Waspmote

General data:

Microcontroller:	ATmega1281
Frequency:	8MHz
SRAM:	8KB
EEPROM:	4KB
FLASH:	128KB
SD Card:	1GB
Weight:	20gr
Dimensions:	73.5 x 51 x 13 mm
Temperature Range:	[-20ºC, +65ºC]
Clock:	RTC (32KHz)

Consumption:

ON:	9mA
Sleep:	62µA
Deep Sleep:	62µA
Hibernate:	0.7µA

Operation without recharging: 1 year *

** Time obtained using the Hibernate mode as the energy saving mode*

Inputs/Outputs:

7 Analog (I), 8 Digital (I/O), 1 PWM,
2 UART, 1 I2C, 1USB

Electrical data:

Battery voltage:	3.3 V - 4.2V
USB charging:	5 V - 100mA
Solar panel charging:	6 - 12 V - 240mA
Auxiliary battery voltage:	3V

Built-in sensors on the board:

Temperature (+/-): -40ºC , +85ºC. Accuracy: 0.25ºC
Accelerometer: ±2g (1024 LSb/g) / ±6g (340LSb/g)
40Hz/160Hz/640Hz/2560Hz

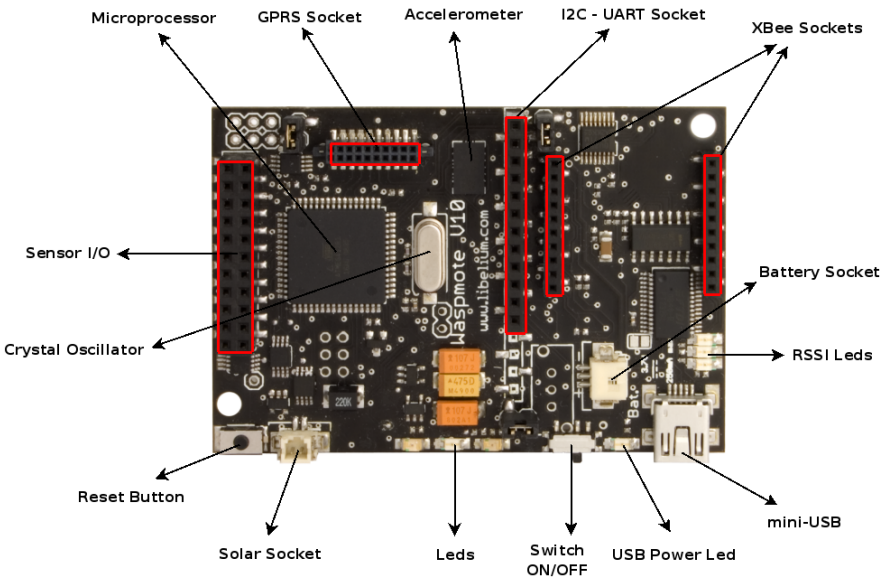

Figure 1: Waspmote Board Top

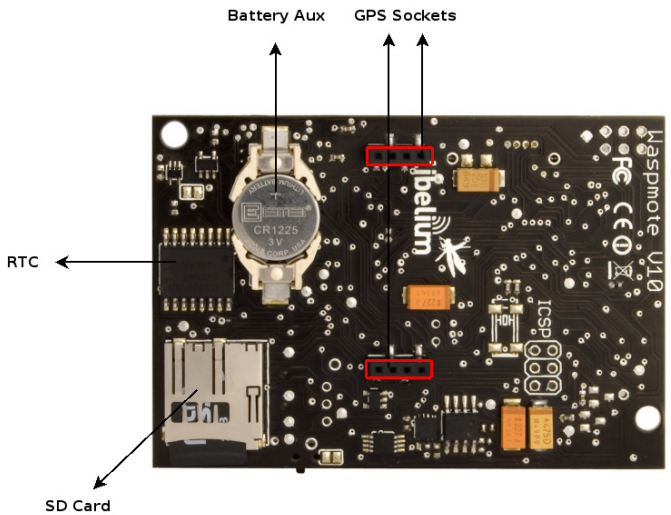

Figure 2: Waspmote Board Bottom

802.15.4/ZigBee

Model	Protocol	Frequency	txPower	Sensitivity	Range *
XBee-802.15.4	802.15.4	2.4GHz	1mW	-92dB	500m
XBee-802.15.4-Pro	802.15.4	2.4GHz	100mW	-100dBm	7000m
XBee-ZB	ZigBee-Pro	2.4GHz	2mW	-96dBm	500m
XBee-ZB-Pro	ZigBee-Pro	2.4GHz	50mW	-102dBm	7000m
XBee-868	RF	868MHz	315mW	-112dBm	40km
XBee-900	RF	900MHz	50mW	-100dBm	10km
XBee-XSC	RF	900MHz	100mW	-106dBm	24km

Figure 3: XBee

** Line of sight and 5dBi dipole antenna*

Antennas: 2.4GHz: 2dBi / 5dBi
868/900MHz: 0dBi / 4.5dBi
Connector: RPSMA
Encryption: AES 128b
Control Signal: RSSI
Standards: XBee-802.15.4 - 802.15.4 Compliant / XBee-ZB - ZigBee-Pro v2007 Compliant
Topologies: p2p, tree, mesh

