Data ready ¹⁰ indication for the DDC interface.
3	All	RXD1	I	UART, leave open if not used, Voltage level referred VCC_IO
4	All	TIMEPULSE	O	Leave open if not used, Voltage level referred VCC_IO
5	All	EXTINT0	I	Leave open if not used, Voltage level referred VCC_IO
6	All	V_BCKP		Backup voltage input pin. Connect to GND if not used.
7	All	VCC_IO		IO supply voltage Input must be always supplied. Usually connect to VCC Pin 8
8	All	VCC		Power supply of module (1.8V for MAX-6G or 3.0V for MAX-6Q/C)
9	All	VRESET	I	Must be connected to VCC always. Can be used as reset input pin with additional circuit (connected to VCC by 3k3 resistor)
10	All	GND		Ground
11	All	RF_IN	I	Matched RF-Input, DC block inside.
12	All	GND		Ground
13	All	ANTON	O	Active antenna or ext. LNA control pin in power save mode
14	All	VCC_RF	O	Can be used for active antenna or external LNA supply.
15	All	RESERVED	-	Leave open.
16	All	SDA2	I/O	DDC Communication interface. Leave open if not used.
17	All	SCL2	I/O	DDC Communication interface. Leave open if not used.
18	All	RESERVED	-	Leave open.

Table 5: Pinout

¹⁰ See chapter 1.8.3 for more information

3 Electrical specifications

3.1 Absolute maximum ratings

Parameter	Symbol	Module	Condition	Min	Max	Units
Power supply voltage	VCC	MAX-6G		-0.5	2.0	V
		MAX-6Q/ MAX-6C		-0.5	3.6	V
Supply Voltage I/O ring	VCC_IO	All		-0.5	3.6	V
Reset input voltage	V_RESET	All		-0.5	3.6	V
Backup supply voltage	V_BCKP	All		-0.5	3.6	V
IO Supply voltage	VCC_IO	All		-0.5	3.6	V
Input pin voltage	Vin	All		-0.5	3.6	V
DC current through any digital I/O pin (except supplies)	Ipin				10	mA
VCC_RF output current	ICC_RF	All			100	mA
Input power at RF_IN	Prfin	All	source impedance = 50 Ω , continuous wave		t.b.d.	dBm
Storage temperature	Tstg	All		-40	85	°C

Table 6: Absolute maximum ratings



GPS receivers are Electrostatic Sensitive Devices (ESD) and require special precautions when handling. For more information see chapter 6.2.6.



Stressing the device beyond the “Absolute Maximum Ratings” may cause permanent damage. These are stress ratings only. The product is not protected against overvoltage or reversed voltages. If necessary, voltage spikes exceeding the power supply voltage specification, given in table above, must be limited to values within the specified boundaries by using appropriate protection diodes. For more information see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

3.2 Operating conditions



All specifications are at an ambient temperature of 25°C.

Parameter	Symbol	Module	Min	Typ	Max	Units	Condition
Power supply voltage	VCC	MAX-6G	1.75	1.8	2.0	V	
		MAX-6Q, MAX-6C	2.5	3.0	3.6	V	
Supply Voltage I/O ring	VCC_IO	All	1.65	3.0	3.6	V	
Backup battery voltage	V_BCKP	All	1.4		3.6	V	
Backup battery current	I_BCKP	All		22		μA	V_BCKP = 1.8 V, VCC_IO = 0V
Input pin voltage range	V _{in}	All	0		VCC_IO + 0.5	V	
Digital IO Pin Low level input voltage	V _{il}	All	0		0.2*VCC_IO	V	
Digital IO Pin High level input voltage	V _{ih}	All	0.7*VCC_IO		VCC_IO + 0.5	V	
Digital IO Pin Low level output voltage	V _{ol}	All			0.4	V	I _{ol} =4mA
Digital IO Pin High level output voltage	V _{oh}	All	VCC_IO - 0.4V			V	I _{oh} =4mA
ANTON Pin Low level output voltage		All	0		0.2*VCC_RF		I _{ol} =0.4mA
ANTON Pin High level output voltage		All	0.7*VCC_RF		VCC_RF		I _{oh} =0.4mA
VCC_RF voltage	VCC_RF	All		VCC-0.1		V	
VCC_RF output current	ICC_RF	All			50	mA	
Antenna gain	G _{ant}	All			50	dB	
Receiver Chain Noise Figure	NF _{tot}	All		3.0		dB	
Operating temperature	T _{opr}	All	-40		85	°C	

Table 7: Operating conditions



Operation beyond the specified operating conditions can affect device reliability.

