DFR1179 ZL9NSQ

Demo Board

Product manual（V2.0）

ZL9NSQ Data Sheet

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picture

Manual Revision History

version number	illustrate	date
1.0	First edition	2024-01-21
2.0	Corrected for new PCB version	2024-03-25

1 Functional description:

ZL9NSQ is a 3D attitude sensing system-level chip that integrates a three-axis accelerometer, a three-axis gyroscope, and a three-axis magnetometer. The chip integrates a 32-bit ARM® Cortex™-M4f+ microprocessor, self-developed IMU Motion Engine algorithm, a 2.4G wireless transceiver, and a packaged antenna. Advanced signal processing algorithms are used to process high-speed sampled internal sensor data to provide accurate and reliable quaternions, Euler angles, calibrated accelerations, and calibrated angular velocities.

The core of ZL9NSQ is the IMU Motion Engine software. The IMU Motion Engine software is a complete set of composite data fusion algorithms, including algorithms such as attitude solution, interference judgment, and online calibration, as well as data communication software. The data communication software is based on the ZLBUS unified communication protocol of Tianqi Technology to realize power management, parameter configuration, data communication and other functions. Users can communicate with the system host through the debugging software to obtain the required 3D posture information without programming. At the same time, users can also use the provided SDK using Python/C++ and other programming languages to realize data exchange with ZL9NSQ, which greatly reduces the difficulty of developing 3D posture applications.

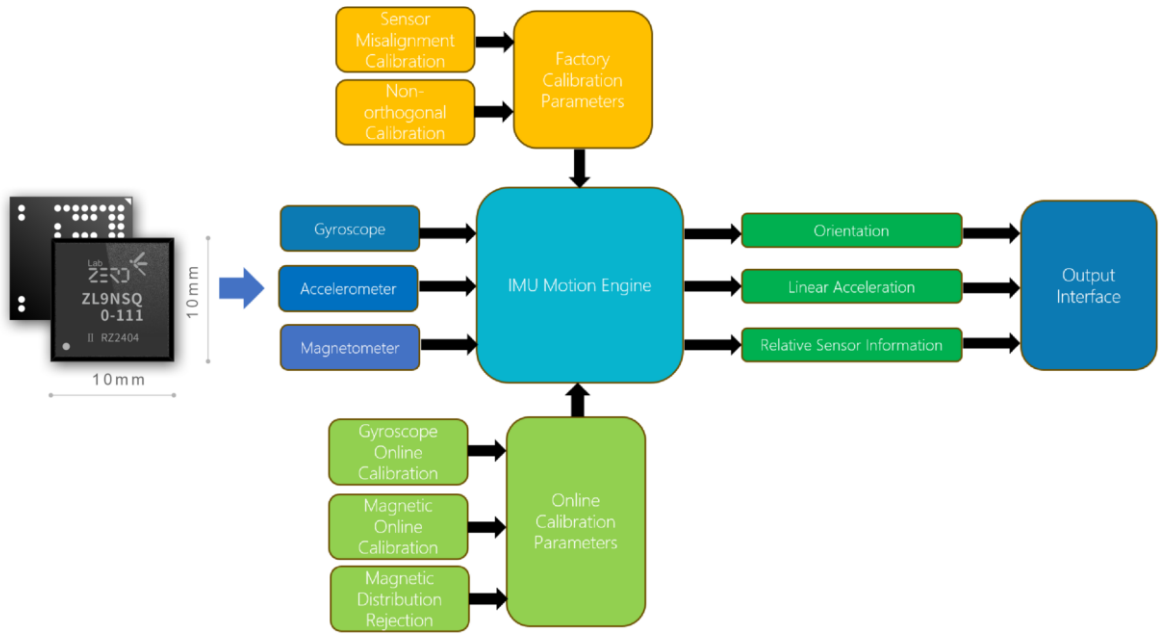


Figure 1 ZL9NSQ functional block diagram

2 Development Boards:

2.1 ZL9NSQ Development Boards

The SIP Demo board is a prototype verification board for rapid development and design. It includes a Type-C interface (only for power supply and lithium battery charging), a battery interface, a battery charging and discharging circuit, and an indicator LED to minimize the system circuit. If you need to know more functions, please refer to the "ZL9NSQ DataSheet".

Figure 2: Top view of ZL9NSQ

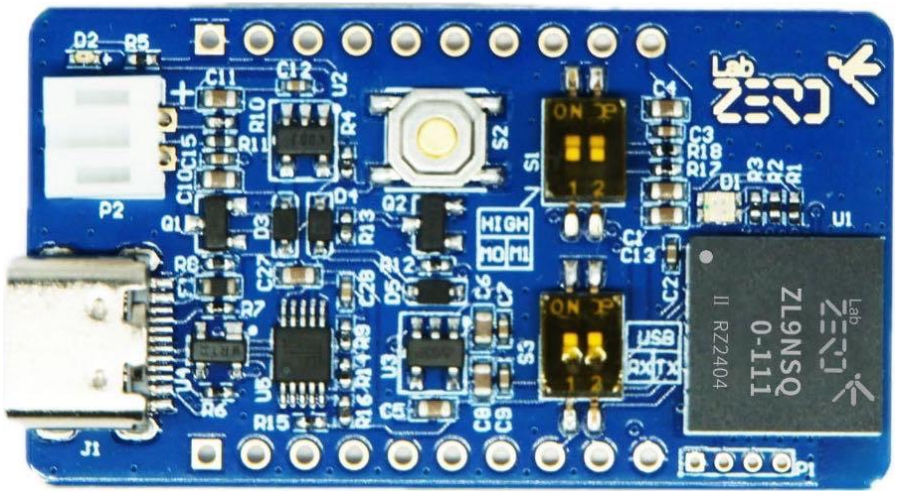
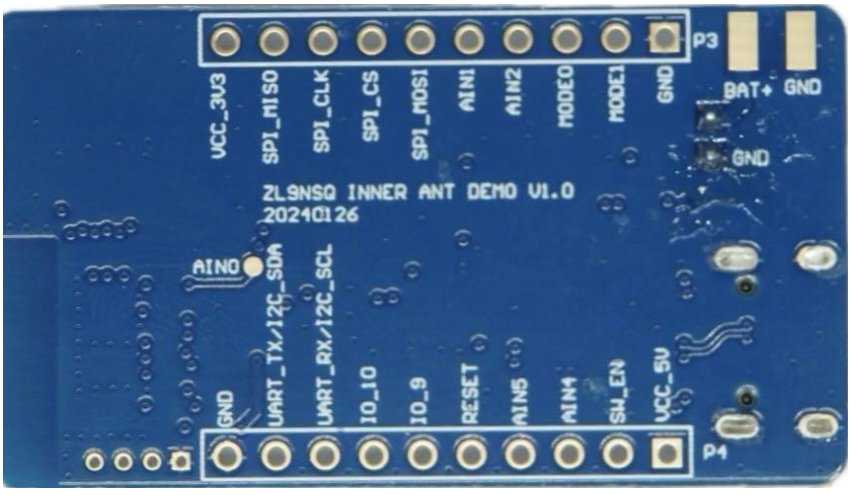


