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Improve your position

GEOLOCATION MODULE

Compact, comprehensive and cutting-edge

The Abeeway-Murata Geolocation Module is a **multi-technology fused location LPWAN module** designed as the ideal platform to **develop a wide range of IoT tracking solutions, minimizing the Total Cost of Ownership (TCO) of IoT geolocation use cases.** It allows your engineering to focus on the use case, to **optimize time-to-market and cost** by using less complex PCBs (all high-density devices being encapsulated), to reduce certification risk and budget, as well as testing time and cost for mass production.

This LoRaWAN® fused location module is a **cost effective, ultra-low power and compact form factor SiP (System in Package)** integrating the high performance STM32WB microcontroller (MCU) with integrated Bluetooth 5.x Low Energy transceiver, the latest LoRaWAN® radio transceiver from Semtech, and an optimized arrangement of multi-technology RF engines for indoor and outdoor positioning.

Application Areas

- Indoor & Outdoor Asset location: shared scooters tracking, parking policy enforcement, theft protection, tool monitoring on construction sites, cable drum monitoring, supply chain monitoring, cattle tracking and more.
- Indoor & Outdoor safety & productivity solutions: visitor tracking, guard tour monitoring, monitored evacuation, social distancing policies, and so on.
- Consumer Tracking Applications: pet / child / elderly safety and protection. Keep-together bubble for schools and theme parks.

Product Highlights

The module contains a high-performance multi-constellation GNSS receiver (GPS, GLONASS, Beidou, and Galileo) and supports a patented ultra Low-Power GPS (LP GPS) mode which can provide a network assisted first fix in 3 to 5 seconds from cold start at -157dBm, while requiring extremely low power (only GNSS correlators are active to collect Pseudo-range information). Indoor positioning can be achieved by combining the Bluetooth Low Energy receiver and the ultra-low power Wi-Fi receiver. The LoRa® radio supports the worldwide unlicensed sub-GHz spectrum also supports device-to-device time-of-flight ranging.

The highly configurable peripherals include multiple digital interfaces: I2C/SPI/UART/ USB/GPIOs, an ADC channel input, and I/Os to support various power management schemes. These I/Os and the power of the STM32WB make it possible to use the module not only as fused location provider, but also as the main MCU for any LoRaWAN® application, and to drive an external LTE-M or NB-IoT modem for cellular LPWAN support.

The module is delivered with an application firmware supporting AT commands to easily deploy your IoT applications. ThingPark Location Engine, a cloud-based fused location solver enabling Network TDoA location, LP-GPS, Wi-Fi and Bluetooth location is available through optional subscription.

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PRODUCT SPECIFICATIONS

- Small size: 17 x 17.5 mm
- Operating range: -25°c to +85°

Location technologies

Outdoor geolocation:

- High performance GNSS chipset: Mediatek MT3333
- Supports GPS, GLONASS, GALILEO, BEIDOU constellations including QZSS, SBAS ranging
- Low power consumption: Acquisition 37mW, Tracking 27 mW
- Superior Sensitivity: Acquisition -148 dBm (cold)/ -163 dBm (hot), Tracking -165 dBm
- Includes RF Front-end Module (FEM) with external LNA, SAW filter and matching
- Separate correlator-only system for patented ultra-low power GPS mode (LPGPS) providing first fix in 3 to 5 seconds from cold start at -157dBm

Short range geolocation :

- Wifi passive sniffing with 802.11 b/g. -90dBm sensitivity at 802.11 b. DQBSK (2Mb/s)
- BLE scan. -90dBm in BLE mode
- Ranging feature: LoRa® time-of-flight distance measurement between supporting devices

LPWAN and unlicensed RF:

- 850-960MHz LoRa®/FSK transceiver and 2.4GHz sniffer/correlator: Semtech LR1110
- High Efficiency 14dBm Tx path, +20dBm PA enabled output power
- High performance LoRa® Rx: Down to -140dBm sensitivity, 4.6mA Rx current
- LoRaWAN® Class A/B/C, all LoRaWAN regions in 850-960MHz spectrum.
- Firmware update over the air, support for compressed delta firmware upgrade
- Optional Secure Element

