AXM23001
802.11b/g/n IoT WiFi Module Datasheet

Model Name: AXM23001

Document No: AXM23001/03/10/2016

Key Features

- Integrated 2.4GHz, IEEE 802.11b/g/n compatible WiFi connectivity
- Integrated PCB antenna (1T1R) and U.FL connector with external antenna
- Supports 802.11e QoS Enhancement (WMM)
- Supports 802.11i security
- Supports WiFi WPS
- Supports WiFi Direct
- Supports WiFi Station and SoftAP mode
- Supports Simple Config API for Mobile APP
- Supports NFC Tag
- ARM Cortex M3, 166MHz
- 1MB ROM
- 512KB RAM
- 2MB SDRAM
- 2MB SPI flash memory
- Hardware security accelerator for secure Wi-Fi and SSL client
- 2 UART interfaces
- 1 SPI interface
- 1 I2S or PCM interface
- 4 PWM with configurable duration and duty cycle from 0~100%
- 3 I2C interfaces
- 1 ADC
- Up to19 GPIOs pins
- Supports External Timer Trigger Event (ETE) with configurable period in low power mode
- Supports real-time OS
- Single operating voltage: 3.3V typical
- Board size: 22.25mm x 19.0mm x 2.62 mm surface mountable module

Applications

- IoT gateway for BT, Zigbee, Zwave, …
- IoT device for Smart home or Sensor network
- Serial to WiFi Device Server
- WiFi Speaker
- WiFi Remote Control/Monitor
- Zigbee to WiFi Bridge
- WiFi Network Camera
- WiFi RFID
- SPI to WiFi Bridge
- WiFi Internet Radio

AXM23001 IoT WiFi module is a 2.4GHz 802.11b/g/n (1T1R) which provides a complete WiFi module solution with various user or host interfaces supported. The module is a surface mountable module with castellated mounting holes which offers smaller-form-factor, lower-cost, pre-calibrated RF front-end and pre-certified IoT WiFi module to free the user from RF and antenna design tasks and regulatory compliance testing, ultimately providing quicker time to market. The user can design his host module with desired function and interface circuits and assemble it with the AXM23001 IoT WiFi module through the castellated mounting holes.