3.3 Indicative power requirements

Table 8 lists examples of the total system supply current for a possible application.

Parameter	Symbol	Module	Min	Typ	Max	Units	Condition
Max. supply current ¹¹	Iccp	All			67	mA	VCC = 3.6 V ¹² / 1.95 V ¹³
Average supply current ¹⁴	Icc Acquisition	All		47 ¹⁵		mA	VCC = 3.0 V ¹² / 1.8 V ¹³
	Icc Tracking (Max Performance mode)	MAX-6G/Q		40 ¹⁶		mA	
		MAX-6C		39 ¹⁶		mA	
	Icc Tracking (Eco mode)	MAX-6G/Q		38 ¹⁶		mA	
		MAX-6C		37 ¹⁶		mA	
	Icc Tracking (Power Save mode / 1 Hz)	MAX-6G/Q		12 ¹⁶		mA	
		MAX-6C		11 ¹⁶		mA	

Table 8: Indicative power requirements



Values in Table 8 are provided for customer information only as an example of typical power requirements. Values are characterized on samples, actual power requirements can vary depending on FW version used, external circuitry, number of SVs tracked, signal strength, type of start as well as time, duration and conditions of test.

¹¹ Use this figure to dimension maximum current capability of power supply. Measurement of this parameter with 1 Hz bandwidth.

¹² MAX-6Q, MAX-6M

¹³ MAX-6G

¹⁴ Use this figure to determine required battery capacity.

¹⁵ FW 7.01, >8 SVs in view, CNo >40 dBHz, current average of 30 sec after cold start.

¹⁶ FW 7.01, with strong signals, all orbits available. For Cold Starts typical 12 min after first fix. For Hot Starts typical 15 s after first fix.

