ASKEY COMPUTER WAH0070-US Wi-Fi HaLow Module Owner's Manual

Contents

1 ASKEY COMPUTER WAH0070-US Wi-Fi HaLow Module
2 Product Information
3 Product Usage Instructions
4 FAQ
5 Scope and Purpose
6 Features
7 Hardware Specification
8 Mechanical Specifications
9 Module Engineering Suggestions
10 Module photo
11 Documents / Resources
11.1 References

ASKEY COMPUTER WAH0070-US Wi-Fi HaLow Module

Product Information

Specifications

- Model: WAH0070-US 802.11ah Module
- Revision: 7.0
- Manufacturer: Askey Computer Corp.
- Date: Dec 13, 2023
- Network Standards: IEEE 802.11ah
- Data Rate: Up to 15Mbps
- Channel Bandwidth: 1/2/4MHz
- Operating Frequency: 902-928 MHz
- Operating Temperature: -40 to 65°C
- Storage Temperature: -20 to 70°C
- Operating Humidity: 20% to 90% RH

Product Usage Instructions

1. General Description and Features

The WAH0070-US 802.11ah Module offers full IEEE 802.11ah compatibility with enhanced performance. It supports channel bandwidths of 1/2/4MHz and data rates of up to 15Mbps. The module provides WPA2/WPA3/WPS support, AP and STA modes, and mesh network support. It also enables the transmission of Standby Radio frames.

2. Hardware Specification

The module features a SPI host interface, LGA form factor, and is based on the Newracom/NRC7394-ST-Q1AS chipset. It supports modulation techniques like BPSK, QPSK, 16QAM, and 64QAM, with modulation technology OFDM. The operating frequency ranges from 902 to 928 MHz with channel bandwidth options of 1/2/4MHz. The operating temperature is -40 to 65°C, and storage temperature is -20 to 70°C.

3. Mechanical Specifications

The module's PCB mechanical drawing provides detailed dimensions for integration into various devices or systems.

4. Module Engineering Suggestions

The module footprint is essential for proper integration with other components or PCB designs. Ensure compatibility with the specified footprint dimensions.

5. Module Photo

A visual reference of the module design is provided for identification purposes.

FAQ

- **Q: What are the main interfaces supported by the WAH0070-US module?**
  - A: The main interfaces supported are UART and SPI for host communication, along with GPIO, AUXADC, I2C, and additional UART and SPI peripherals.
- **Q: What are the key network standards supported by the module?**
  - A: The module is compliant with IEEE 802.11ah standards, ensuring compatibility and performance in networking applications.

Revision List

Date	Revision	Comments
2023/06/09	1.0	1st Draft Version
2023/07/24	2.0	Add photo and footprint
2023/07/24	3.0	Add Storage temperature (Tape & Reel)
2023/09/01	4.0	Update TX power
2023/09/22	5.0	Update TX power
2023/10/13	6.0	Update Operating temperature
2023/12/13	7.0	Add power consumption

Scope and Purpose

This Purchasing Specification applies to the 802.11ah Module.

General Description

The WAH0070-US is the IEEE 802.11ah a Wi-Fi HaLow module. It is operating in the Sub 1GHz license-exempt band, offering longer range and lower power connectivity necessary for internet of things (IoT) applications. It enables streamlined data transfer interoperability with existing Wi-Fi networks while meeting up to 1Km long-range data transfer with low power onsumption requirements. It integrated Newracom NRC7394 and an external RF front-end module (FEM) which can increase transmission power up to 20 dBm.It outputs the accurate power for each channel through the temperature sensor integrated in the SoC and calibration at the factory. On-board serial flash can be used for user application programs and OTA software update and store MAC address, calibration data and information. It also can support execution in place (XIP) feature with a 16KB internal cache memory

Features

- Standard
  - Full IEEE 802.11ah compatibility with enhanced performance
  - 1/2/4 MHz channel bandwidth, up to 15Mbps data rate
  - WPA2/WPA3/WPS support
  - AP and STA, mesh network support
  - Support transmission of Standby Radio frame
- Main interface
  - UART and SPI support for host interface
  - Serial Flash (2Mbyte, optional 4Mbyte) for XIP
- Peripherals
  - GPIO, AUXADC
  - I2C, SPI and UART