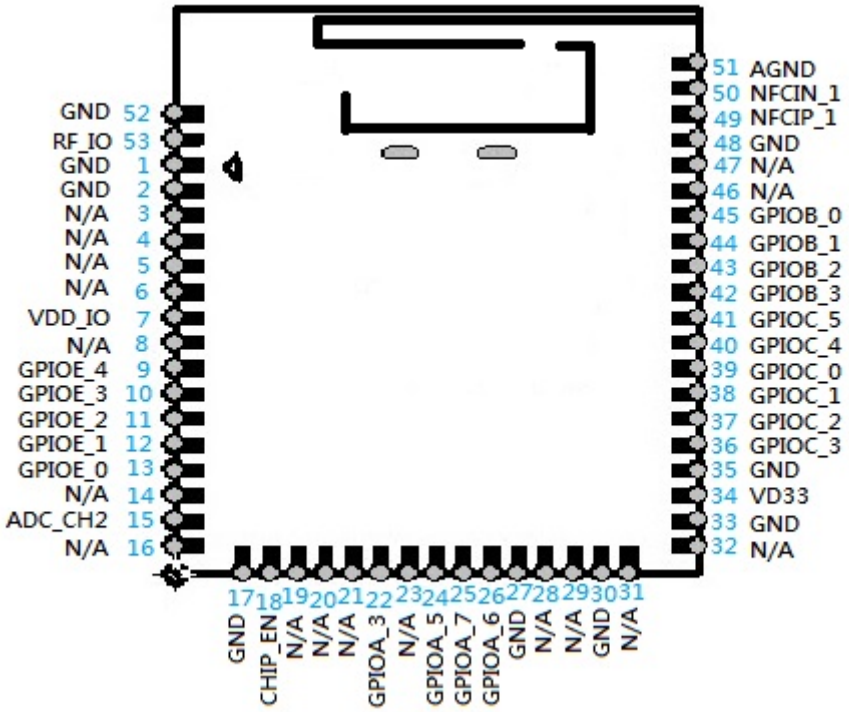
Product Specification

Features		Specifications
Microprocessor		ARM Cortex M3 up to 166Mhz
Memory		• 1MB ROM • 512KB SRAM • 2MB SDRAM • 2MB SPI flash memory
Data Rate		IEEE 802.11b: 1, 2, 5.5 and 11 Mbps IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps IEEE 802.11n: 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65 and 72.2Mbps in 20MHz BW 15, 30, 45, 60, 90, 120, 135 and 150Mbps using in 40MHz BW
Radio	Frequency Range	USA(FCC), Europe(ETSI), Worldwide Domain
	Modulations	802.11b/g/n
	Antenna	Integrated PCB antenna and U.FL connector for external antenna
RF Receiver Max Receive Level		802.11b DSSS: -4dBm 802.11b CCK: -10dBm 802.11g OFDM: -20dBm 802.11n : -20dBm
RF Receiver Min Receive Sensitivity		802.11b: -80dBm @ 1 Mbps; -80dBm @ 2 Mbps; -79dBm @ 5.5 Mbps; -76dBm @ 11 Mbps 802.11g: -82dBm @ 6 Mbps; -81dBm @ 9 Mbps; -79dBm @ 12 Mbps; -77dBm @ 18 Mbps; -74dBm @ 24 Mbps; -70dBm @ 36 Mbps; -66dBm @ 48 Mbps; -65dBm @ 54 Mbps 802.11n (20MHz): -82dBm @ MCS0; -79dBm @ MCS1; -77dBm @ MCS2; -74dBm @ MCS3; -70dBm @ MCS4; -66dBm @ MCS5; -65dBm @ MCS6; -64dBm @ MCS7 802.11n (40MHz): -79dBm @ MCS0; -76dBm @ MCS1; -74dBm @ MCS2; -71dBm @ MCS3; -67dBm @ MCS4; -63dBm @ MCS5; -62dBm @ MCS6; -61dBm @ MCS7
RF Output Power		802.11b: 16 ±2dBm; 802.11g: 14 ± 2dBm; 802.11n: 13 ± 2dBm
Security		WEP-64/128, WPA, WPA2
Power Saving		• Deep Sleep Mode • Deep Standby Mode • Sleep Mode
Network Interface		802.11b/g/n WiFi with 10/100M Ethernet through provided SPI interface for backup connection
Protocols Supported		Supports TCP, UDP, ICMP, IGMP, IPv4, DHCP, ARP, DNS, SMTP, SNTP, RFC2217 and HTTP in software
Real-Time OS		FreeRTOS
Management		Web Server, Serial Console, Windows application utility
OTA Firmware Update		Web Server, Windows application utility through TFTP protocol

Features		Specifications
Operating Voltage		3.3V typical
Average Power Consumption at 3.3V Power Input in Serial to WiFi Device Server Application	WLAN mode, High Performance @ 166MHz, UART data transfer at 921 Kbps.	90.8mA or 299.64 mW typical
	WLAN mode, High Performance @ 166MHz, UART data transfer at 115.2 Kbps.	85mA or 280.5 mW typical
	WLAN mode, High Performance @ 166MHz, UART is idle and no data in transfer.	38mA or 125.4 mW typical

	WLAN mode, High Performance @ 166MHz, AXM23001 WiFi module in Station of Sleep mode .	2.7mA or 8.91 mW typical
	WLAN mode, High Performance @ 166MHz, AXM23001 WiFi module in Station of Deep Standby mode.	0.07mA or 0.23 mW typical
	WLAN mode, High Performance @ 166MHz, AXM23001 WiFi module in Station of Deep Sleep mode.	0.02mA or 0.06 mW typical
Peak Current at 3.3V power input when AXM23001 WiFi module is operating site survey function in Station Mode.		500 mA
Electromagnetic Compatibility	USA (FCC)	Pre-Tested
	Europe (CE)	Pre-Tested
Operating Temperature		-20℃ to +70℃