4 Mechanical specifications

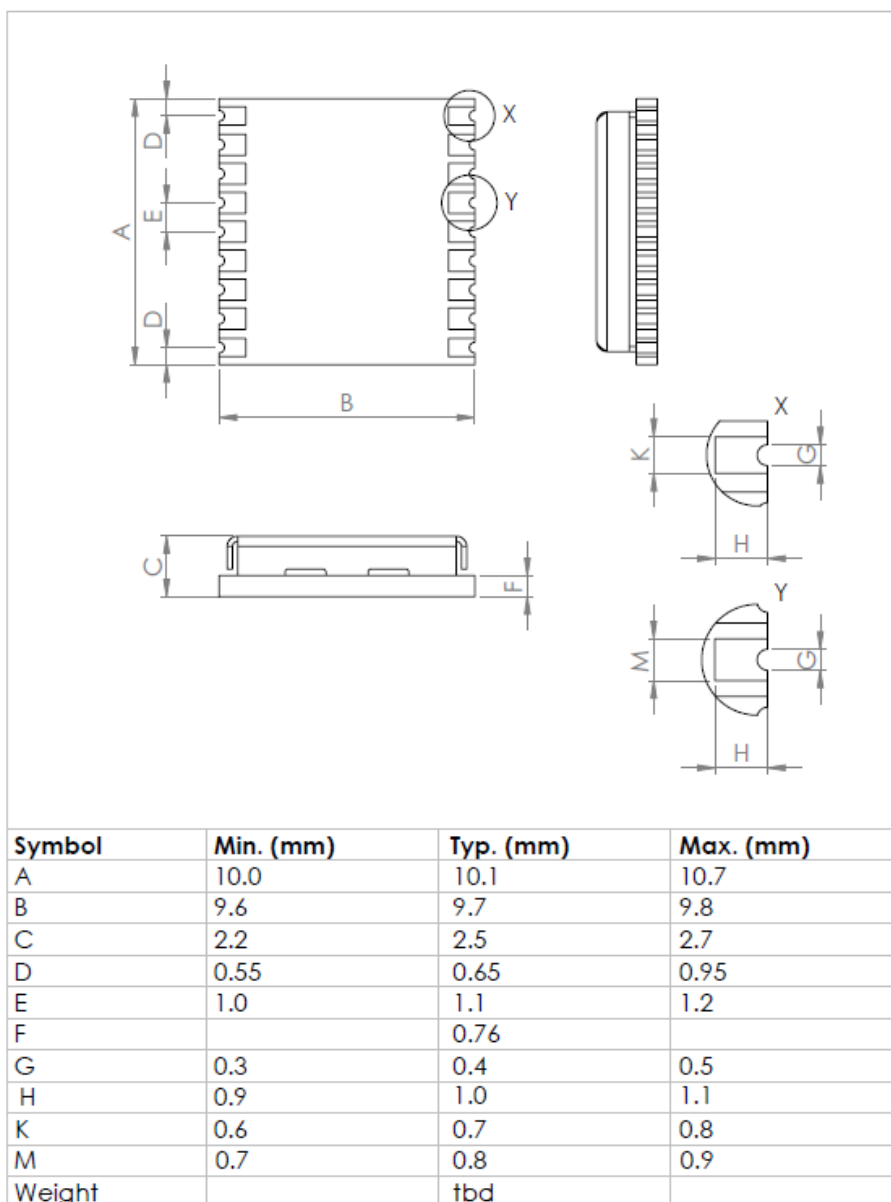


Figure 3: Dimensions



For information regarding the Paste Mask and Footprint see the *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1].

5 Qualification and certification

5.1 Reliability tests

Tests for product family qualifications according to ISO 16750 "Road vehicles - Environmental conditions and testing for electrical and electronic equipment", and appropriate standards (see Table 9).

Test	Reference	Test Conditions
Temperature step test	ISO16750-4 IEC60068-2-1 IEC60068-2-2	Function tests at stable temperature. The temperature has to decrease in 5K steps from RT to -40°C followed by increase to +85°C in 5K steps.
Temperature cycling	IEC60068-2-14 Na	-40°C / +125°C, 300 cycles, air to air No function
Dry heat I ("desert")	IEC60068-2-2	+60°C / 5%rH, Toper max, VCCmax, 1000 hours, in function
Damp heat II ("tropical")	IEC60068-2-3	+60°C/95%rH, Toper max, VCCmax, 1000 hours, in function
High Temp. Operating Life (Life span)	IEC60068-2-2	1000hrs @ 85°C Ta Toper max, VCCmax
Dry heat II	IEC60068-2-2	+125°C, 1000 hours, no function
Function test at Umin, Unom, Umax	ISO16750-4 IEC60068-2-1 IEC60068-2-2	Function test at Umin, Unom, Umax 1 hour / voltage level Test at -40°C, RT, +85°C
Damp heat cyclic	IEC60068-2-30 Db Variation 1	+25°C...+55°C; >90% rH 6 cycles of 24 hours
Vibration in function	IEC60068-2-6	5-500 Hz; 5g; 2.5 hrs/axis at -40°C 2.5 hrs/axis at +85°C 3 hrs/axis at RT Total: 24 hours, function supervision
Mechanical Shock	IEC60068-2-27 Ea	30g/11ms (half sine), 3 Shocks/axis, no function
Robustness of terminations of Surface Mounted Devices	IEC60068-2-21 Ue1	1mm/s +/- 0.5mm/s D>2mm 1 Bending cycle Duration on Dmax: 20s +/- 1s

Table 9: u-blox qualification requirements

5.2 Approvals



Products marked with this lead-free symbol on the product label comply with the "Directive 2002/95/EC of the European Parliament and the Council on the Restriction of Use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS).

All u-blox 6 GPS modules are RoHS compliant.

6 Product handling & soldering

6.1 Packaging

MAX-6 modules are delivered as hermetically sealed, reeled tapes in order to enable efficient production, production lot set-up and tear-down.



Figure 4: Reeled u-blox 6 modules

6.1.1 Reels

MAX-6 GPS modules are deliverable in quantities of 250pcs on a reel. The dimensions of the reel will be defined in the next document release. Sample quantities of less than 250pcs will not be delivered as hermetically sealed, reeled tapes.

6.1.2 Tapes

Tape size will be defined in the next document release.

6.2 Shipment, storage and handling

MAX modules are designed and packaged to be processed in an automatic assembly line, and are shipped in Tape-and-Reel.



MAX-6 modules are Moisture Sensitive Devices (MSD) in accordance to the IPC/JEDEC specification. Appropriate MSD handling instructions and precautions are summarized in Sections 6.2.1 to 6.2.3. Read them carefully to prevent permanent damage due to moisture intake.



GPS receivers contain highly sensitive electronic circuitry and are Electrostatic Sensitive Devices (ESD). Handling MAX-6 modules without proper ESD protection may destroy or damage them permanently. See Section 6.2.6 for ESD handling instructions.

6.2.1 Moisture Sensitivity Levels

The Moisture Sensitivity Level (MSL) relates to the packaging and handling precautions required. MAX-6 modules are rated at MSL level 4.



