# 1. Overview

WiZ 8285 2416P is an embedded Wi-Fi module with built-in a PCB antenna based on ESP8285.

**Table 1-1. WiZ 8285 2416P specification**

| Categories | Items | Specifications |
|---|---|---|
| Hardware | Operating Voltage | Min. 2.7VDC, Max. 3.6VDC |
|  | Operating Current | Avg. 120mA, Max. 240mA |
|  | Operating Temperature | -10°C ~ 105°C |
|  | Size | 24 x 16 x 3mm |
|  | Interfaces | 5 x PWM, 4 x GPIO, 1 x ADC, 1x UART |
|  | Dimming Control | PWM @ 200Hz, Logic level |
| Wi-Fi | Protocols | 802.11 b/g/n, WPA2 |
|  | Frequency | 2412-2462MHz |
| Software | Encryption | Wi-Fi: WPA2, TCP: TLS1.2 |
|  | Network Protocols | IPv4, TCP/UDP, HTTPS, MQTT |
|  | Upgrade | Automated and transparent, from Cloud |
|  | User Control | Smart Application, Cloud control, Voice control (Amazon Alexa, Google Home) |
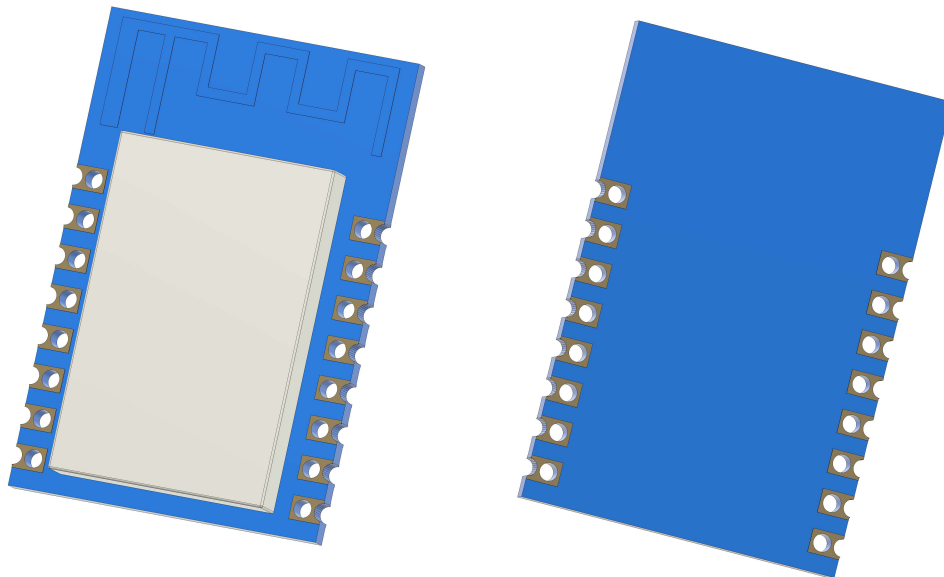