Pinout Diagram of Castellated Mounting Holes



Pin Description of Castellated Mounting Holes

Pin type abbreviation:

P: Power input
G: Ground
B: Bidirectional signal pin
I: Input signal pin
O: Output signal pin
N/A: Not connected

Module Pin No	Pin Name	Pin Type	Description
1	GND	G	Ground
2	GND	G	Ground
3	N/A	N/A	Not connected
4	N/A	N/A	Not connected
5	N/A	N/A	Not connected
6	N/A	N/A	Not connected
7	VDD_IO	P	GPIOE and GPIOC group IO power
8	N/A	N/A	Not connected
9	GPIOE_4	B	GPIO pin, please refer to Pin Function Table
10	GPIOE_3	B	GPIO pin, please refer to Pin Function Table
11	GPIOE_2	B	GPIO pin, please refer to Pin Function Table
12	GPIOE_1	B	GPIO pin, please refer to Pin Function Table
13	GPIOE_0	B	GPIO pin, please refer to Pin Function Table
14	N/A	N/A	Not connected
15	ADC_CH2	I	AD converter input
16	N/A	N/A	Not connected
17	GND	G	Ground
18	CHIP_EN	I	Chip enable
19	N/A	N/A	Not connected
20	N/A	N/A	Not connected
21	N/A	N/A	Not connected
22	GPIOA_3	B	GPIO pin, please refer to Pin Function Table
23	N/A	N/A	Not connected
24	GPIOA_5	B	GPIO pin, please refer to Pin Function Table
25	GPIOA_7	B	GPIO pin, please refer to Pin Function Table
26	GPIOA_6	B	GPIO pin, please refer to Pin Function Table
27	GND	G	Ground
28	N/A	N/A	Not connected
29	N/A	N/A	Not connected
30	GND	G	Ground
31	N/A	N/A	Not connected
32	N/A	N/A	Not connected
33	GND	G	Ground
34	VD33	P	3.3V power input
35	GND	G	Ground
36	GPIOC_3	B	GPIO pin, please refer to Pin Function Table
37	GPIOC_2	B	GPIO pin, please refer to Pin Function Table
38	GPIOC_1	B	GPIO pin, please refer to Pin Function Table
39	GPIOC_0	B	GPIO pin, please refer to Pin Function Table
40	GPIOC_4	B	GPIO pin, please refer to Pin Function Table
41	GPIOC_5	B	GPIO pin, please refer to Pin Function Table
42	GPIOB_3	B	GPIO pin, please refer to Pin Function Table
43	GPIOB_2	B	GPIO pin, please refer to Pin Function Table
44	GPIOB_1	B	GPIO pin, please refer to Pin Function Table
45	GPIOB_0	B	GPIO pin, please refer to Pin Function Table
46	N/A	N/A	Not connected
47	N/A	N/A	Not connected

48	GND	G	Ground
49	NFCIP_1	I	NFC input differential signal
50	NFCIN_1	I	NFC input differential signal
51	AGND	G	Ground
52	GND	G	Ground
53	RF_IO	B	RF signal

