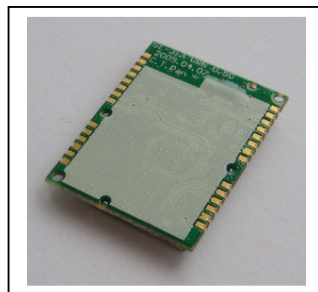


GPS Engine Board

UR-91

Ublox-6

User Manual



RoHS
Compliant

IWASHI 

Product Information

Product Name: UR-91

Product Description:

UR-91 is a compact, high performance, and low power consumption GPS engine board.

It uses ublox 6 chipset which can track up to 16 satellites and 50 channels at a time and perform fast TTFF in weak signal environments. UR-91 is suitable for the following applications:

- Automotive navigation
- Personal positioning
- Fleet management
- Mobile phone navigation
- Marine navigation

Product Features:

ublox 6 high performance and low power consumption GPS Chipset

Very high sensitivity (Tracking Sensitivity: -160 dBm)

Extremely fast TTFF (Time To First Fix) at low signal level

One serial port and one usb port

Built-in LNA

3Mbit of internal ROM and 2Mbit of RAM

Compact size (17mm * 22.4mm * 3.0mm) suitable for space-sensitive application

One size component, easy to mount on another PCB board

Support NMEA 0183 and ublox binary protocol

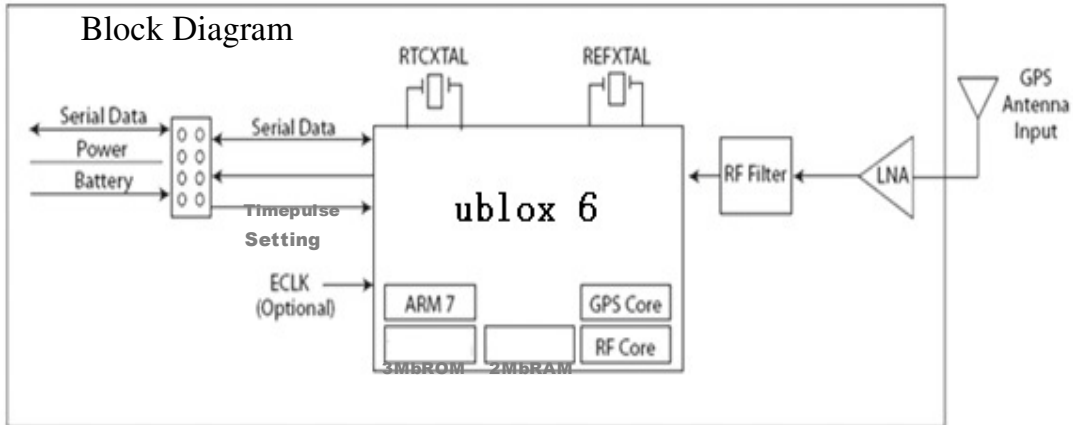
Product Specifications

GPS Receiver

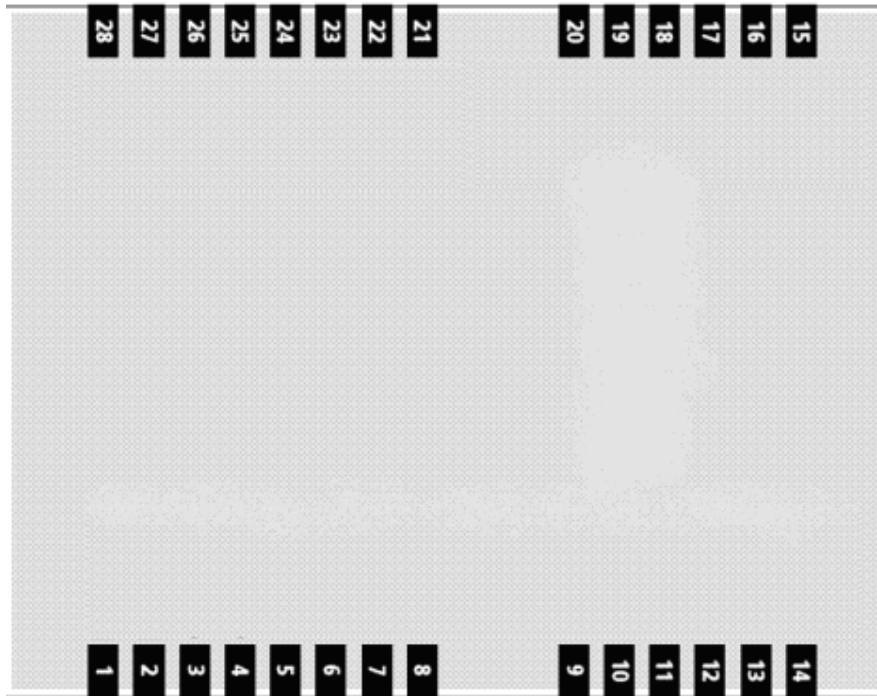
Chipset	ublox UBX-G6010
Frequency	L1, 1575.42 MHz
Code	C/A Code
Protocol	NMEA 0183 v2.3
	GALILEO L1 open service(with upgrade) Default:GGA,GSA,GSV,RMC Support:VTG,GLL,TXT