For MSL standard see IPC/JEDEC J-STD-020, which can be downloaded from www.jedec.org.

6.2.2 Shipment

Table 10 summarizes the dry pack requirements for different MSL levels in the IPC/JEDEC specification.

MSL Level	Dry Pack Requirement
1	Optional
2	Required
2a	Required
3	Required
4	Required

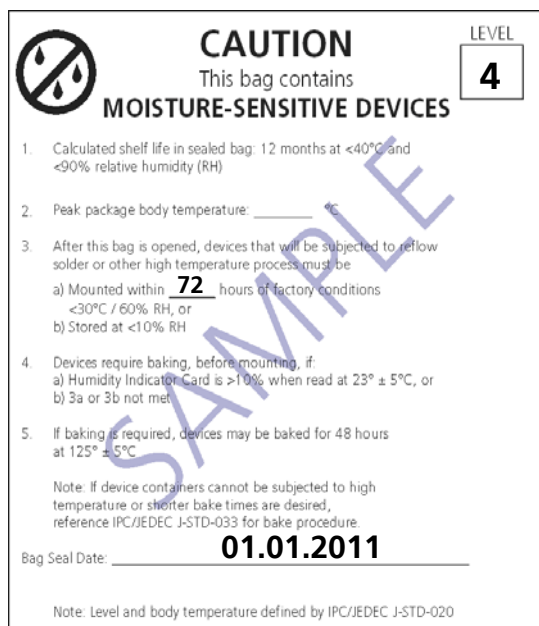
Table 10: JEDEC specification of dry pack requirements

According to IPC/JEDEC specification J-STD-020, if a device passes MSL level 1, it is classified as not moisture sensitive and does not require dry pack. If a device fails level 1 but passes a higher numerical level, it is classified as moisture sensitive and must be dry packed in accordance with J-STD-033.

MAX-6 modules are delivered on Tape-and-Reels in a hermetically sealed package ("dry bag") to prevent moisture intake and protect against electrostatic discharge. For protection from physical damage, the reels are individually packed in cartons.

Carrier materials such as trays, tubes, reels, etc., that are placed in the Moisture Barrier Bag (MBB) can affect the moisture level within the MBB. Therefore, the effect of these materials is compensated by adding additional desiccant in the MBB to ensure the shelf life of the SMD packages.

The dry bag provides an IPC/JEDEC compliant MSD label describing the handling requirements to prevent humidity intake. IPC/JEDEC specifications require that MSD sensitive devices be packaged together with a Humidity Indicator Card (HIC) and desiccant to absorb humidity. If no moisture has been absorbed, the three fields in the HIC indicate blue color. Figure 5 shows examples of an MSD label and HIC.



CAUTION
This bag contains
MOISTURE-SENSITIVE DEVICES

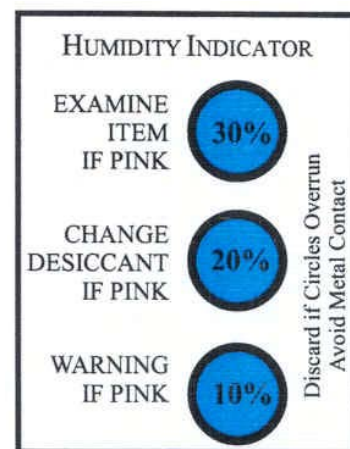
LEVEL 4

- Calculated shelf life in sealed bag: 12 months at $<40^{\circ}\text{C}$ and $<90\%$ relative humidity (RH)
- Peak package body temperature: _____ $^{\circ}\text{C}$
- After this bag is opened, devices that will be subjected to reflow solder or other high temperature process must be:
 - Mounted within **72** hours of factory conditions $<30^{\circ}\text{C}$ / 60% RH, or
 - Stored at $<10\%$ RH
- Devices require baking, before mounting, if:
 - Humidity Indicator Card is $>10\%$ when read at $23^{\circ} \pm 5^{\circ}\text{C}$, or
 - 3a or 3b not met
- If baking is required, devices may be baked for 48 hours at $125^{\circ} \pm 5^{\circ}\text{C}$

Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure.