Pin Function Table

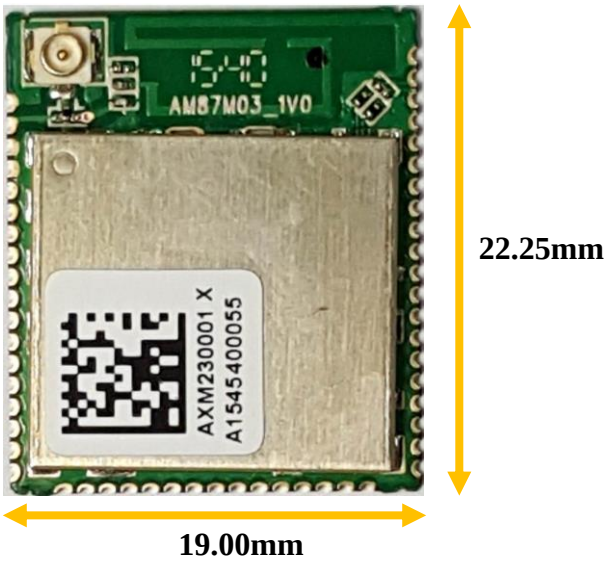
Pin Name	JTAG	UART	I2C	SPI	I2S	PCM
GPIOA_3		UART0_RTS				
GPIOA_5		UART0_CTS				
GPIOA_6		UART0_IN				
GPIOA_7		UART0_OUT				
GPIOB_0		UART_LOG_OUT				
GPIOB_1		UART_LOG_IN				
GPIOB_2			I2C3_SCL			
GPIOB_3			I2C3_SDA			
GPIOC_0		UART0_IN		SPI0_CS0	I2S1_WS	PCM1_SYNC
GPIOC_1		UART0_CTS		SPI0_CLK	I2S1_CLK	PCM1_CLK
GPIOC_2		UART0_RTS		SPI0_MOSI	I2S1_SD_TX	PCM1_OUT
GPIOC_3		UART0_OUT		SPI0_MISO	I2S1_MCK	PCM1_IN
GPIOC_4			I2C1_SDA	SPI0_CS1	I2S1_SD_RX	
GPIOC_5			I2C1_SCL	SPI0_CS2		
GPIOE_0	JTAG_TRST	UART0_OUT	I2C2_SCL	SPI0_CS0		PCM0_SYNC
GPIOE_1	JTAG_TDI	UART0_RTS	I2C2_SDA	SPI0_CLK		PCM0_CLK
GPIOE_2	JTAG_TDO	UART0_CTS	I2C3_SCL	SPI0_MOSI		PCM0_OUT
GPIOE_3	JTAG_TMS	UART0_IN	I2C3_SDA	SPI0_MISO		PCM0_IN
GPIOE_4	JTAG_CLK		I2C3_SCL	SPI0_CS1		