Hardware Specification

General Specifications

Host Interfaces	SPI
Form factor	LGA module, 38ins
Chipset	Newracom/NRC7394-ST-Q1AS
Network Standards	IEEE 802.11ah
Modulation Techniques	BPSK,QPSK,16QAM,64QAM
Modulation Technology	OFDM
Supported Data Rate	MCS0~MCS7,MCS10
Network Architectures	AP Client, Iot applications
Antenna Type	External Antenna
Operating Frequency	902~928 MHz
Channel BandWidth	1/2/4MHz
Temperatures (AMBIENT)	Operating temperature -40 to 65 ℃ Storage temperature (Tape & Reel) -20 to 70 ℃
Humidity (non-condensing)	Operating Humidity: 20% to 90% RH Storage Humidity: less than 60% RH
OS Compatibility	TBD
Manufacturer ID Product ID	TBD
Dimension	18mm*13.5mm*2.1mm
Weight	TBD

Electronic Specification

Power consumption (VDD_IO=3.3V,VBAT=3.3V,VDD_FEM = 5.0V)					
Supplied Voltage	VDD_IO	VBAT	VDD_FEM	Unit	Note
Tx @ 20 dBm	2	140	303	mA	
Continuous Rx	1.8	22	0	mA	
Deep Sleep mode	0.00009	0.0035	0.038	mA	

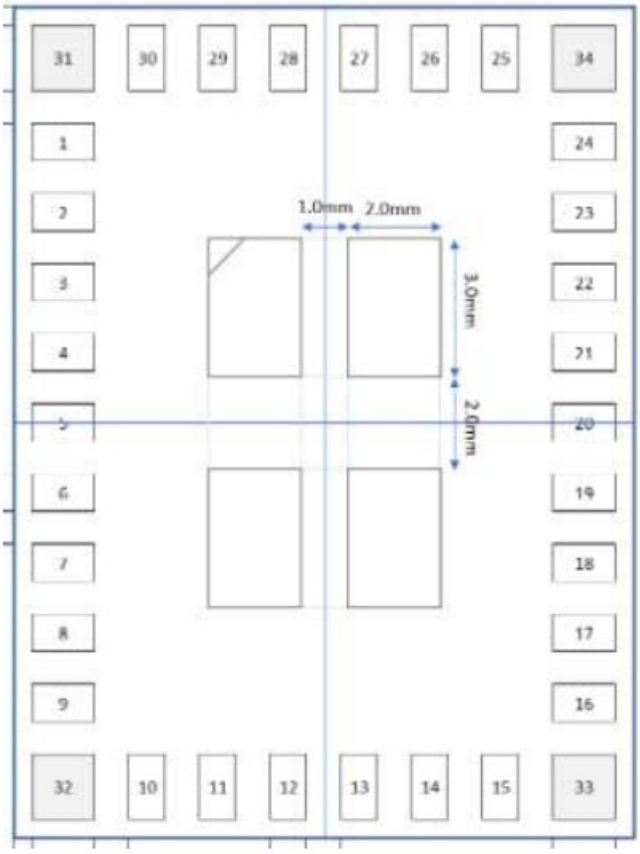
Radio Specification

- Condition: Temp=25°C

TX Output Power							**Note**
BW	MCS	Modulation/ Coding Rate	Min	Typical	Max	Unit	
1M	MCS10	BPSK1/2 rep.2x	16	18	20	dBm	
	MCS0	BPSK1/2	16	18	20	dBm	
	MCS1	BPSK3/4	16	18	20	dBm	
	MCS2	16QAM1/2	16	18	20	dBm	
	MCS3	16QAM3/4	16	18	20	dBm	
	MCS4	64QAM2/3	16	18	20	dBm	
	MCS5	64QAM3/4	16	18	20	dBm	
	MCS6	64QAM5/6	16	18	20	dBm	
	MCS7	64QAM3/4	16	18	20	dBm	
2M	MCS0	BPSK1/2	16	18	20	dBm	
	MCS1	BPSK3/4	16	18	20	dBm	
	MCS2	16QAM1/2	16	18	20	dBm	
	MCS3	16QAM3/4	16	18	20	dBm	
	MCS4	64QAM2/3	16	18	20	dBm	
	MCS5	64QAM3/4	16	18	20	dBm	
	MCS6	64QAM5/6	16	18	20	dBm	
	MCS7	64QAM3/4	16	18	20	dBm	
4M	MCS0	BPSK1/2	16	18	20	dBm	
	MCS1	BPSK3/4	16	18	20	dBm	VDD_FEM 5 .0V
	MCS2	16QAM1/2	16	18	20	dBm	
	MCS3	16QAM3/4	16	18	20	dBm	
	MCS4	64QAM2/3	16	18	20	dBm	
	MCS5	64QAM3/4	16	18	20	dBm	
	MCS6	64QAM5/6	16	18	20	dBm	
	MCS7	64QAM3/4	16	18	20	dBm	
Receive Sensitivity							**Note**
BW	MCS	Modulation/ Coding Rate	11ah spec dBm			Unit	
	MCS10	BPSK1/2 rep.2x	-98			dBm	
	MCS0	BPSK1/2	-95			dBm	