Bag Seal Date: **01.01.2011**

Note: Level and body temperature defined by IPC/JEDEC J-STD-020



HUMIDITY INDICATOR

EXAMINE ITEM IF PINK **30%**

CHANGE DESICCANT IF PINK **20%**

WARNING IF PINK **10%**

Discard if Circles Overrun
Avoid Metal Contact

Figure 5: Examples of MSD label and Humidity Indicator Card

6.2.3 Storage and floor life

The calculated shelf life for dry packed SMD packages is a minimum of 12 months from the bag seal date, when stored in a noncondensing atmospheric environment of <40°C/90% RH.

Table 11 lists floor life for different MSL levels in the IPC/JEDEC specification.

MSL level	Floor life (out of bag) at factory ambient ≤30°C/60% RH or as stated
1	Unlimited at ≤30°C/85% RH
2	1 year
2a	4 weeks
3	168 hours
4	72 hours

Table 11: JEDEC specification of floor life

The parts must be processed and soldered within the time specified for the MSL level. If this time is exceeded, or the humidity indicator card in the sealed package indicates that they have been exposed to moisture, the devices need to be pre-baked before the reflow solder process.

6.2.4 Drying

Both encapsulant and substrate materials absorb moisture. IPC/JEDEC specification J-STD-020 must be observed to prevent cracking and delamination associated with the "popcorn" effect during reflow soldering. The popcorn effect can be described as miniature explosions of evaporating moisture. Baking before processing is required in the following cases:

- Humidity indicator card: At least one circular indicator is no longer blue
- Floor life or environmental requirements after opening the seal have been exceeded, e.g. exposure to excessive seasonal humidity.

Refer to Section 4 of IPC/JEDEC J-STD-033 for recommended baking procedures. Table 4-1 of the specification lists the required bake times and conditions for drying. For example, a module that has exceeded its floor life by >72 hours shall be baked at 125°C for 48 hours. (Floor life begins counting at time = 0 after bake).



Do not attempt to bake u-blox modules while contained in tape and rolled up in reels. For baking, place parts individually onto oven tray.



Oxidation Risk: Baking SMD packages may cause oxidation and/or intermetallic growth of the terminations, which if excessive can result in solderability problems during board assembly. The temperature and time for baking SMD packages are therefore limited by solderability considerations. The cumulative bake time at a temperature greater than 90°C and up to 125°C shall not exceed 96 hours. If the bake temperature is not greater than 90°C, there is no limit on bake time. Bake temperatures higher than 125°C are not allowed.

6.2.5 Reflow soldering

Reflow profiles are to be selected according u-blox recommendations (see *LEA-6/NEO-6/MAX-6 Hardware Integration Manual* [1]).

6.2.6 ESD handling precautions

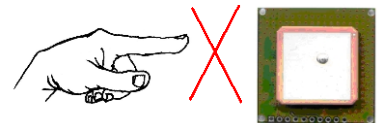
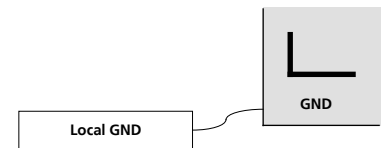


MAX-6 modules are Electrostatic Sensitive Devices (ESD). Observe precautions for handling! Failure to observe these precautions can result in severe damage to the GPS receiver!



GPS receivers are Electrostatic Sensitive Devices (ESD) and require special precautions when handling. Particular care must be exercised when handling patch antennas, due to the risk of electrostatic charges. In addition to standard ESD safety practices, the following measures should be taken into account whenever handling the receiver:

- Unless there is a galvanic coupling between the local GND (i.e. the work table) and the PCB GND, then the first point of contact when handling the PCB shall always be between the local GND and PCB GND.
- Before mounting an antenna patch, connect ground of the device
- When handling the RF pin, do not come into contact with any charged capacitors and be careful when contacting materials that can develop charges (e.g. patch antenna ~10pF, coax cable ~50-80pF/m, soldering iron, ...)
- To prevent electrostatic discharge through the RF input, do not touch any exposed antenna area. If there is any risk that such exposed antenna area is touched in non ESD protected work area, implement proper ESD protection measures in the design.
- When soldering RF connectors and patch antennas to the receiver's RF pin, make sure to use an ESD safe soldering iron (tip).