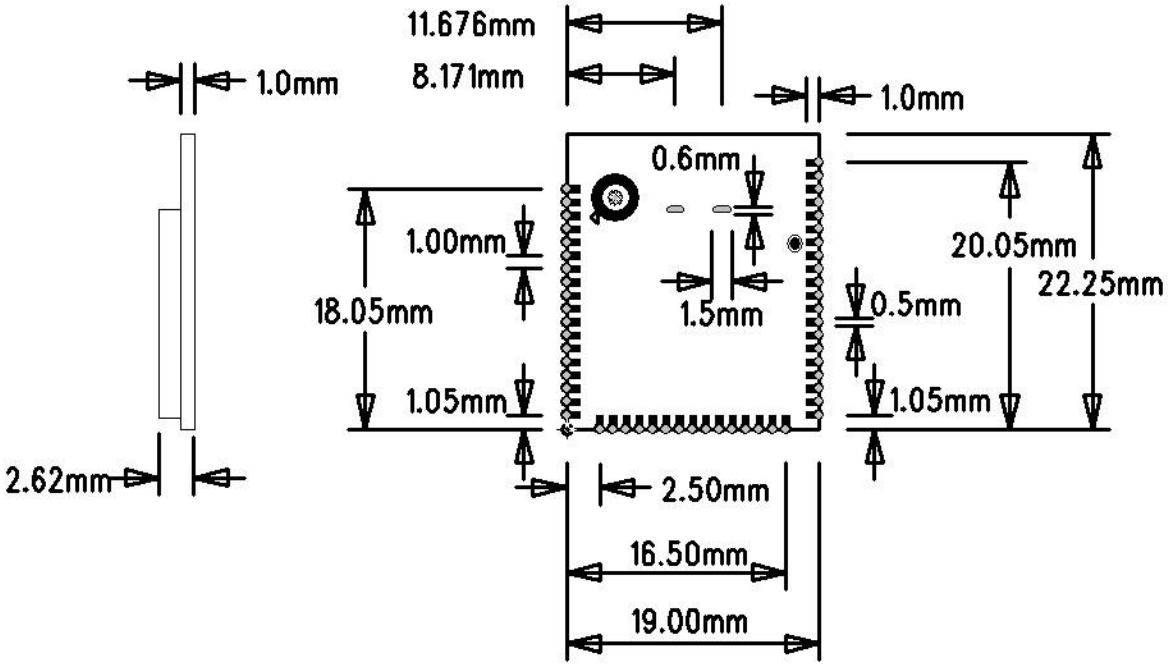
Pin Name	WL_LED	PWM	ETE(*)	WKDT(**)	GPIO_INT	AXM23001 Main Board
GPIOA_3						UART_RTS
GPIOA_5				WKDT0		UART_CTS
GPIOA_6						UART_IN
GPIOA_7						UART_OUT
GPIOB_0			ETE0			UART_LOG_OUT (Console Log Out)
GPIOB_1	WL_LED0		ETE1			UART_LOG_IN (Console Log In / RTC Wake Up)
GPIOB_2			ETE2			I2C3_SCL (RTC / Temp Sensor)
GPIOB_3			ETE3		GPIO_INT	I2C3_SDA (RTC / Temp Sensor)
GPIOC_0		PWM0	ETE0			SPI0_CS0
GPIOC_1		PWM1	ETE1		GPIO_INT	SPI0_CLK
GPIOC_2		PWM2	ETE2			SPI0_MOSI
GPIOC_3		PWM3	ETE3		GPIO_INT	SPI0_MISO
GPIOC_4					GPIO_INT	Reserved
GPIOC_5					GPIO_INT	Reserved
GPIOE_0		PWM0				Status_LED
GPIOE_1		PWM1			GPIO_INT	WPS/Simple Config Button
GPIOE_2		PWM2			GPIO_INT	Reserved
GPIOE_3		PWM3		WKDT3	GPIO_INT	Factory System Default Button
GPIOE_4						Beep

