



FEATURE

The AI6108L module from AcSiP is designed in compliance with the IEEE 802.11ah standard, supporting data rates up to 32.5 Mbps (@BW=8MHz) with programmable operation between 902 MHz and 928 MHz.

This module has been designed to provide a simplified Wi-Fi HaLow connection to external hosts, while leveraging the latest WPA3 security protocol. It includes an ultra-long-reach PA, high linearity LNA, T/R switch, and 32 MHz crystal oscillator, making it an ideal choice for customers looking to replace their existing RF technology with Wi-Fi HaLow.

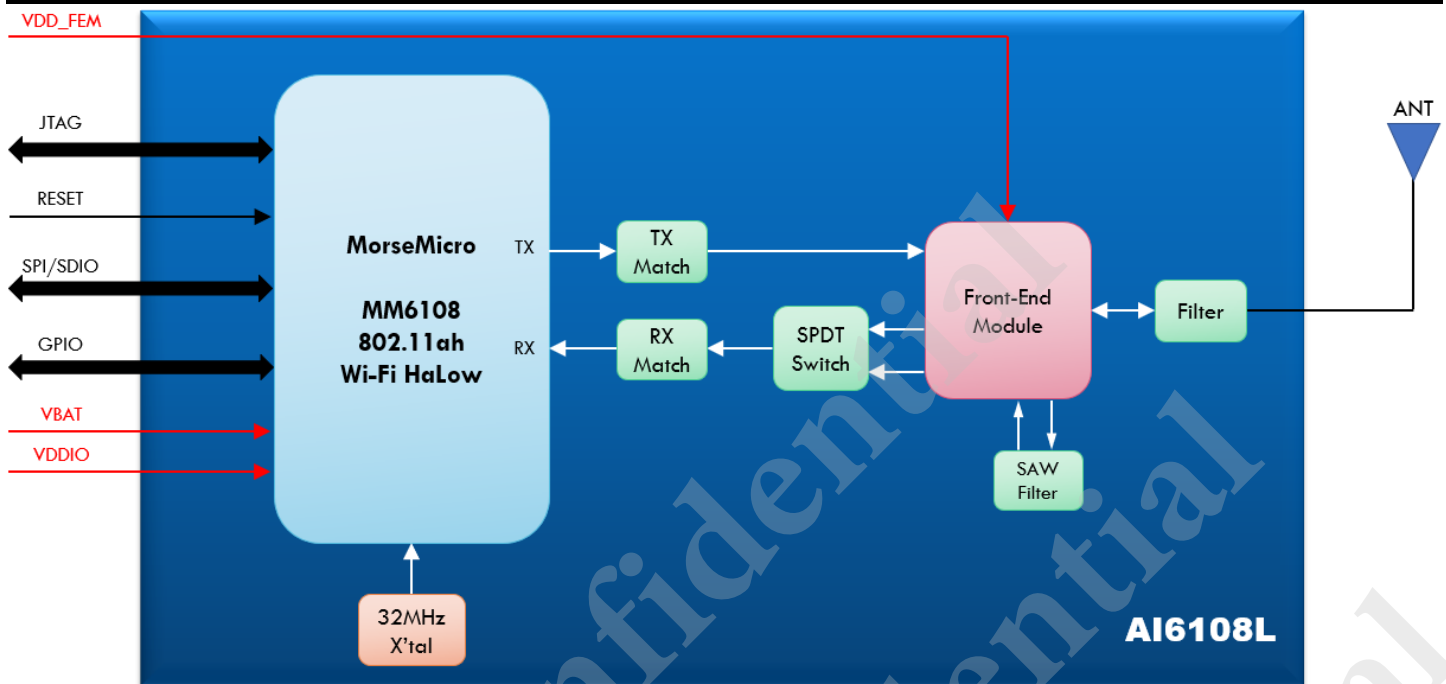
Overall, the AI6108L module provides customers who want to use Wi-Fi HaLow connection technology with a highly integrated, high-performance, and reliable solution.

Ultra-long-range, low-power Wi-Fi HaLow module for IoT applications:

- Channel bandwidth options of 1 / 2 / 4 / 8 MHz
- Single-stream max data rate of 32.5 Mbps @8MHz or 15 Mbps @4MHz channel
- Radio supporting Sub-1 GHz frequency bands
 - Frequency Range: 902-928 MHz
 - Max output power: 21 dBm
- 802.11ah OFDM PHY supporting WFA HaLow certification
 - BPSK & QPSK, 16-QAM & 64-QAM Modulation
 - Automatic frequency and gain control
 - Packet detect and channel equalization
 - Forward Error Correction (FEC) coding and decoding
 - Support for Modulation and Coding Scheme (MCS) rates MCS 0-7 and MCS 10
 - Support for 1 MHz and 2 MHz duplicate modes
 - Support for Traveling Pilots and Short Guard Intervals