**Figure 1-1. Appearance**
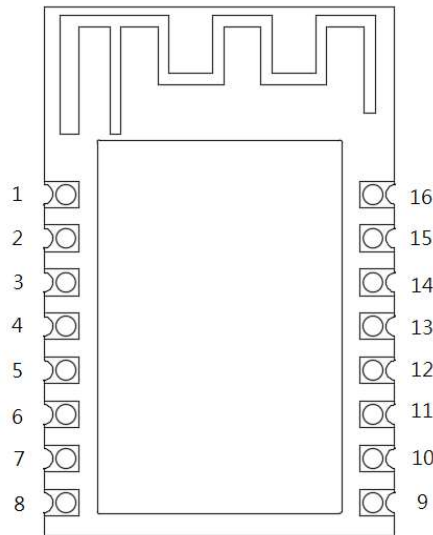
# 2. Pin Description



**Figure 2-1. WiZ 8285 2416P Pin Connection Layout**

**Table 2-1. WiZ 8285 2416P pin standard definitions**

| Pin Number | Pin Name | Function Description |
|---|---|---|
| 1 | RST | External reset signal (Low voltage level: Active) |
| 2 | AD | ADC pin (Connected to internal WiZclick circuit) |
| 3 | EN | Enable pin (Internal pull up), active high. |
| 4 | GPIO16 | GPIO16 (Connected to internal WiZclick circuit) |
| 5 | GPIO14 | GPIO14, PWM output for LED driver (B) |
| 6 | GPIO12 | GPIO12, PWM output for LED driver (R) |
| 7 | GPIO13 | GPIO13, PWM output for LED driver (CW) |
| 8 | VDD | Power input for the module 3.3V |
| 9 | GND | Power Ground |
| 10 | GPIO15 | GPIO15 (10K internal pull-low added), PWM output for LED driver (G) |
| 11 | GPIO2 | GPIO2 |
| 12 | GPIO0 | GPIO0 |
| 13 | GPIO4 | GPIO4, PWM output for LED driver (WW) |
| 14 | GPIO5 | GPIO5 (or IR) |
| 15 | RXD0 | UART_Rx; GPIO3 |
| 16 | TXD0 | UART_Tx; GPIO1 |

*Note: some pins function can be modified with firmware modification.

# 3. Functional Description

## 3.1 WiZclick function

WiZ-8285-2416P modules are built-in the hardware WiZclick circuit. The WiZclick feature to make any existing hardware switch smarter, the favorite light modes 1 and 2 magically available with your existing switches.

## 3.2 Interface Description

**Table 3-1. Interface Description**

| Interface | Pin | Function Description |
|---|---|---|
| PWM | PWM - CW, PWM - WW, PWM - R, PWM - G, PWM - B | Currently the PWM interface has five channels. PWM interface can realize the control of LED lights. |
| IR | GPIO5 (or IR) | The functionality of the infra-red remote control interface can be realized via software programming. The interface uses NEC coding, demodulation. The frequency of the modulated carrier signal is 38kHz. (You can configure this interface to other GPIO) |
| ADC | AD | Tests the input voltage of the ADC pin. |
| UART | RXD0, TXD0 | Communicates with the UART device. |

# 4. Electrical Specifications

## 4.1 Electrical Characteristics

**Table 4-1. Electrical Characteristics**

| Parameter | Symbol | Min | TYP | Max | Unit |
|---|---|---|---|---|---|
| Storage temperature | - | −40 | - | 125 | ℃ |
| Operating temperature | - | −40 | 25 | 105 | ℃ |
| Maximum soldering temperature (Condition: IPC/JEDEC J-STD-020) | - | - | - | 260 | ℃ |
| Supply voltage | VDD | 2.7 | 3.3 | 3.6 | V |
| Input logic level low | $V_{IL}$ | −0.3 | - | 0.25 VDD | V |
| Input logic level high | $V_{IH}$ | 0.75 VDD | - | VDD + 0.3 | V |
| Output logic level low | $V_{OL}$ | - | - | 0.1 VDD | V |
| Output logic level high | $V_{OH}$ | 0.8 VDD | - | - | V |

## 4.2  WiFi Radio

**Table 4-2. Wi-Fi Radio Characteristics**

| Description | Min | TYP | Max | Unit |
|---|---|---|---|---|
| Input frequency | 2412 | - | 2462 | MHz |
| Input reflection | - | - | −10 | dB |
| Output Power | | | | |
| PA output power in 11b mode | | 18 | | dBm |
| PA output power in 11g mode | | 22 | | dBm |
| PA output power in 11n-HT20 mode | | 20 | | dBm |
| Sensitivity | | | | |
| DSSS, 1 Mbps | - | −98 | - | dBm |
| CCK, 11 Mbps | - | −91 | - | dBm |
| 6 Mbps (1/2 BPSK) | - | −93 | - | dBm |
| 54 Mbps (3/4 64-QAM) | - | −75 | - | dBm |
| HT20, MCS7 (65 Mbps, 72.2 Mbps) | - | −72 | - | dBm |
| Adjacent channel rejection | | | | |
| OFDM, 6 Mbps | - | 37 | - | dB |
| OFDM, 54 Mbps | - | 21 | - | dB |
| HT20, MCS0 | - | 37 | - | dB |
| HT20, MCS7 | - | 20 | - | dB |

## 4.3  Power Consumption

The following power consumption data were obtained from the tests with a 3.3V power supply and a voltage stabilizer, in 25°C ambient temperature. All data are based on 50% duty cycle in continuous transmission mode.