Note:
(*) External Timer Trigger Event
(**) Wake Up Detection

Board Dimensions

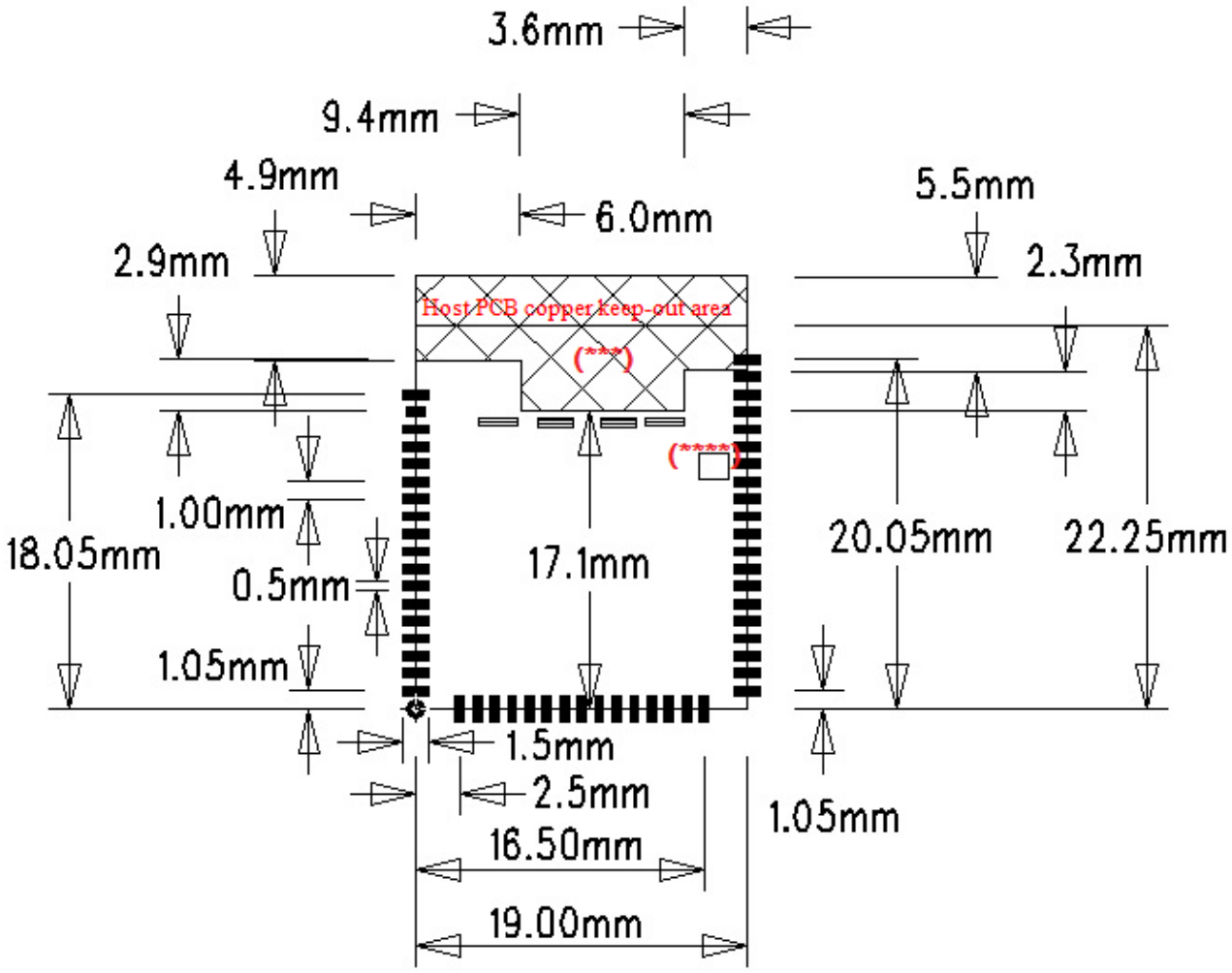
The AXM23001 is a surface mountable module with castellated mounting holes on three sides. Below shows the module dimensions.