- 802.11ah MAC supporting WFA HaLow certification
 - Support for STA and AP roles
 - Listen-Before-Talk (LBT) access with energy detect
 - 802.11 power save
 - 802.11 fragmentation and defragmentation
 - Packet aggregation
 - Power-Saving Target Wake Time (TWT) support for long battery life
 - Restricted Access Windows(RAW)
 - Automatic and manual MCS rate selection
- Support for various interface options
 - SDIO 2.0 compliant host/slave interface
 - 2xUARTs
- Power Management Unit (PMU) for various modes of operation
 - Power-down (interrupt driven wake)
 - Hibernate mode (internal / external wake)
 - Target wake time mode
 - Active receive / transmit mode
 - Integrated DC-DC converter supports a wide supply voltages, from 3.0V to 3.6V
- Wide spectrum of security features
 - AES encryption engine
 - Hardware support for SHA1 and SHA2 hash functions (SHA-256, SHA-384, SHA-512)
 - WPA3 including Protected Management Frames (PMF)
 - Opportunistic Wireless Encryption (OWE)

AI6108L Block Diagram



Technical Specification

Product Description	IEEE 802.11ah Sub-1 GHz Wi-Fi HaLow module
Main Chipset	Morse Micro MM6108
Frequency Range	902 – 928 MHz
Modulation	BPSK, QPSK, 16-QAM, 64-QAM
Channel Bandwidth	1 / 2 / 4 / 8 MHz
Host Interface	SDIO / SPI
Package	LGA type module with shielding cover
Dimension	18.5 mm x 14 mm x 2.15 mm (Max.)

Recommended Operation Conditions

Operating Voltage	<ul style="list-style-type: none"> ■ 3.3V
Temperature	<ul style="list-style-type: none"> ■ Operating : -30℃ ~ +85℃ ■ Storage : -40℃ ~ +105℃
Humidity	<ul style="list-style-type: none"> ■ Operating : 10 ~ 95% (Non-Condensing) ■ Storage : 5 ~ 95% (Non-Condensing)

PIN Assignment

Pin	Name	Type	Primary function	Alternate & Other Function(s)
1	GND	Power	Ground	
2	GND	Power	Ground	
3	GND	Power	Ground	
4	JTAG_TCK ^[1]	I	JTAG Clock	
5	JTAG_TDI ^[1]	I	JTAG Data In	
6	NC	NC	Do Not Connect	
7	JTAG_TMS ^[1]	I	JTAG Mode Select	
8	JTAG_TRST	I	JTAG Reset	
9	JTAG_TDO ^[2]	O	JTAG Data Out	
10	NC	I/O	Do Not Connect	
11	GPIO10 ^[2]	I/O	General Purpose IO10	
12	GND	Power	Ground	
13	GPIO9 ^[2]	I/O	General Purpose IO9	
14	GPIO8 ^[2]	I/O	General Purpose IO8	
15	GPIO7 ^[2]	I/O	General Purpose IO7	UART1_TX ^[4]
16	SDIO_D1 ^[3]	I/O	SDIO D1	SPI_INT
17	SDIO_D0 ^[3]	I/O	SDIO D0	SPI_MISO
18	SDIO_CLK	I/O	SDIO Clock	SPI_SCK
19	VDD_IO	Power	3.3V VDD_IO Supply	
20	GND	Power	Ground	
21	SDIO_CMD ^[3]	I/O	SDIO Command	SPI_MOSI
22	SDIO_D3 ^[3]	I/O	SDIO D3	SPI_CS
23	SDIO_D2 ^[3]	I/O	SDIO D2	
24	GPIO6 ^[2]	I/O	General Purpose IO6	UART1_RX ^[4]
25	VBAT	Power	3.3V VBAT Supply	
26	GND	Power	Ground	
27	GPIO5 ^[2]	I/O	General Purpose IO5	I2C_SCL ^[4]
28	GPIO4 ^[2]	I/O	General Purpose IO4	I2C_SDA ^[4]

29	GPIO3 ^[2]	I/O	General Purpose IO3	UART0_TX, PWM1_3 ^[4]
30	GPIO2 ^[2]	I/O	General Purpose IO2	UART0_RX, PWM1_2 ^[4]
31	GND	Power	Ground	
32	VDD_FEM	Power	3.3V Frontend Module Supply	
33	GPIO1 ^[2]	I/O	General Purpose IO1	PWM1_1 ^[4]
34	BUSY	O	Wi-Fi BUSY / General Purpose IO0	
35	RESET_N ^[5]	I	System Reset (active low)	
36	WAKE ^[5]	I	Wake	
37	GND	Power	Ground	
38	ANT	Analog	Antenna	
-	GND	Ground	Exposed ground pad - Connect to PCB GND	