**Table 4-3. Power Consumption**

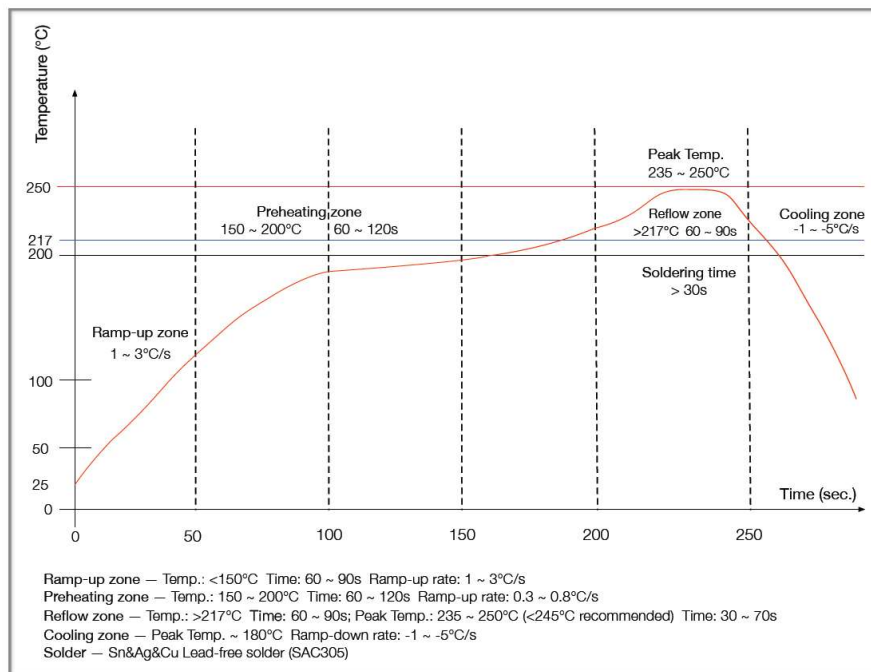| Modes | Min | TYP | Max | Unit |
|---|---|---|---|---|
| Tx 802.11b, CCK 11 Mbps, POUT = +17 dBm | - | 170 | - | mA |
| Tx 802.11g, OFDM 54 Mbps, POUT = +15 dBm | - | 140 | - | mA |
| Tx 802.11n, MCS7, POUT = +13 dBm | - | 120 | - | mA |
| Rx 802.11b, 1024 bytes packet length , –80 dBm | - | 50 | - | mA |
| Rx 802.11g, 1024 bytes packet length , –70 dBm | - | 56 | - | mA |
| Rx 802.11n, 1024 bytes packet length , –65 dBm | - | 56 | - | mA |

## 4.4  Reflow Profile



**Figure 4-1. WiZ 8285 2416P Reflow Profile**

## 4.5  Electrostatic Discharge

**Table 4-4. Electrostatic Discharge Parameters**

| Name | Symbol | Reference | Level | Max | Unit |
|---|---|---|---|---|---|
| Electrostatic Discharge (Human - Body Model) | $V_{ESD}$ (HBM) | Temperature: 23 ± 5℃<br>Based on ANSI/ESDA/JEDEC JS - 001 - 2014 | 2 | 2000 | V |
| Electrostatic Discharge (Charged - Device Model) | $V_{ESD}$ (CDM) | Temperature: 23 ± 5℃<br>Based on JEDEC EIA/JESD22 - C101F | C2 | 500 | V |