1M	MCS1	BPSK3/4	-92	dBm	PER<10% 256bytes
	MCS2	16QAM1/2	-90	dBm	
	MCS3	16QAM3/4	-87	dBm	
	MCS4	64QAM2/3	-83	dBm	
	MCS5	64QAM3/4	-79	dBm	
	MCS6	64QAM5/6	-78	dBm	
	MCS7	64QAM3/4	-77	dBm	
2M	MCS0	BPSK1/2	-92	dBm	
	MCS1	BPSK3/4	-89	dBm	
	MCS2	16QAM1/2	-87	dBm	
	MCS3	16QAM3/4	-84	dBm	
	MCS4	64QAM2/3	-80	dBm	
	MCS5	64QAM3/4	-76	dBm	
	MCS6	64QAM5/6	-75	dBm	
	MCS7	64QAM3/4	-74	dBm	
4M	MCS0	BPSK1/2	-89	dBm	
	MCS1	BPSK3/4	-86	dBm	
	MCS2	16QAM1/2	-84	dBm	
	MCS3	16QAM3/4	-81	dBm	
	MCS4	64QAM2/3	-77	dBm	
	MCS5	64QAM3/4	-73	dBm	
	MCS6	64QAM5/6	-72	dBm	
	MCS7	64QAM3/4	-71	dBm	

Pin Assignment for WAH0070-US



BOT view

Pin	Name	Type	Primary function	Alternate & Other Function(s)
1	NC	I/O	Do Not Connect	
2	GPIO12	I/O	UART1_TXD	TDO
3	GPIO13	I/O	UART1_RXD	TDI
4	GPIO14	I/O	UART1_CTS	
5	GPIO20	I/O	UART1_RTS	
6	GPIO19	I/O	MODE	
7	GPIO17	I/O	ADC0	
8	GPIO18	I/O	ADC1	
9	GPIO25	I/O		
10	VDD_IO	Power(1.68V~3.6V)	VDD_IO Supply	
11	GND	Power	Ground	
12	GPIO9	I/O	UART0_RXD	
13	GPIO8	I/O	UART0_TXD	
14	GND	Power	Ground	
15	VBAT	Power (2.4V~3.6V)	VBAT Supply	
16	RST	I	PMS_POR	
17	GPIO28	I/O	HSPI_CS	

18	GPIO29	I/O	HSPI_MISO	
19	GPIO6	I/O	HSPI_MOSI	
20	GPIO7	I/O	HSPI_CLK	
21	GPIO30	I/O	HSPI_EIR	
22	GPIO10	I/O	TMS	SWD_IO
23	GPIO11	I/O	TCK	SWD_CLK
24	NC	NC	Do Not Connect	
25	VDD_FEM	Power(3.15V~5.2V)	PA power Supply	
26	GND	Power	Ground	
27	NC	I/O	Do Not Connect	
28	NC	I/O	Do Not Connect	
29	GND	Power	Ground	
30	RF_ANT	Analog	Antenna	
31	GND	Power	Ground	
32	GND	Power	Ground	
33	GND	Power	Ground	
34	GND	Power	Ground	
35	GND	Power	Ground	
36	GND	Power	Ground	
37	GND	Power	Ground	
38	GND	Power	Ground	