Figure 3 ZL9NSQ bottom view



2.2 ZL9NSQ Development board interface and pin description

Development board external interface

Development board interface	Describe

P2	Lithium battery interface, external 3.7V lithium battery
J1	USB Type-C port, battery charging and UART debugging port
P3	Module pin input and output function interface
P4	Module pin input and output function interface

Development board dip switch

Dip switch interface	Describe
Dip switch S1	Hardware mode configuration MODE0, MODE1 pull-up and pull-down configuration, by default, MODE0, MODE1 are NC, If you need to configure MODE0 and MODE1 to high level, set the S1 DIP switch to high level. Turning the dial upwards means a high level.
Dip switch S3	The default dip switch is down, that is, uart/I2C is connected to the P4 pin. The uart function of J1 USB is invalid. If you want to use the uart function of J1 USB, you need to turn the dip switch up.

Pin definition of socket P3	Describe
GND	Power Ground
MODE0	Hardware Mode Configuration
MODE1	Hardware Mode Configuration
AIN2	Analog Input (ADC)
AIN1	Analog Input (ADC)
SPI_CLK	SPI_CLK (master)
SPI_MISO	SPI_MISO (master)
SPI_MOSI	SPI_MOSI (master)
SPI_CS	SPI_CS (master)
VCC_3V3	Onboard LDO output power 3.3v

Pin definition of socket P4	Describe
VCC_5V	Power supply
SW_EN	System 3.3V power enable
AIN4	Analog Input (ADC)
AIN5	Analog Input (ADC)
RESET	Chip module reset pin, which can be disconnected by default
IO_9	Custom IO
IO_10	Custom IO
UART_TX / I²C_SCL	I2C Slave or UART
UART_RX / I²C_SDA	I2C Slave or UART
GND	GND

3.Instructions

3.1 powered by

The ZL9NSQ development board can be powered by a P2 battery, a USB Type-C power supply, or the VCC_5V of the development board P4.

Power the development board. If the P2 interface is connected to a battery, the charging circuit of the development board will charge the battery, and the LED D2 will light up yellow. When the battery is fully charged, D2 will go out.

In Bluetooth output mode, after powering on, long press the S2 button for 2 seconds, and the RGB tricolor light D1 will flash green to broadcast Bluetooth. If it is in SPI data transmission mode, after powering on, long press the S2 button for 2 seconds, and the RGB tricolor light D1 will flash blue (the Bluetooth function is disabled in this mode).

	LED status or color
After long pressing the S2 button	D1 lights up red at first, then keeps flashing green to broadcast Bluetooth
Bluetooth Broadcast	D1 flashes green
Bluetooth connection is successful (or in SPI data transmission mode)	D1 flashes blue light (flashing at 1HZ frequency)
Lithium battery charging	D2 has a long yellow light, and will automatically turn off when fully charged

3.2 Instructions for use of button S2

In the off state, press and hold the S2 button for about 2 seconds to turn on the module. In the on state, press and hold the S2 button for about 2 seconds to turn off the module. If the user does not use the S2 button, the user can control it through the SW_EN of the pin header P4. A high level turns on the module, and a low level turns off the module.

3.3 Module power supply description

The development board integrates lithium battery charge and discharge management (rated charging voltage 4.2V), as well as 1-way 3.3V LDO power management. External input power is used to charge the lithium battery through USB Type-C or the VCC_5V pin of pin header P4. In the charging state, LED light D2 is always yellow. When the battery is fully charged, LED light D2 automatically turns off. The VCC_3V3 pin of pin header P3 is the 3.3V output pin of the system LDO

3.4 Data interface

The development board supports three types of data transmission modes, namely Bluetooth, UART, and SPI. By default, the MODE0 and MODE1 of the DIP switch S1 are configured to low level, that is, the Bluetooth BLE data transmission mode, and the data communication follows the ZLBUS communication protocol. The relevant data interface configuration is as follows:

Mode1	**Mode0**	Command configuration interface	Data output interface
X	X	UART	RF
Low（default)	Low（default)	UART	RF
Low	High	I^2C	RF
High	Low	UART	SPI
High	High	I^2C	SPI

Table 1 Interface Configuration

Note: For more information about UART configuration commands, Bluetooth protocols, data packet formats, and SPI transmission data formats, please refer to ZLBUS user instructions and ZL9NSQ datasheet.