	ublox binary and NMEA Command
Available Baud Rate	9,600 bps or others by optional
Channels	50
Internal ROM	3Mbit of ROM and 2Mbit of RAM
Sensitivity	Tracking:-160dBm Reacquisition:-160dBm ColdStart:-146dBm
Cold Start	29 seconds, average
Warm Start	29 seconds, average
Hot Start	1 second, average
Accuracy	HorizontalPosition:Autonomous<2.5maverage, SBAS < 2.0m average Velocity: 0.1 m/s Time pulse signal: RMS 30 ns
Maximum Altitude	18,000 meter
Maximum Velocity	515 m/s(1000 knots)
Dynamics	≦ 4G
Update Rate	4 Hz
A-GPS	AssistNow on-line and off-line
Interface	
I/O Pins	1 serial port/1 usb port
Physical Characteristic	
Type	28-pin stamp holes
Dimensions	22.4mm * 17.0 mm * 3.0 mm ±0.1mm
DC Characteristics	
Power Supply	3.3VDC ± 5%
Backup Voltage	1.8~3.6VDC
Power Consumption	Max Performance: Acquisition:49mA ; Tracking: 42mA Eco Mode: Acquisition:48mA ; Tracking:38mA Power Save Mode: 16mA
Environmental Range	
Humidity Range	5% to 95% non-condensing
Operation Temperature	-40°C to 80°C
Storage Temperature	-40°C to 80°C

2. Technical Information



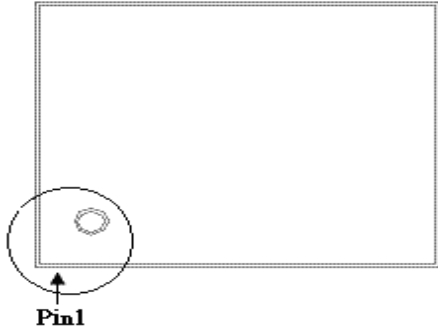
Module Pin Assignment:



