AS776-1 Bluetooth module Reference manual

FCC ID:2AM6KAS776-1

Revision History

NO.	changes	Revision	Date
1	Initial release	V1.0	2017-06-10

Disclaimer

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●Description

IIC-tek BT BLE module is base on ST（**BlueNRG-1**）。It can use for local wireless communication. BlueNRG-1 is a very low power Bluetooth low energy (BLE) single-mode system-onchip, compliant with Bluetooth specification.Module can working on standard national regulation in the 2.4G ISM Band,Support GFSK Modulation mode,Power output support H/L GAIN MODE.maximum +8dBm power output，It provides 96 dB link budgets with excellent link reliability。

Module can working on the passthrough mode and Advertising mode after power on，it provides auto connect mode and scan mode when your App was working by mobile equipment;Passthrough mode:module can communication with mobile equipment by uart,also can set the parameter and controller the module.

Module can read and measurement the Peripheral device parameters and send it to the mobile equipment;

The AS776-1 bluetooth pass-through module extends the features of award-winning network processor, enabling the usage of the embedded Cortex M0 for running the user application code. It includes 160 KB of programming Flash memory, 24 KB of static RAM memory with retention (two 12 KB banks) and SPI, UART, I²C standard communication interface peripherals. It also features multifunction timers, watchdog, RTC and DMA controller.

An ADC is available for interfacing with analog sensors, and for reading the measurement of the integrated battery monitor. A digital filter is available for processing a PDM stream.

module offers the same excellent RF performance of the BlueNRG radio, and the integrated high efficiency DC/DC converter keeps the same ultra-low power characteristics, if working on the sleep mode, current consumption allowing a further increase in the battery lifetime of the applications.
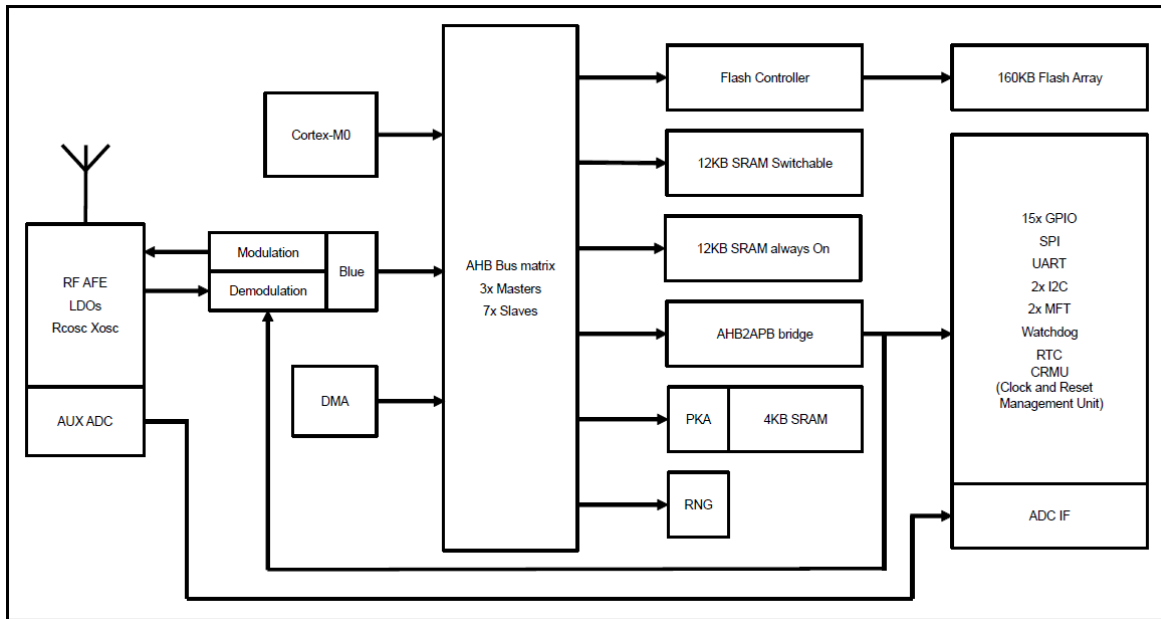
Feature：

