

# CKC6-1-W Datasheet

---



Copyright©2024

## Version Description

DATE	Description of changes	Author.
2025/2/6	V1.0 released	chen

# About this manual

---

This manual describes the CKC6-1-W product parameters and contains the following sections

<b>Chapter</b>	<b>caption</b>	<b>content</b>
Chapter 1	Product Introduction	Overview of module features and functional applications
Chapter 2	Function Description	Description of module functions and specific explanations
Chapter 3	Electrical Characteristics	Introduction to basic electrical performance parameters of the module
Chapter 4	Module Types and Pin Definitions	Provision of module types, pin definitions, and functional descriptions
Chapter 5	PCB Design	Guidelines for module layout and PCB layout considerations
Chapter 6	Package Information	Provision of module package dimension drawings
Chapter 7	Certification description	Certification description
Chapter 8	Shipping Information	Explanation of module shipping methods

# 1. Product introduction

---

The CKC6-1-W is a multi-functional module that integrates various communication technologies including 2.4 GHz Wi-Fi 6, Bluetooth 5, Matter, HomeKit, Zigbee 3.0, and Thread 1.3, providing users with a wide range of connectivity options. It is equipped with the ESP32-C6 chip, which integrates two 32-bit processors based on the RISC-V architecture: a high-performance processor and a low-power processor. The module not only supports Wi-Fi and Bluetooth LE (Low Energy) connectivity but also integrates 802.15.4 baseband and MAC layer protocols, as well as the corresponding RF (Radio Frequency) module, enabling Wi-Fi, Bluetooth, and 802.15.4 technologies to coexist and share the same antenna, significantly saving space and simplifying design complexity.

The KC6-1-W is versatile and powerful, offering a rich set of peripheral interfaces that allow it to easily connect to various devices, thereby meeting the application needs of multiple fields such as smart homes, industrial automation, healthcare, consumer electronics, and more.

The CKC6-1-W module features a PCB on-board antenna and is configured with up to 16 MB of external SPI flash.

The CKC6-1-W comes in four variants, with different models having varying flash configurations and operating conditions. The comparison of different models is shown in the table below:

Ordering Code	flash	Ambient temperature
CKC6-1-W-N4	4 MB	0-85°C
CKC6-1-W-N8	8 MB	0-85°C
CKC6-1-W-N16	16 MB	0-85°C
CKC6-1-W-H4	4 MB	0-105°C