Mechanical Specifications

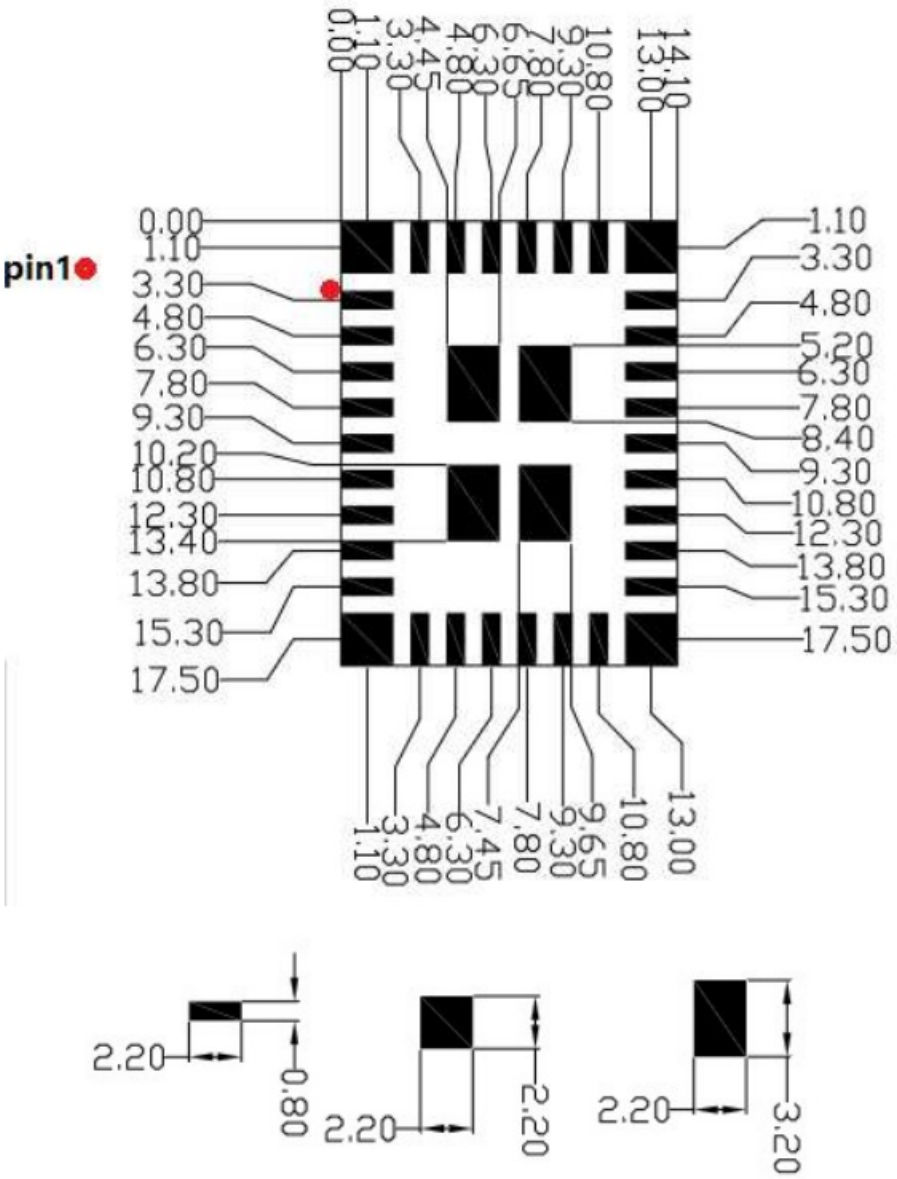
PCB Mechanical Drawing:

13.5 mm x 18.0mm x 2.1mm

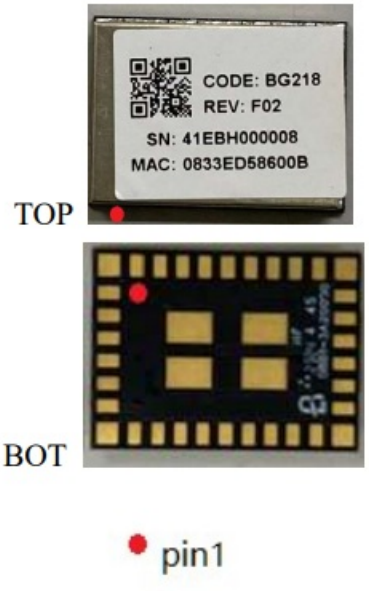
Module Engineering Suggestions

Footprint

Unit：mm



Module photo



Documents / Resources

	ASKEY COMPUTER WAH0070-US Wi-Fi HaLow Module [pdf] Owner's Manual WAH0070-US, WAH0070-US Wi-Fi HaLow Module, Wi-Fi HaLow Module, HaLow Module, Module

References

- **User Manual**

Manuals+, **Privacy Policy**

This website is an independent publication and is neither affiliated with nor endorsed by any of the trademark owners. The "Bluetooth®" word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. The "Wi-Fi®" word mark and logos are registered trademarks owned by the Wi-Fi Alliance. Any use of these marks on this website does not imply any affiliation with or endorsement.