[1] JTAG pins should be tied to GND via a 10k pull down resistor

[2] All unused GPIO should be tied to GND via a 10k pull down resistor

[3] All SDIO bus pins should be pull up with a 10-100k resistor as per the SDIO standard

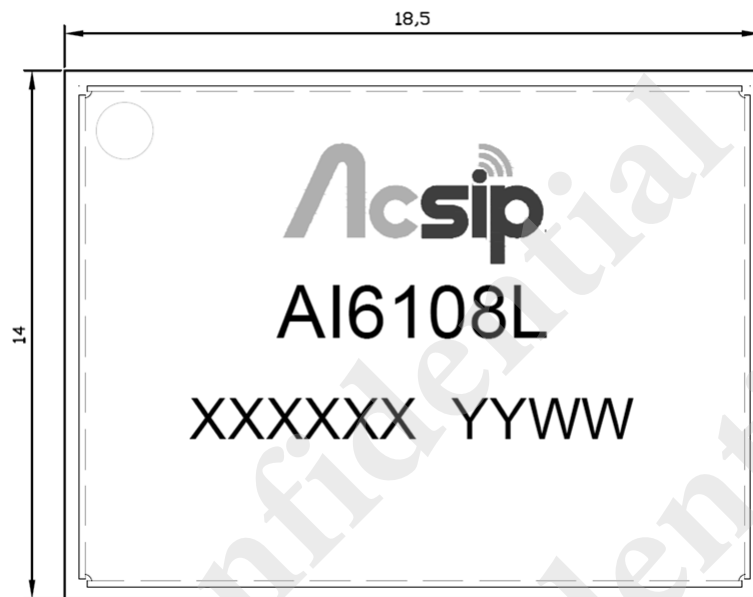
[4] Pending software support

[5] Supplied from VBAT domain. Other digital pins are driven by VDDIO domain.

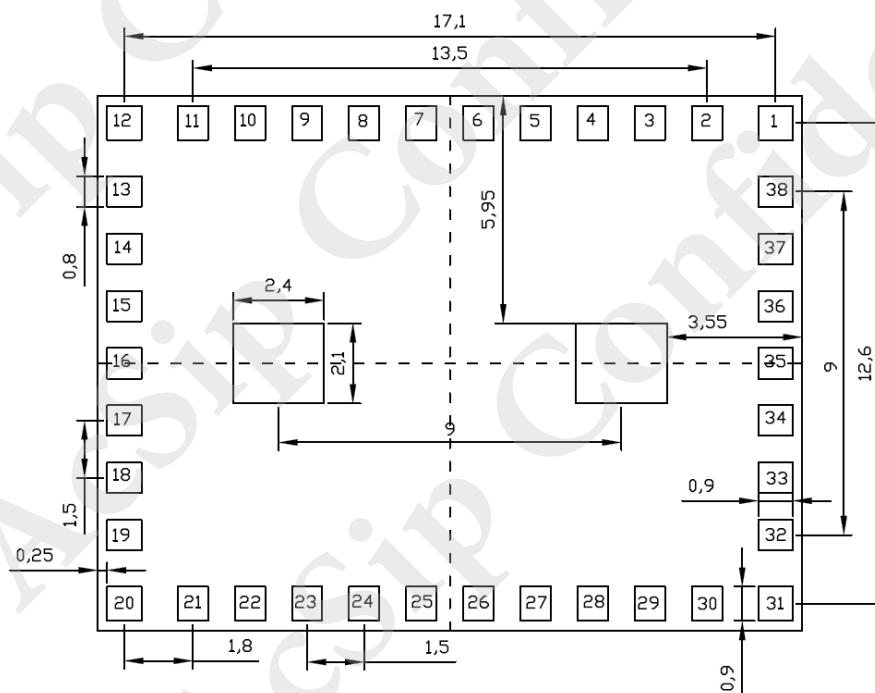


Mechanical Dimension

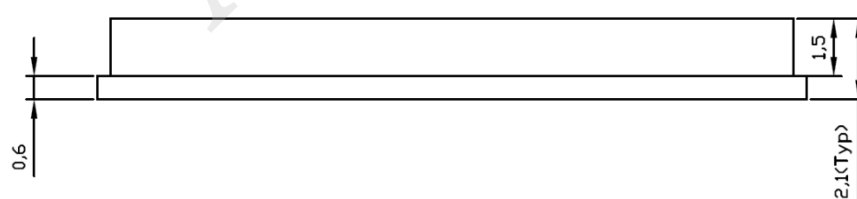
Unit: mm (Typ.)



Top View



Bottom View



Side View