**Note:** The recommended operating ambient temperature range for the module is 40°C to 85°C..

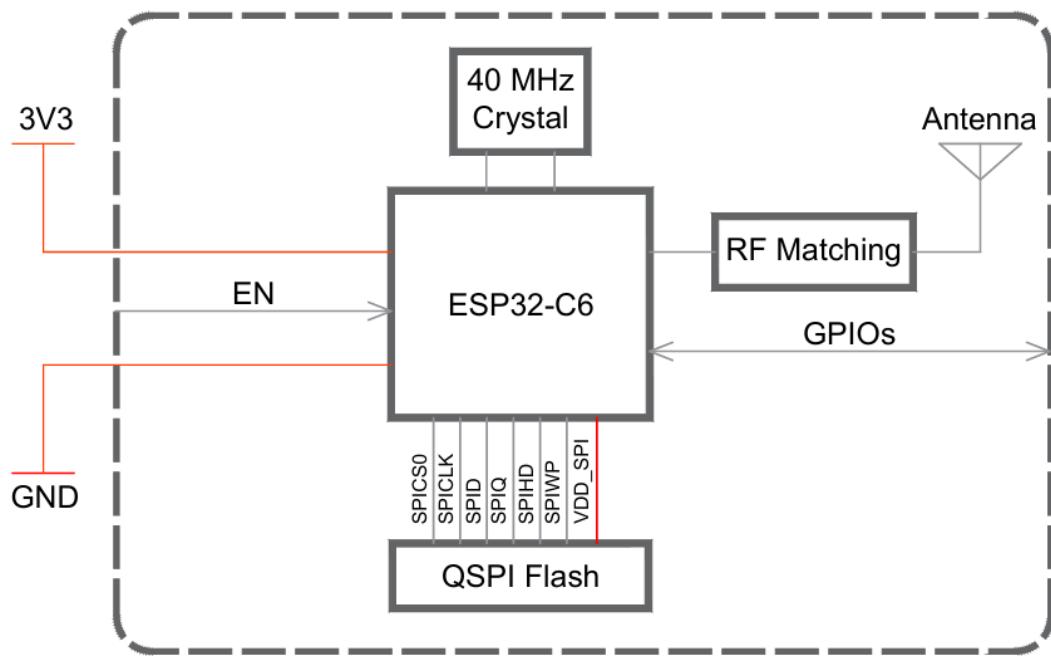
## Product Features

- Supports IEEE 802.11 b/g/n protocols
- Supports IEEE 802.11ax protocol (2.4G frequency band)
- Supports Bluetooth Low Energy (Bluetooth LE)
- Compatible with IEEE 802.15.4-2015 protocol, supports Thread, Zigbee, Matter, HomeKit, MQTT

# 2. Functional description

---

## 2.1 module functional block diagram



## 3. Electrical Characteristics

### 3.1 Rated Parameters

Conditions: VDD=3.3V±10%, GND=0V; tested at 25°C room temperature.

Parameter	instructions
modules name	CKC6-1-W
hardware interface	PWM,IIC,GPIO,UART
operating voltage	3.0V~3.6V
operating temperature	-20°C~85°C
Storage environment	Temperature: -10°C~75°C, relative humidity: 20%RH~80%RH
Wireless	wifi :IEEE802.11b/g/n/ax Bluetooth :Bluetooth5.0、Bluetoothmesh 802.15.4:Thread、Zigbee、Matter、HomeKit、MQTT
Wireless Security Protocol	GCMP, CCMP, TKIP, WAPI, WEP, BIP, WPA2-PSK/WPA2-Enterprise, and WPA3-PSK/WPA3-Enterprise
Security	AES-128/256 (FIPS PUB 197),HMAC,RSA,SHA(FIPS PUB 180-4),Digital signature

### 3.3 Current Consumption in Other Modes

#### 3.3.1 Current Consumption in Modem-sleep Mode

Mode	CPU Frequency(MHz)	Description	Typ (mA)	
			All Peripherals Clocks Disabled	All Peripherals Clocks Enabled
Modem-sleep	160	CPU is running	27	38
		CPU is idle	17	28
	80	CPU is running	19	30
		CPU is idle	14	25

**Note:**

1. In practice, the current consumption might be different depending on which peripherals are enabled.
2. In Modem-sleep mode, Wi-Fi is clock gated.
3. In Modem-sleep mode, the consumption might be higher when accessing flash.

#### 3.3.2 Current Consumption in Low-Power Modes

Mode	Description	Typ(μA)
Light-sleep	CPU and wireless communication modules are powered down, peripheral clocks are disabled, and all GPIOs are high-impedance	180
	CPU, wireless communication modules and peripherals are powered down, and all GPIOs are high-impedance	35
Deep-sleep	RTC timer and LP memory are powered on	7
Power off	CHIP_PU is set to low level, the chip is powered off	1

### 3.4 Wi-Fi RF Specifications

Conditions: VDD=3.3V±10%, GND=0V; tested at 25°C room temperature.

Descriptions	Performance Parameters
wireless standard	IEEE 802.11 b/g/n/ax
Center frequency of operating channel	2412 ~ 2484 MHz

### 3.5 Bluetooth RF Specifications

Conditions: VDD=3.3V±10%, GND=0V; tested at 25°C room temperature.