MCU platform:

- Ultra-Low Power MCU: STM32WB55
- 32 bits ARM -based Cortex- M4
- 1MB of Flash Memory and 256KB of SRAM memory

I/Os:

- Digital: USB 2.0, UART Host, SPI, I2C, serial wire debug bus
- 10xGPIOs, 1xAIO, Application cross trigger inputs & outputs

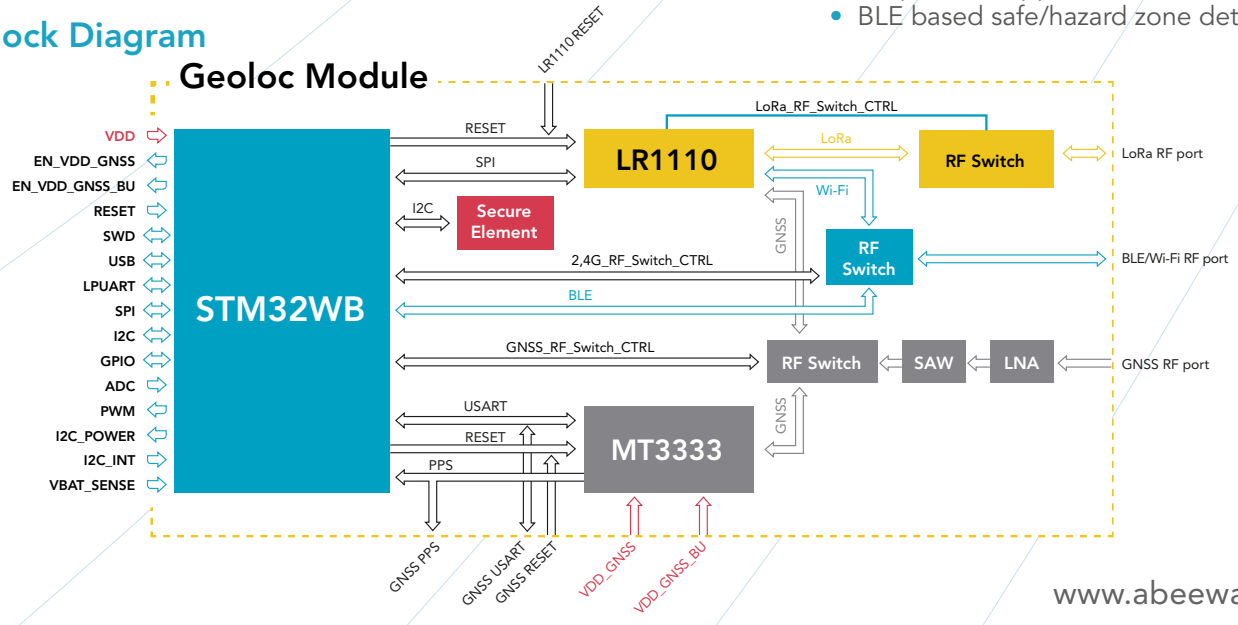
Additional features:

- Low-Power 32KHz clock, independent TCXOs for MCU and LR1110
- Power supply & battery monitoring with energy usage monitor
- Device management: RTC, BOR, timeouts, on chip temperature sensor
- Communication with the Android/iOS over BLE interface
- BLE scan function for inventory of tools and accessories
- Indoor BLE/WiFi fingerprinting with HERE Tracking (requires subscription)
- Indoor BLE based geolocation with Quuppa Intelligent Location (requires Quuppa infrastructure)
- BLE based safe/hazard zone detection

Product references

Product	SKU
LoRaWAN-BLE-WiFi-GNSS Geoloc module	MOABE5ZZ1WL-633
LoRaWAN-BLE-WiFi-GNSS Geoloc module evaluation board	MOABE5ZZ1WL-633EVK
LoRaWAN-BLE-WiFi-GNSS scanner Geoloc module	MOABE5ZZ1WL-857