7 Default settings

Interface	Settings
Serial Port 1 Output	9600 Baud, 8 bits, no parity bit, 1 stop bit Configured to transmit both NMEA and UBX protocols, but only following NMEA and no UBX messages have been activated at start-up: GGA, GLL, GSA, GSV, RMC, VTG, TXT
USB Output	Configured to transmit both NMEA and UBX protocols, but only following NMEA and no UBX messages have been activated at start-up: GGA, GLL, GSA, GSV, RMC, VTG, TXT USB Power Mode: Bus-Powered
Serial Port 1 Input	9600 Baud, 8 bits, no parity bit, 1 stop bit Automatically accepts following protocols without need of explicit configuration: UBX, NMEA The GPS receiver supports interleaved UBX and NMEA messages.
USB Input	Automatically accepts following protocols without need of explicit configuration: UBX, NMEA The GPS receiver supports interleaved UBX and NMEA messages. USB Power Mode: Bus-Powered
TIMEPULSE (1Hz Nav)	1 pulse per second, synchronized at rising edge, pulse length 100ms
Power Mode	Maximum Performance mode

Table 12: Default settings

Refer to the *u-blox 6 Receiver Description including Protocol Specification* [2] for information about further settings.

8 Labeling and ordering information

8.1 Product labeling

To be defined.

8.2 Explanation of codes

3 different product code formats are used. The **Product Name** is used in documentation such as this data sheet and identifies all u-blox 6 products, independent of packaging and quality grade. The **Ordering Code** includes options and quality, while the **Type Number** includes the hardware and firmware versions. Table 13 below details these 3 different formats:

Format	Structure
Product Name	PPP-GV
Ordering Code	PPP-GV-T
Type Number	PPP-GV-T-XXX

Table 13: Product Code Formats

The parts of the product code are explained in Table 14.

Code	Meaning	Example
PPP	Product Family	MAX
G	Product Generation	6 = u-blox6
V	Variant	T = Timing, R = DR, etc.
T	Option / Quality Grade	Describes standardized functional element or quality grade such as Flash size, automotive grade etc.
XXX	Product Detail	Describes product details or options such as hard- and software revision, cable length, etc.

Table 14: part identification code

8.3 Ordering information

Ordering No.	Product
MAX-6G-0	ROM-based u-blox 6 GPS Module with TCXO 1.8V, 9.7x10.1 mm, 250 pcs/reel
MAX-6C-0	ROM-based u-blox 6 GPS Module, 9.7x10.1 mm, 250 pcs/reel
MAX-6Q-0	ROM-based u-blox 6 GPS Module with TCXO, 9.7x10.1 mm, 250 pcs/reel

Table 15: Product Ordering Codes



Product changes affecting form, fit or function are documented by u-blox. For a list of Product Change Notifications (PCNs) see our website at: <http://www.u-blox.com/en/notifications.html>

Related documents

- [1] LEA-6/NEO-6/MAX-6 Hardware Integration Manual , Docu. No GPS.G6-HW-09007
- [2] u-blox 6 Receiver Description including Protocol Specification, Docu. No GPS-SW-09017

All these documents are available on our homepage (<http://www.u-blox.com>).



For regular updates to u-blox documentation and to receive product change notifications please register on our homepage.

Revision history

Revision	Date	Name	Status / Comments
	18/2/2011	dhur	Initial Version

Contact

For complete contact information visit us at www.u-blox.com

Headquarters

u-blox AG

Zuercherstrasse 68
CH-8800 Thalwil
Switzerland
Phone: +41 44 722 74 44
Fax: +41 44 722 74 47
E-mail: info@u-blox.com

Offices

North, Central and South America

u-blox America, Inc.

Phone: +1 (703) 483 3180
E-mail: info_us@u-blox.com

Regional Office West Coast:

Phone: +1 (703) 483 3184
E-mail: info_us@u-blox.com

Technical Support:

Phone: +1 (703) 483 3185
E-mail: support_us@u-blox.com

Europe, Middle East, Africa

u-blox AG

Phone: +41 44 722 74 44
E-mail: info@u-blox.com

Technical Support:

Phone: +41 44 722 74 44
E-mail: info@u-blox.com

Asia, Australia, Pacific

u-blox Singapore Pte. Ltd.

Phone: +65 6734 3811
E-mail: info_ap@u-blox.com
Support: support_ap@u-blox.com

Regional Office China:

Phone: +86 10 68 133 545
E-mail: info_cn@u-blox.com
Support: support_cn@u-blox.com

Regional Office Japan:

Phone: +81 3 5775 3850
E-mail: info_jp@u-blox.com
Support: support_jp@u-blox.com

Regional Office Korea:

Phone: +82 2 542 0861
E-mail: info_kr@u-blox.com
Support: support_kr@u-blox.com

Regional Office Taiwan:

Phone: +886 2 2657 1090
E-mail: info_tw@u-blox.com
Support: support_tw@u-blox.com