Descriptions	Performance Parameters
wireless standard	Bluetooth5、Bluetoothmesh
Center frequency of operating channel	2402 ~ 2480 MHz

### 3.6 802.15.4 RF Specifications

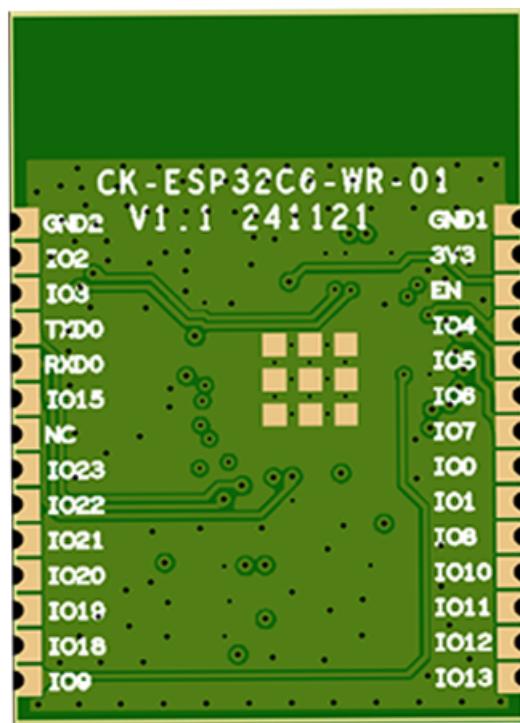
Conditions: VDD=3.3V±10%, GND=0V; tested at 25°C room temperature.

Descriptions	Performance Parameters
wireless standard	2405 ~ 2475MHz

\*:Zigbee has 15 channels from channel 11 to channel 25 in the 2.4 GHz band with a channel spacing of 5 MHz.

## 4. Pin Definitions

### 4.1 Pin Layout



CKC6-1-W Module Schematic

### 4.2 Pin Description

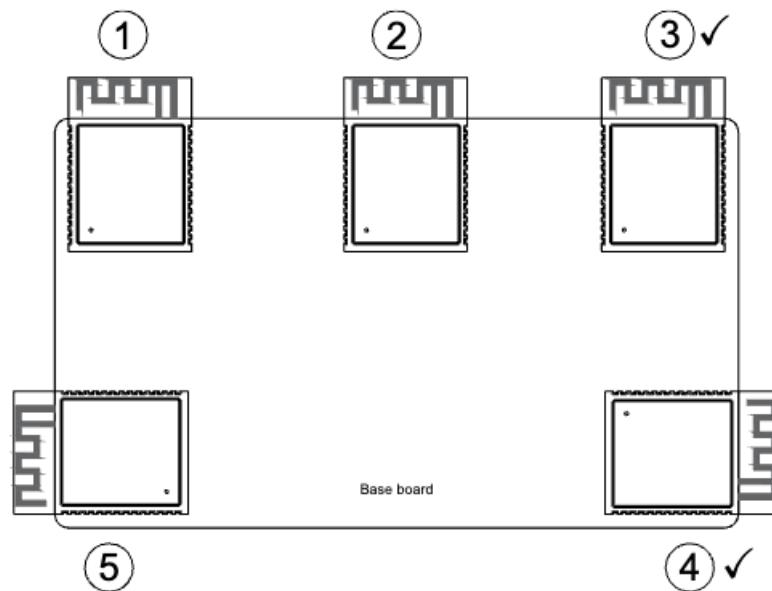
Name	No.	Type	Function
GND	1	P	GND
3V3	2	P	Power supply
EN	3	I	High:on,enables the chip. Low:off,the chip powers off. Note:Donot leave the EN pin floating.
IO4	4	I/O/T	MTMS,GPIO4,LP_GPIO4,LP_UART_RXD,ADC1_CH4,FSPIHD
IO5	5	I/O/T	MTDI,GPIO5,LP_GPIO5,LP_UART_TXD,ADC1_CH5,FSPIWP
IO6	6	I/O/T	MTDI,GPIO5,LP_GPIO5,LP_UART_TXD,ADC1_CH5,FSPIWP
IO7	7	I/O/T	MTDO,GPIO7,LP_GPIO7,LP_I2C_SCL,FSPIID
IO0	8	I/O/T	GPIO0,XTAL_32K_P,LP_GPIO0,LP_UART_DTRN,ADC1_CH0
IO1	9	I/O/T	GPIO1,XTAL_32K_N,LP_GPIO1,LP_UART_DSRN,ADC1_CH1
IO8	10	I/O/T	GPIO8
IO10	11	I/O/T	GPIO10
IO11	12	I/O/T	GPIO11
IO12	13	I/O/T	GPIO12,USB_D-
IO13	14	I/O/T	GPIO13,USB_D+
IO9	15	I/O/T	GPIO9
IO18	16	I/O/T	GPIO18,SDIO_CMD,FSPICS2
IO19	17	I/O/T	GPIO19,SDIO_CLK,FSPICS3
IO20	18	I/O/T	GPIO20,SDIO_DATA0,FSPICS4
IO21	19	I/O/T	GPIO21,SDIO_DATA1,FSPICS5
IO22	20	I/O/T	GPIO22,SDIO_DATA2
IO23	21	I/O/T	GPIO23,SDIO_DATA3
NC	22	-	NC
IO15	23	I/O/T	GPIO15
RXD0	24	I/O/T	U0RXD,GPIO17,FSPICS1
TXD0	25	I/O/T	U0TXD,GPIO16,FSPICS0
IO3	26	I/O/T	GPIO3,LP_GPIO3,LP_UART_CTSN,ADC1_CH3
IO2	27	I/O/T	GPIO2,LP_GPIO2,LP_UART_RTSN,ADC1_CH2,FSPIQ
GND	28	I/O/T	GND
EPAD	29	P	GND