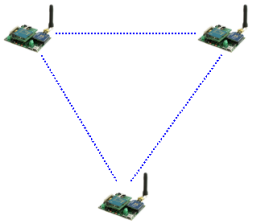

Figure 4: p2p

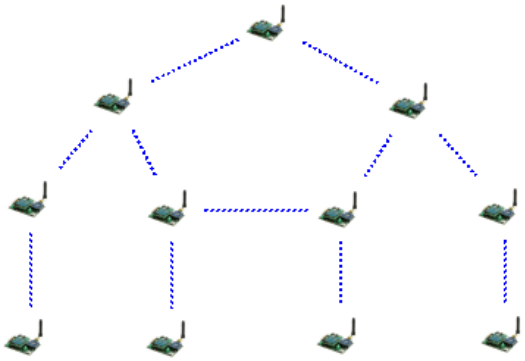

Figure 5: tree

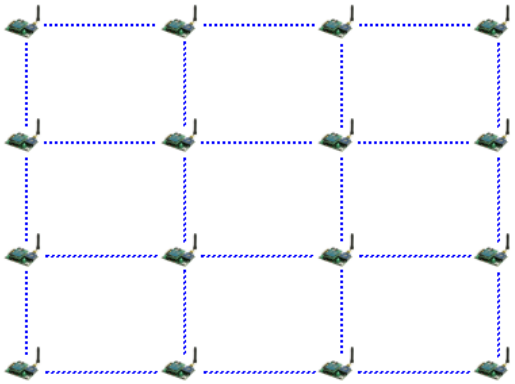

Figure 6: mesh

Sensor Boards

- **Gases Board**: Carbon Monoxide (CO), Carbon Dioxide (CO_2), Methane (CH_4), Oxygen (O_2), Hydrogen (H_2), Ammonia (NH_3), Isobutane (C_4H_{10}), Ethanol (CH_3CH_2OH), Toluene ($C_6H_5CH_3$), Hydrogen Sulphide (H_2S), Nitrogen Dioxide (NO_2), atmospheric pressure, humidity and temperature.
- **Event Detection Board**: pressure, weight, curvature, stretch, vibration, impact, inclination, temperature, liquid level, light, PIR, Hall effect and presence of liquid.
- **Prototyping Board**: ADC (16b), amplification stages, current to voltage converter, relay (10A).

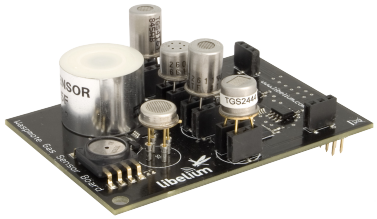

Figure 7: Gases Board

Figure 8: Event Detection Board

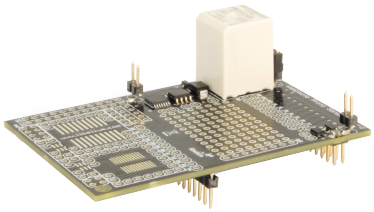

Figure 9: Prototyping Board

GSM/GPRS

Model: HiLo (Sagem)
Quadband: 850MHz/900MHz/1800MHz/1900MHz
TX Power: 2W(Class 4) 850MHz/900MHz, 1W(Class 1) 1800MHz/1900MHz
Sensitivity: -106dBm
Antenna connector: UFL
External Antenna: 0dBi

Actions:

- Making/Receiving calls
- Making 'x' tone missed calls
- Sending/Receiving SMS
- Internet connection through TCP/IP and UDP/IP Sockets
- SMTP Service (sending emails)
- POP3 Service (receiving emails)
- FTP Service (downloading and uploading files)

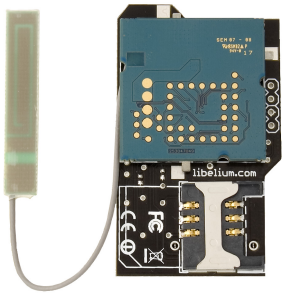

Figure 10: GPRS

GPS

Model: A1084 (Vincotech)
Movement sensitivity: -159dBm
Acquisition sensitivity: -142dBm
Hot Start Time: <1s
Warm Start Time: <32s
Cold Start Time: <35s
Antenna connector: UFL
External antenna: 26dBi

Available information: latitude, longitude, height, speed, direction, date/time and ephemerids management.

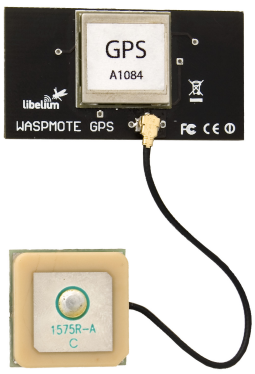

Figure 11: GPS

Programmable interruptions:

- **Asynchronous**
  - -Sensors (programmable threshold)
  - -Low Battery (programmable threshold)
  - -Accelerometer: Free-fall, impact (programmable threshold)
  - -Arrival of SMS, calls and data
- **Synchronous:**
  - - Watchdog: programmable alarms: from 32ms to 8s
  - - RTC: programmable alarms: from 1s to days

Power supplies

- 1100mA/1900mA Lithium Battery
- Solar Panel: rigid (12V – 200mA) and flexible (7V – 100mA)
- USB (220V-USB, car lighter USB)

USB-PC interface

Model: Waspmote Gateway *
Communication: 802.15.4/ZigBee - USB PC
Programmable buttons and leds
** Included in the developers Kit*

Compiler:
- IDE-Waspmote (open source)
-Language: C++
-Versions Windows, Linux and Mac-OS

Figure 12: Waspmote Gateway

Certifications

- CE (Europe)
- FCC (USA)
- IC (Canada)

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