# 5. Application Example
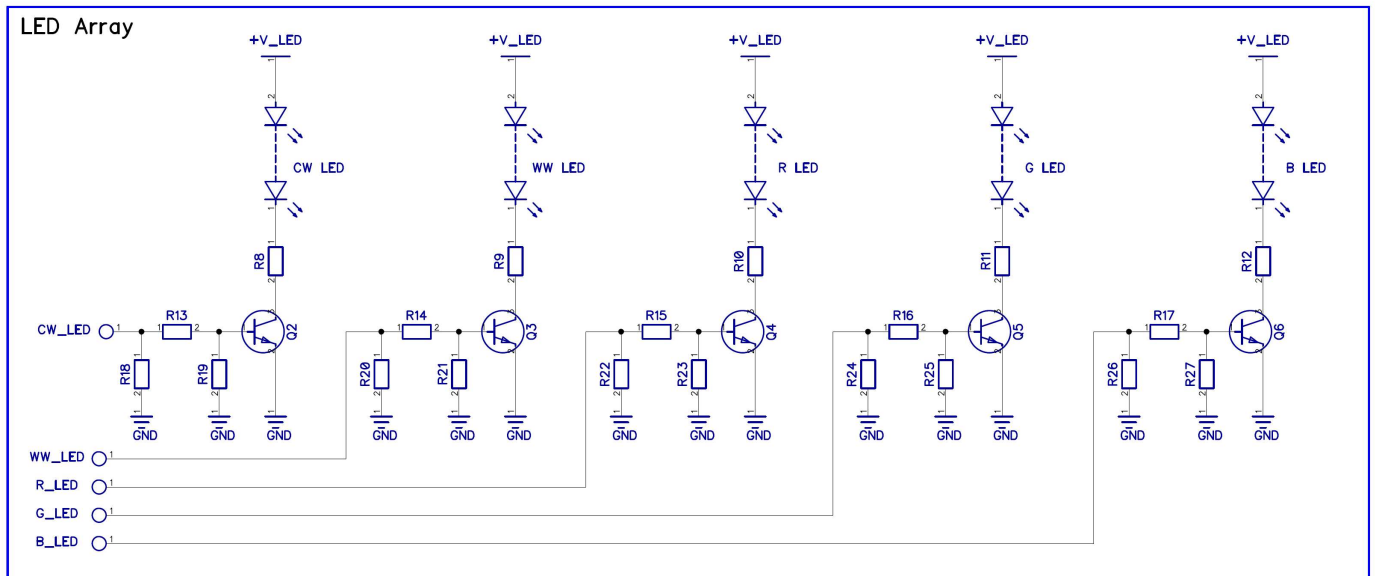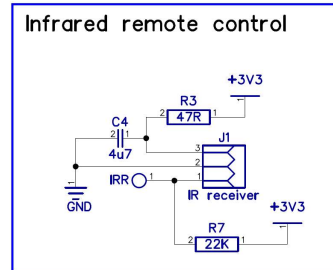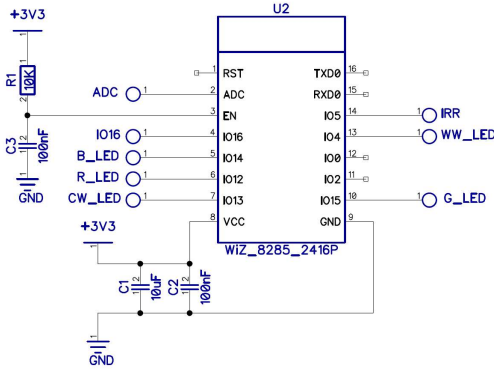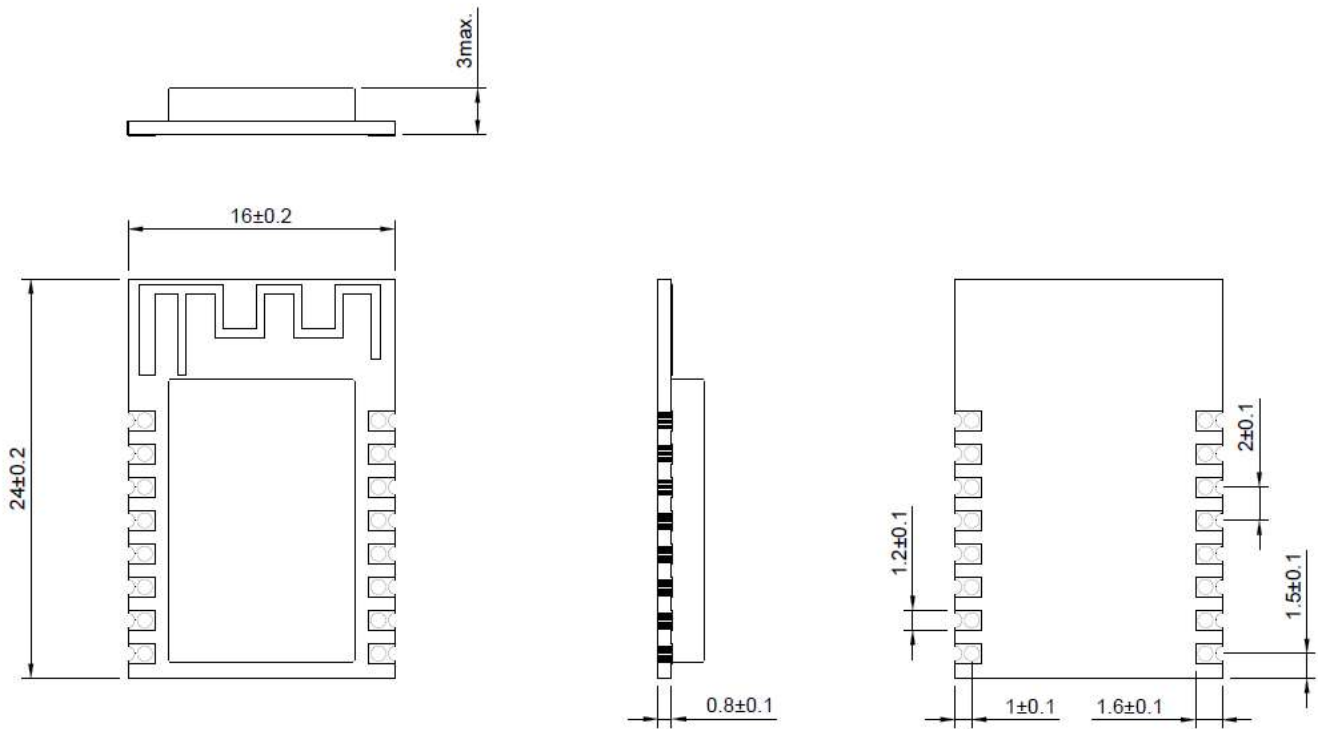
# 6. Dimensions