**Note:** GPIO08 and GPIO09 are BOOT pins and enter DOWNLOAD mode when both IOs are pulled low at the same time during power-up. GPIO09 pulls up when powering up, and any level of GPIO08 enters normal startup mode.

## 5. PCB Layout Recommendations

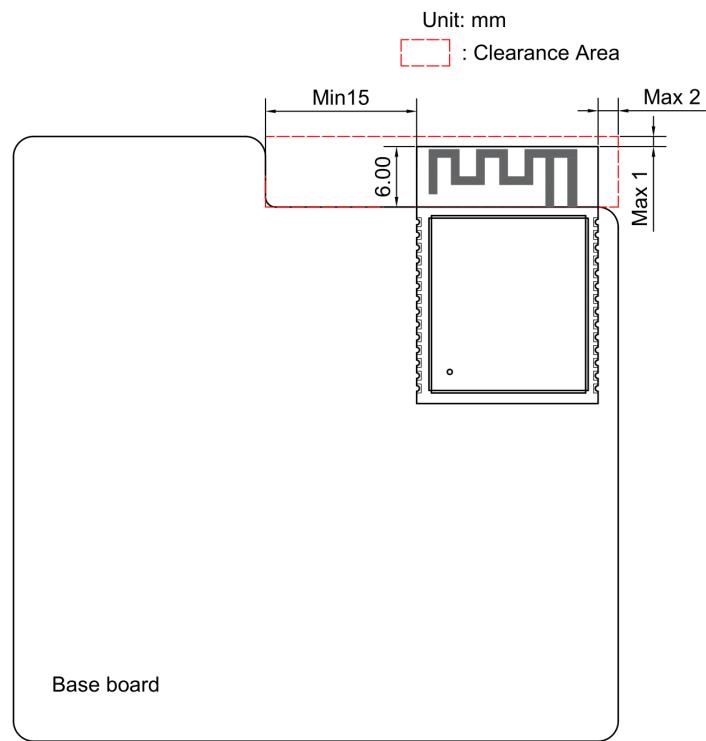
### PCB layout and module layout considerations:

1. Pay attention to the module placement in PCB layout, as far as possible away from interference sources: magnetic components (such as motors, inductors, transformers, etc.), high-frequency signal devices (such as crystal, high-frequency clock signals, etc.)
2. Module PCB antenna area and expand 15 mm area to be empty (strictly prohibit the laying of copper, wire, placed components), such as the use of modules for on-board (on-board) design, need to pay attention to the layout of the module in the base plate, should minimise the impact of the base plate on the module PCB antenna performance. It is recommended to extend the antenna area of the module to the edge of the board, and place the feedpoints close to the edge of the bottom board. In the module placement diagram below, ✓ represents the highly recommended placement, other positions are not recommended.