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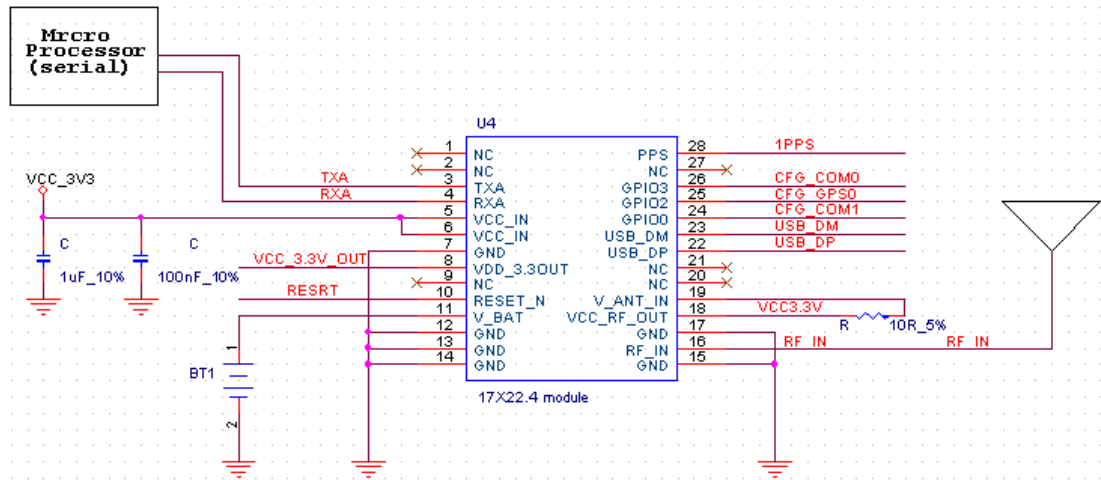
Pin NO.	Pin Name	I/O	Remark
1	NC	X	Reserve
2	NC	X	Reserve
3	TXA	O	This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written software. Output TTL level, 0V ~ 2.85V.
4	RXA	I	This is the main receive channel for receiving software commands to the engine board from ublox demo software or from user written software.
5	VCC	PWR	Main power supply to the engine board.
6	VCC	PWR	Main power supply to the engine board.
7	GND	G	Ground.
8	VCC_3.3_VOUT	PWR	Output voltage 3.3V
9	NC	X	Reserve
10	Reset	I	Reset (Active Low)
11	VBAT	PWR	Backup battery supply voltage
12	NC	X	Reserve
13	GND	G	Ground.
14	GND	G	Ground.
15	GND	G	Ground.