1. Module provide a communication interface with user equipment by usart;Usart default baud rate is 9600bps;

2. Usart support maximum 256byte Byte package length。

3. In the high spend passthrough mode,transceiver spend up to 4Kbit/S(@0dBm,3V)。

4. Support AT instruction reset the module，and acquire the equipment MAC。

5. Support AT instruction set the BT Advertising interval;

6. support AT instruction set the transmitted power，support use define the Advertising data，define the equipment identification code,define the USART baud rate,difine the module name(also to store the data when power off);

7. Operating supply voltage from （1.7 to 3.6）V, support battery voltage measurement.

8. Support link states indicate,USART transmitted data states indicate。

9. RF power output adopt BALUN,which uses this technique is more safe with a stable performance.

10. Ultra low power when the mode in the standby mode，HALT mode limit current 0.4uA，module field power dissipation(Characteristics measured over recommended operating conditions unless otherwise specified. Typical value are referred to TA = 25 °C, VBAT = 3.0 V. All performance data are referred to a 50 Ω antenna connector, via reference design, QFN32 package version)：

Module sta	Average	Test condition
Deep sleep	0.4uA	EN set to high level;
Advertising	70uA	Advertising interval 500ms
	409uA	Advertising interval 250ms
Connecting	510uA	(20bytes, connecting interval 250ms)
	609uA	(20bytes, connecting interval500ms)

◆**Description：**

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1.Measuring method：Use the multimeter uA or mA,power supply is 3.3V (@ -2 dBm).

2.The application setting are different, the actual current changes obviously, the above data is for reference only.

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┌──────────────────────────────────────────────────────────────────────────────┐
│                         ┌──────────┐              ┌─────────────┐   ┌──────────────┐ │
│                         │Cortex-M0 │              │Flash Controller│  │160KB Flash Array│ │
│                         └──────────┘              └─────────────┘   └──────────────┘ │
│        Y                                           ┌──────────────┐   ┌──────────────┐ │
│       ┌────────┐  ┌──────────┐ ┌────┐ ┌──────────┐│12KB SRAM Switchable│ │  15x GPIO    │ │
│       │ RF AFE │  │Modulation│ │Blue│ │AHB Bus matrix│                │   │  SPI        │ │
│       │ LDOs   │  │Demodulation│└────┘ │3x Masters │┌──────────────┐  │  UART       │ │
│       │Rcosc Xosc│└──────────┘        │7x Slaves  ││12KB SRAM always On│ │  2x I2C     │ │
│       └────────┘                       │          │└──────────────┘  │  2x MFT     │ │
│       ┌────────┐  ┌──────────┐        │          │┌──────────────┐  │  Watchdog   │ │
│       │AUX ADC │  │  DMA     │        │          ││AHB2APB bridge│  │  RTC        │ │
│       └────────┘  └──────────┘        │          │└──────────────┘  │  CRMU       │ │
│                                       │          │┌────┬─────────┐  │(Clock and Reset│ │
│                                       │          ││PKA │4KB SRAM │  │Management Unit)│ │
│                                       │          │└────┴─────────┘  └──────────────┘ │
│                                       │          │┌──────────┐     ┌──────────────┐ │
│                                       └──────────┘│   RNG    │     │    ADC IF     │ │
│                                                   └──────────┘     └──────────────┘ │
└──────────────────────────────────────────────────────────────────────────────┘
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Application：