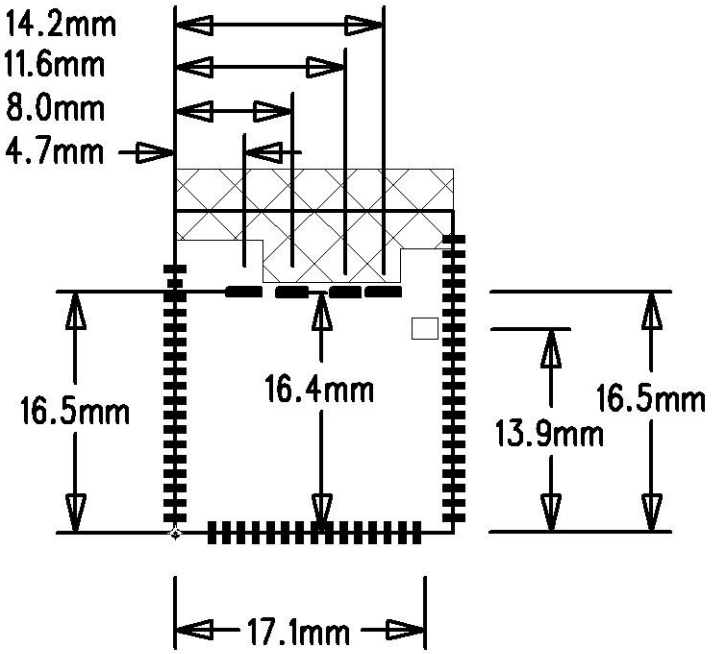


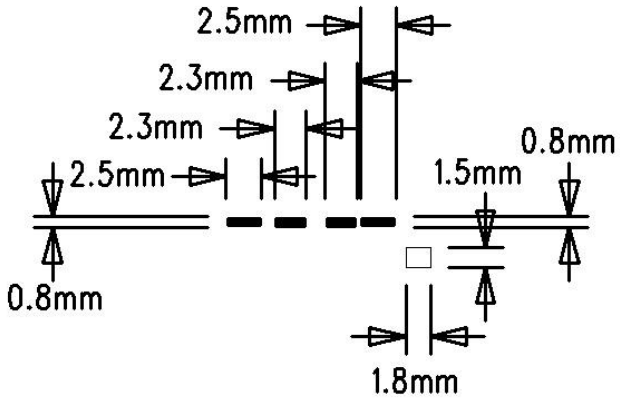
Host PCB Footprint

Below shows the recommended host PCB footprints for the module. The AXM23001 module has an integrated PCB antenna and U.FL connector with external antenna which requires the host PCB to maintain certain copper keep-out area as shown below, for best antenna performance. Also, when mounting on the host PCB of user's system, the module's PCB antenna should be on the edge of the host PCB and faced outward.



Note:
(***) Demarcation specifies the "Host PCB copper keep-out area"
(****) The 1.5mm x 1.8mm area specifies copper keep-out component layer

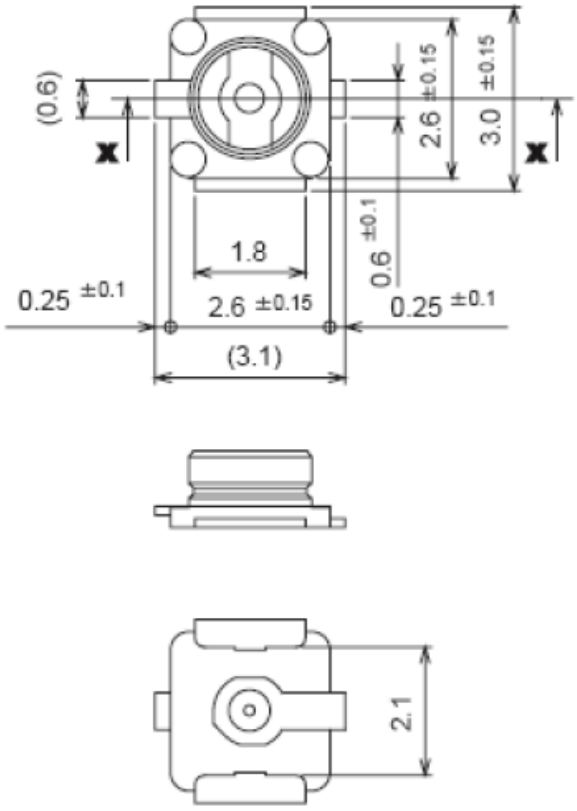


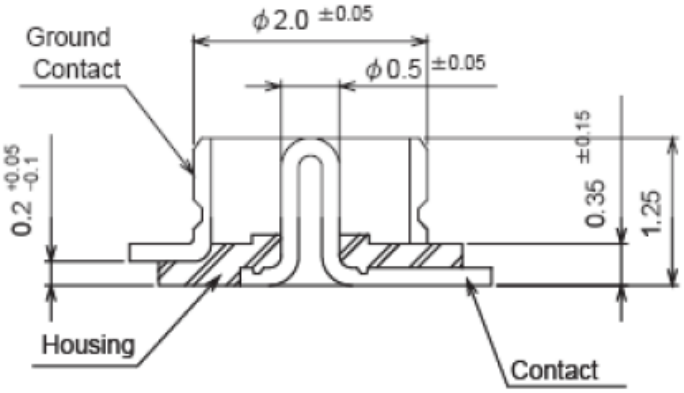


U.FL Connector Dimensions

The below shows the module of U.FL dimensions.

Unit: mm





Ordering Information

Part No.	Description
AXM23001-A-P	AX23001 802.11b/g/n IoT WiFi Module integrated PCB antenna
AXM23001-A-X	AX23001 802.11b/g/n IoT WiFi Module with U.FL connector for external antenna

Revision History

Revision	Date	Description
1.00	2015/11/30	Initial release.
1.10	2016/01/22	1. Modified Product Specification description. 2. Add U.FL Connector Dimensions.
1.20	2016/03/10	Modified Operating Temperature information.