**Figure 6-1. WiZ 8285 2416P Dimensions**

**Regulatory Module Integration Instructions**

**2.2 List of applicable FCC rules**

This device complies with part 15.247 of the FCC Rules.

**2.3 Summarize the specific operational use conditions**

This module can be applied in household electrical appliances as well as lighting equipments. . The input voltage to the module should be nominally 2.7-3.6 V DC ，typical value 3.3V DC and the ambient temperature of the module should not exceed 105℃.

This module using PCB antenna with maximum gain is 2dBi.Other antenna arrangement is not covered by this certification.
If the antenna needs to be changed，the certification should be re-applied.

**2.4 Limited module procedures**

Not applicable

**2.5 Trace antenna designs**

Not applicable

**2.6 RF exposure considerations**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment .This equipment should be installed and operated with minimum distance 20cm between the radiator& your body. If the device built into a host as a portable usage， the additional RF exposure evaluation may be required as specified by 2.1093.

**2.7 Antennas**

Module contains one PCB antenna.

**2.8 Label and compliance information**

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID: 2AUOF-2416P " ，or "Contains FCC ID: 2AUOF-2416P "，Any similar wording that expresses the same meaning may be used.

**2.9 Information on test modes and additional testing requirements**

a)The modular transmitter has been fully tested by the module grantee on the required number of channels， modulation types， and modes， it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer， installing the modular transmitter， perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions

limits or band edge limits (e.g., where a different antenna may be causing additional emissions).

b)The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

C)If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5, 15.15, and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected

The 2.4G WIFI Module is based on ESP8285 chip .support standard Bluetooth HCI UART commands. For the testing module on your product, user can refer to specification of the Bluetooth system on how to configure and evaluate the module.This specification can also be found on the official Bluetooth website:
https://www.bluetooth.org/en‐us/specification/adopted‐specifications.

## 2.10 Additional testing, Part 15 subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device .

The host integrator installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation and should refer to guidance in KDB 996369.

### Frequency spectrum to be investigated

For host products with certified modular transmitter, the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3), or the range applicable to the digital device, as shown in Section 15.33(b)(1), whichever is the higher frequency range of investigation.

### Operating the host product

When testing the host product, all the transmitters must be operating.The transmitters can be enabled by using publicly-available drivers and turned on, so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

When testing for emissions from the unintentional radiator，the transmitter shall be placed in the receive mode or idle mode，if possible. If receive mode only is not possible then，the radio shall be passive (preferred) and/or active scanning. In these cases，this would need to enable activity on the communication BUS (i.e.，PCIe，SDIO，USB) to ensure the unintentional

radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4，ANSI C63.10 and ANSI C63.26 for further general testing details.

The product under test is placed into a normal 'paired' mode with another wifi device, as per the normal intended use of the product (for example, transferring data).

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

ISED RSS Warning: This device complies with Innovation, Science and Economic Development Canada licence‑exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ISED RF exposure statement:
This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator& your body.This transmitter must not be co‑located or operating in conjunction with any other antenna or transmitter. Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés.Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm tonon corps.Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d'autres.

IC Label Instructions:

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module IC: 25479-2416P",or "Contains  IC: 25479-2416P", Any similar wording that expresses the same meaning may be used .

Instructions d'étiquetage IC:

L'extérieur des produits finis contenant ce module doit afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser des libellés tels que: contient le module émetteur IC: 25479-2416P "ou" contient: IC: 25479-2416P", tout libellé similaire exprimant le même sens peut être utilisé.