16	RF IN	I	GPS antenna input
17	GND	G	Ground.
18	VCC_RF_OUT	O	Supply Antenna Bias voltage(3.3V)
19	V_ANT_IN	I	Active Antenna Bias voltage
20	NC	X	Reserve
21	NC	X	Reserve
22	USB_DP	I/O	USB I/O LINE
23	USB_DM	I/O	USB I/O LINE
24	Setting	S	CFG_COM1(Baud rate setting)
25	Setting	S	CFG-GPS0(Power mode setting, OPEN=Maximize performance mode; GROUND=Eco mode)
26	Setting	S	CFG_COM0 (Baud rate setting)
27	NC	X	Reserve
28	Timepulse	O	One pulse per second

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Application Circuit



PS: OPEN=1
GND=0

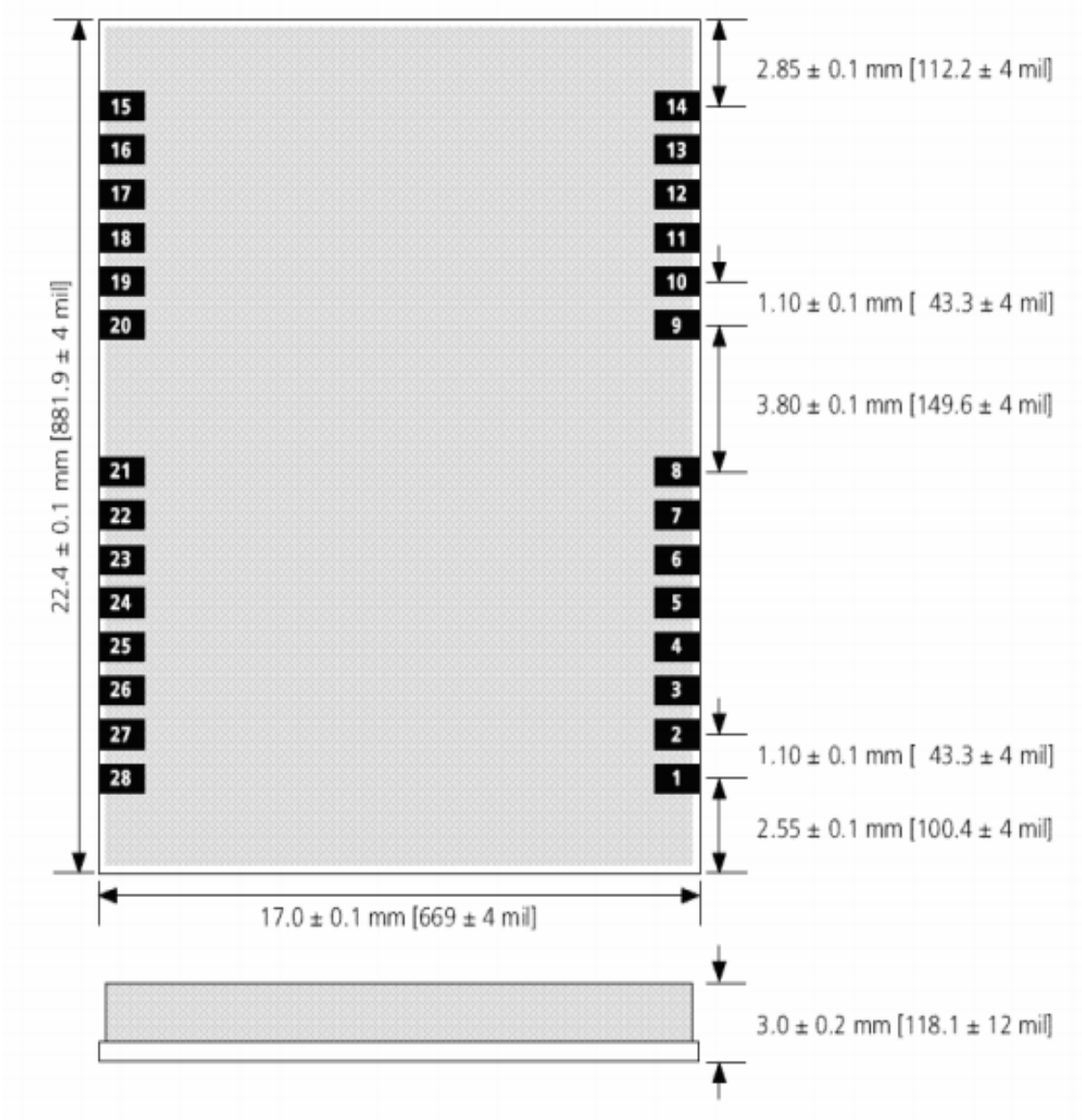
CFG_COM1	CFG_COM0	PROTOCOL	MESSAGE	BAUD-RATE
1	1	NMEA	GSV, RMC, GSA, GGA, GLL, VTG, TXT	9600
1	0			38400
0	1		GSV, RMC, GSA, GGA, VTG, TXT	4800
0	0	UBX		