Automotive products

Smart Watches

Fitness, wellness and sports

Consumer medical

Security/proximity

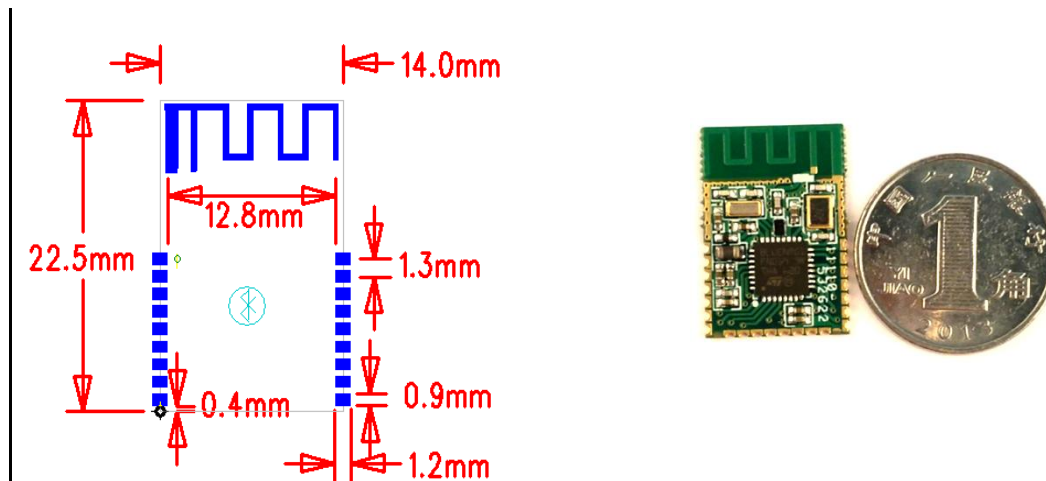Remote control

Home and industrial automation

Assisted living

Mobile phone peripherals

Lighting

PC peripherals

●Package and Pin information

Module:AS776-1（ 4 layers with FCC,CE,ROHS,BQB certification ）

▲ Notice：The green circle is first PIN 。

Pin No.:	Pin name	I/O	description
Pin1	I2C_SDA	IO	IIC _SDA,GPIO;
Pin2	I2C_SCL	O	IIC _SCL,GPIO;
Pin3	UART_RX	IO	USART_RX,GPIO;
Pin4	UART_TX	IO	USART_TX,GPIO;
Pin5	PC4	IO	ONLY GPIO;
Pin6	PC5	IO	ONLY GPIO;
Pin7	PC6	IO	ONLY GPIO;
Pin8	PA0/SWIN	IO	GPIO, programmer pin SWIN;
Pin9	PA1/NRST	IO	Don't use this pin,is reset PIN;
Pin10	VDD	---	Power supply（ 1.7V-3.6V ）
Pin11	PD1	IO	ONLY GPIO;
Pin12	PD2	IO	ONLY GPIO;

Pin13	PD3	IO	ONLY GPIO;
Pin14	PB0	IO	ONLY GPIO;
Pin15	PB1	IO	ONLY GPIO;
Pin16	PB2	IO	ONLY GPIO;
Pin17 Pin18	GND	---	POWER ground, GND

BT TO Usart pass-through module description:

1. Usart baud,data bit,parity,and stop bit set : baud rate 9600bps ;   data bit 8;   parity bit:0;   stop bit :1.

BT data service【 UUID：0x9981】

UUID	Executable operation	byte	Default	Notice
FFE9 (handle: 0x00xx)	Write/Without_Resp	20	N	The data will be send to USART

USART data service【 UUID：0x9982】

UUID	Executable operation	byte	Default	Notice
FFE4 (handle: 0x00XX)	Notify	20	N	Data input from serial port will be sent to mobile devices in this channel

FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This device has been evaluated and shown compliant with the FCC RF Exposure limits under fixed exposure conditions (antennas are greater than 20cm from a person's body) when installed in certain specific OEM configurations.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Due to missing shielding the module is strictly limited to integration by the Grantee himself or his dedicated OEM integrator under control of the Grantee. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

The outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: 2AM6KAS776-1 Or Contains FCC ID: 2AM6KAS776-1"

When the module is installed inside another device, the user manual of this device must contain below warning statements;

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product

IMPORTANT NOTE:

This device is intended only for OEM integrators under the following conditions:

(1) According to FCC Part 15 Subpart C Section 15.212, the radio elements of the modular transmitter must have their own shielding. However, due to there is no shielding for this BT module, this module is granted as a Limited Modular Approval.

(2) This module has been designed to operate with PCB antenna having a maximum gain of 0dBi.

(3) Integration is typically strictly restricted to Grantee himself or dedicated OEM integrators under control of the Grantee.

The module will be responsible to satisfy SAR/RF Exposure requirements, when the module integrated into any (portable, mobile, fixed) host device.

This module is intended for OEM integrator only and the OEM integrators and instructed to ensure that the end user has no manual instructions to remove or install the device.

The OEM integrator is still responsible for the FCC compliance requirement of the end product, which integrates this module.

The module has no shielding and tested stand alone. This module is tested and approved as Limited modular approval with stand alone configuration, any OEM incorporated this radio module into any system are require additional testing and evaluation.

The module is only certified with the installed antenna. Any change of the antenna will void the certification.