Block Diagram



Pin Connection

Pin N°	Terminal Name	Type	Dscription
1	GND	Ground	Ground
2	NRST_MCU	I	Reset STM32WB
3	I2C_INT1	I/O	Interrupt for I2C Sensor
4	I2C_SCL	I/O	I2C Clock
5	I2C_SDA	I/O	I2C Data
6	I2C_POWER	I/O	Power Supply for I2C Sensor
7	GPIO1	I/O	General Purpose I/O
8	BOOT0	I	Boot Option
9	GND	Ground	Ground
10	ANT_2G4	RF	2,4 GHz Antenna (BLE/WiFi)
11	GND	Ground	Ground
12	GPIO2	I/O	General Purpose I/O
13	SWDIO	I/O	JTAG Data
14	SWCLK	I/O	JTAG Clock
15	SWO	I/O	JTAG Trace
16	GND	Ground	Ground
17	GND	Ground	Ground
18	GND	Ground	Ground
19	VDD	Power	Power supply for MCU and LoRa
20	VDD	Power	Power supply for MCU and LoRa
21	GND	Ground	Ground
22	GPIO3	I/O	General Purpose I/O
23	USB_DP	I/O	USB DP port
24	USB_DM	I/O	USB DM port
25	SPI_CS	I/O	SPI Chip Select
26	SPI_MOSI	I/O	SPI Data in
27	SPI_MISO	I/O	SPI Data out
28	SPI_SCK	I/O	SPI Clock
29	GPIO4	I/O	General Purpose I/O
30	VDD_GNSS	Power	Main Power Supply for GNSS IC
31	GND	Ground	Ground
32	VDD_GNSS_BU	Power	Back-Up Power Supply for GNSS IC
33	GND	Ground	Ground
34	GND	Ground	Ground
35	EN_VDD_GNSS	I/O	Enable Pin GNSS Power Supply
36	EN_VDD_ GNSS_BU	I/O	Enable Pin GNSS Back-Up Power Supply
37	GND	Ground	Ground
38	USART_TX_ GNSS	I/O	USART to GNSS IC
39	USART_RX_ GNSS	I/O	USART to GNSS IC
40	NRST_GNSS	I	Reset MT3333
41	GNSS_PPS	O	PPS Clock from MT3333
42	GND	Ground	Ground
43	GND	Ground	Ground
44	ANT_GNSS	RF	GNSS Antenna
45	GND	Ground	Ground
46	VBAT_SENSE	AI/O	Measure Battery Voltage
47	GPIO5	I/O	General Purpose I/O
48	LPUART_CTS	I/O	LPUART of STM32
49	GND	Ground	Ground
50	GND	Ground	Ground
51	NRST_LORA	I	Reset LR1110
52	GND	Ground	Ground
53	ANT_LORA	RF	LoRa Antenna
54	GND	Ground	Ground
55	GPIO6	I/O	General Purpose I/O
56	GPIO7	I/O	General Purpose I/O
57	LPUART_RTS	I/O	LPUART of STM32
58	PWM_CTRL	I/O	Load control
59	GPIO8	I/O	General Purpose I/O
60	GPIO9	I/O	General Purpose I/O
61	LPUART_TX	I/O	LPUART of STM32
62	LPUART_RX	I/O	LPUART of STM32
63	USR_ADC	AI/O	Analog IO
64	GPIO10	I	General Purpose I/O
65	I2C_INT2	I/O	Interrupt for I2C Sensor
66	GND	Ground	Ground

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PRODUCT SPECIFICATIONS

Abeeway is the market leader in low-power geolocation and a provider of disruptive IoT tracking solutions worldwide. Abeeway offers the most energy-efficient, reliable and flexible geolocation solutions using unique tracking devices and a smart multi-technology location system optimized for long-range and low-power-consumption LoRaWAN™ connectivity. The system makes precise geolocation power-efficient for various environments by combining high-precision GPS, our patented cloud computing technology Low Power GPS and ultra-low-consumption Wi-Fi sniffing technique. Offering the fastest time-to-market, Abeeway delivers a complete end-to-end solution for mass-market IoT sectors for asset tracking and management, process and decision optimization and personal safety.

Abeeway is a member of LoRa Alliance™ and is part of the Actility Group. Actility Group is a leading provider of LPWA IoT connectivity solutions, tools, business services and applications.