GPS Active Antenna Specifications (Recommendation)

- Frequency: 1575.42 + 2MHz
- Axial Ratio: 3 dB Typical
- Output Impedance: 50Ω
- Polarization: RHCP
- Amplifier Gain: 15~20dB Typical
- Output VSWR: 2.0 Max.
- Noise Figure: 2.0 dB Max
- Antenna Input Voltage: 3.3V (Typ.)

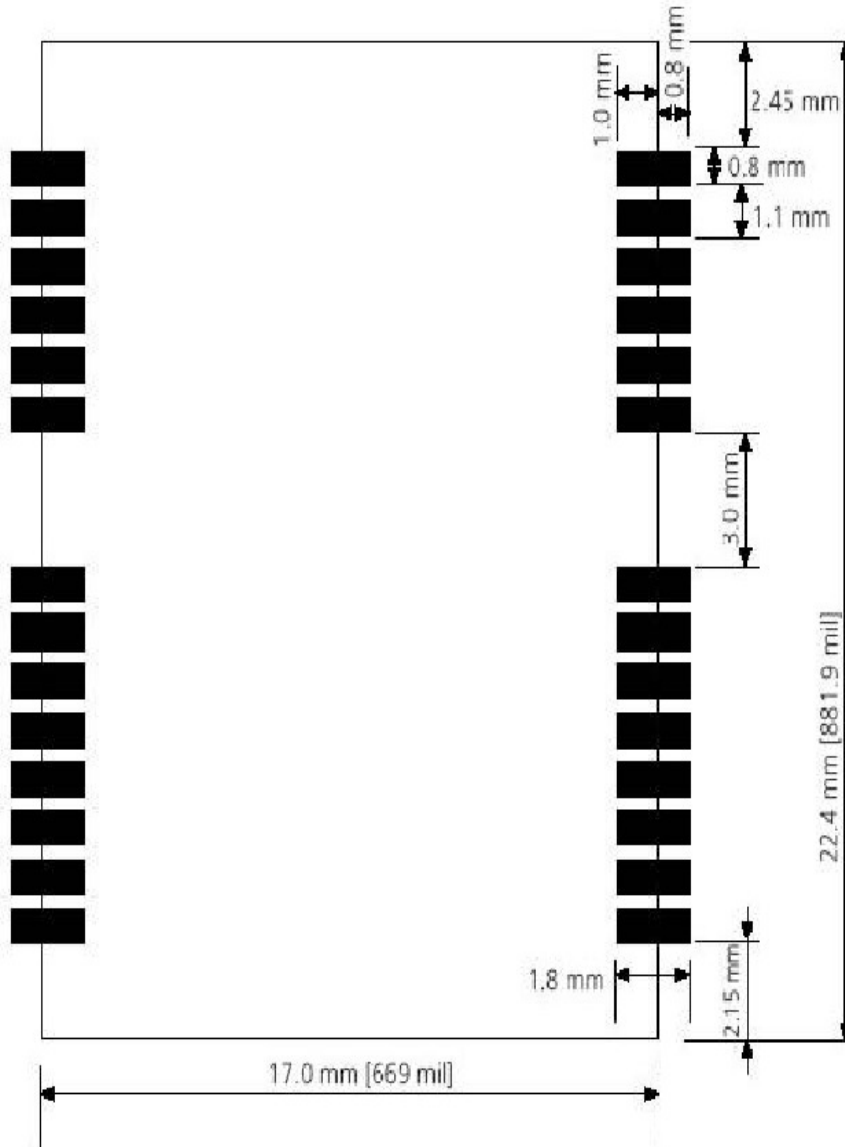
Dimensions

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Recommended Layout PAD



Unit: mm
Tolerance: 0.1mm

UR-91 Application Guideline

Layout Rules

Do not routing the other signal or power trace under the engine board .

*** RF:**

This pin receives signal of GPS analog via external active antenna .It has to be a controlled impedance trace at 50ohm.

Do not place the RF traces close to the other signal path and not routing it on the top layer.

Keep the RF traces as short as possible.

*** Antenna:**

Keep the active antenna on the top of your system and confirm the antenna radiation pattern 、 axial ratio 、 power gain 、 noise figure 、 VSWR are correct when you Setup the antenna in your case.

GPS Passive (or Active) Antenna Specifications(Recommendation)

Frequency: 1575.42±2 MHz

Axial Ratio: 3 dB Typical

Output Impedance: 50Ω

Polarization: RHCP

Output VSWR: 1.5 Max.

Active option

Low Noise Amplifier:

Amplifier Gain :16~20dB Typical

Output VSWR: 2.0 Max.

Noise Figure: 2.0 dB Max.

Antenna Input Voltage :3.3V Typical

Design Notes

VCC

This is the main power supply to the engine board. (3.3Vdc \pm 5%)

GND

Ground pin for the baseband circuit.

RXA

This is the main channel for receiving software commands from u-blox software or from your proprietary software.

TXA

This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written software.

Output TTL level, 0V ~ 2.85V

RF_IN

This pin receives signal of GPS analog via external active antenna . It has to be a controlled impedance trace at 50ohm. Do not have RF traces closed the other signal path and routing it on the top layer. Keep the RF traces as short as possible.

VBAT

This is the battery backup power input for the SRAM and RTC when main power is removed. Typical, the current draw is 15uA. Without the external backup battery, the module/engine board will always execute a cold start after turning on. To achieve the faster start-up offered by a hot or warm start, a battery backup must be connected. The battery voltage should be between 1.8v and 3.6v.

Time pulse

1 pulse per second synchronized at rising edge pulse length 100ms

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CFG_GPS0

The system power modes can be configured at the **CFG_GPS0** pin

PIO21 / CFG_GPS0	GPS mode
1	Maximum Performance Mode XTO.
0	Eco Mode XTO.

Wake Up

This pin will be used in future functions in low-power modes.

CFG_COM0 and CFG_COM1

The baud rate of the communication interface can be configured using the **CFG_COM** pins as follows

PIO20 / CFG_COM1	PIO19 / CFG_COM0	Protocol	Messages	UART1/2 Baud rate
1	1	NMEA	GSV, RMC, GSA, GGA, GLL, VTG, TXT	9600
1	0			38400
0	1		GSV ¹ , RMC, GSA, GGA, VTG, TXT	4800

DM and DP

USB bidirectional communication pin. The u-blox USB interface supports the full-speed data rate of 12 Mbit/s.