CKC6-1-W Schematic of the position of the series module (antenna feed point on the right) on the base plate

If the antenna can not extend the edge of the board, please ensure that the PCB antenna to a large enough clearance area (prohibited laying copper, wire, placement of components), the clearance area is recommended to at least 15 mm. PCB antenna below the area of the bottom plate, please cut off, in order to minimise the impact of the bottom plate plate on the PCB antenna. The feed point is still placed as close as possible to the edge of the board. As an example, a module with the feedpoint on the right side is drawn with the recommended headroom area.

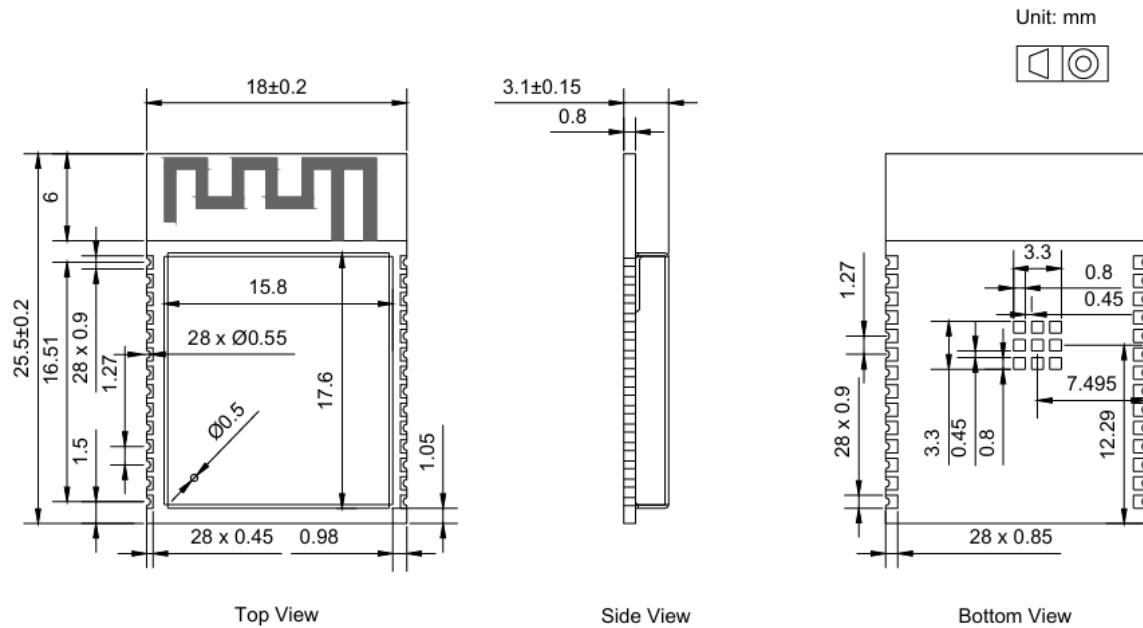


Schematic of antenna area clearance

3. The module's power (VCC) pin capacitors and the module's other pin capacitors and resistors should be placed as close as possible to the module's pins, and the alignment path should be short.

## 6. Physical Dimensions

Module Dimensions:

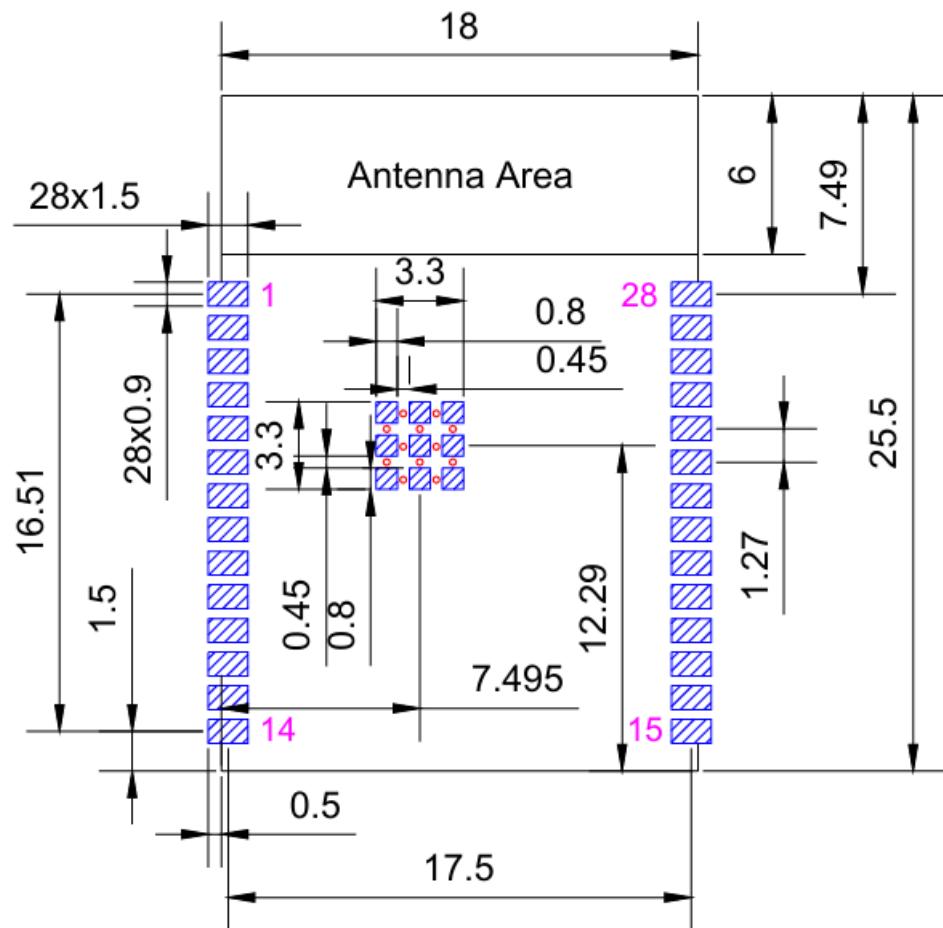


Recommended PCB Land Pattern:

Unit: mm

○ Via for thermal pad

▨ Copper



## 7. Certification description

---

### 7.1 FCC compliance 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 important announcement Important

#### Radiation Exposure Statement

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

---

## 2.2 List of applicable FCC rules

CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

## 2.3 Specific operational use conditions

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

## 2.4 Limited module procedures

Not applicable

## 2.5 Trace antenna designs

Not applicable

## 2.6 RF exposure considerations

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

## 2.7 Antennas

This radio transmitter FCC ID: 2A2SV-CKC61W has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Type of antenna:	Maximum Gain	Frequency range:
Bluetooth/2.4G Wi-Fi	PCB Antenna	0.85dBi	2400-2500MHz

## 2.8 Label and compliance information

The final end product must be labeled in a visible area with the following " Contains FCC ID: 2A2SV-CKC61W ".

## 2.9 Information on test modes and additional testing requirements

Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

## 2.10 Additional testing, Part 15 Subpart B disclaimer

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

## 2.11 Note EMI Considerations

Host manufacturer is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

## 2.12 How to make changes

This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacturer only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.

## 8. Shipping Information

The CKC6-1-W module is shipped in a braided tape and reel package.



### Disclaimer and Copyright Notice

The information in this document, including any referenced UL addresses, is subject to change without notice. The document is provided "as is" without any warranty, including any warranty of merchantability, fitness for a particular purpose, or non-infringement, and any warranty mentioned elsewhere in connection with any proposals, specifications, or samples. This document assumes no liability, including liability for infringement of any patent rights arising from the use of the information contained herein. This document does not grant, by estoppel or otherwise, any license to any intellectual property rights, whether express or implied.

Copyright © 2024 CoolHome Technology. All rights reserved.

---