

**CDI-WY16600A-00****Software:**

客户 Customer	客户承认 Approve (请盖印章)	日期 Date

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深圳市中龙通电子科技有限公司  
CHINA DRAGON TECHNOLOGY LIMITED

公司地址: 深圳市宝安区沙井街道南浦路林坡坑蚝三第一工业园 B4 栋

电话: (86 755) 81449957

传真: (86 755) 81449967

E-mail: Info@cdtech.cn

[Http://www.cdtech.cn](http://www.cdtech.cn)

### 更改记录:

## Reversion History:

## 1. Overview

The CDI-WY16600A-00 is a WiFi+BLE module designed based on the ECR6600-AWLL6.

The ECR6600 is a SoC (System on a Chip) applied in smart home IoT (Internet of Things) terminal devices, supporting the Wi-Fi 802.11b/g/n/ax and BLE 5.0 protocols.

It has a built-in power management module, power amplifier, low-noise amplifier, and transmit-receive switch.

Adopting a RISC processor architecture, the ECR6600 features sufficient storage space, abundant peripheral interfaces, and a more secure encryption mechanism.

It integrates a FullMAC architecture and a wider operating range on the chip.

The WiFi subsystem and BLE subsystem share the RF (Radio Frequency) section, including ADC (Analog-to-Digital Converter), DAC (Digital-to-Analog Converter), and PLL (Phase-Locked Loop). Only one of WiFi and BLE can operate at a time.

## 2. Features

- Supports IEEE 802.11b/g/n/ax
- Supports Full MAC, including LMAC (Low MAC) and UMAC (Upper MAC)
- Supports SoftAP, STA (Station), and WiFi Direct modes
- Supports WMM QoS (Wi-Fi Multimedia Quality of Service)
- Supports 0.8/1.6/3.2  $\mu$  s guard intervals
- Supports 802.11 ax MCS0-MCS7
- Supports a maximum data rate of 150 Mbps
- Supports MU-OFDMA (Multi-User Orthogonal Frequency Division Multiple Access) for both uplink and downlink (supported by STA)
- Supports beamforming for STA (STA acts as Beamformee)
- Supports Mid-amble
- Supports 20M and 40M bandwidths; 802.11ax only supports 20M bandwidth
- Supports Dual Carrier Modulation (DCM)

## BLE Features

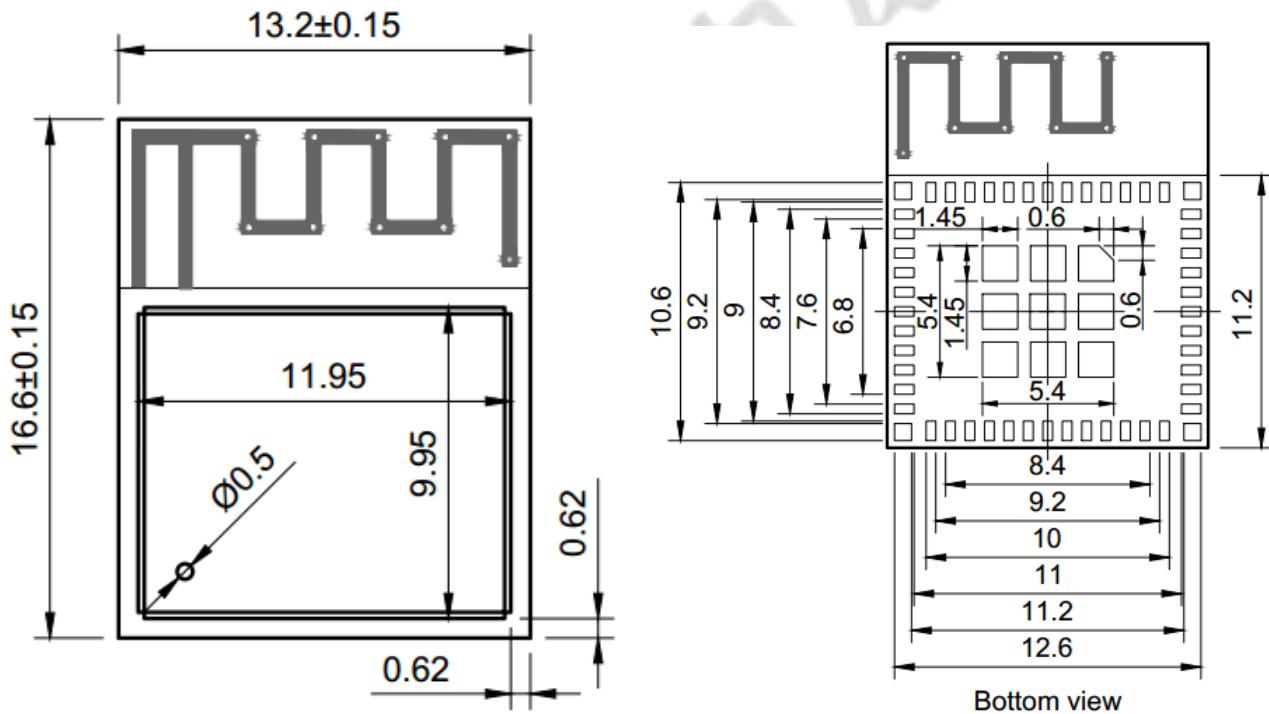
- Supports BLE 5.0 protocol (AOA and AOD not supported)
- Supports BLE single-device connection
- Supports simultaneous advertising and scanning
- Supports enhanced power consumption control
- Supports Adaptive Frequency Hopping (AFH)
- Supports asynchronous data transmission and reception
- Supports connection parameter update
- Supports scalable data packet length
- Supports Link Layer encryption
- Supports LE Ping

## 3. General Specification

Model	CDI-WY16600A-00
Product Name	IEEE 802.11b/g/n/ax Wi-Fi6 and BLE 5.0
Major Chipset	ECR6600-AWLL6
Modulation Method	802.11b(DSSS):CCK(11,5.5Mbps),DQPSK(2Mbps),DBPSK(1Mbps) 802.11g(OFDM):BPSK(9,6Mbps),QPSK(18,12Mbps),16QAM(36,24Mbps),64QAM(54,48Mbps) 802.11n(OFDM):BPSK,QPSK,16QAM,64QAM(65Mbps) 802.11ax(OFDMA )/64-QAM BLE(GFSK )
Channel Bandwidth	WIFI:20MHz/40MHz BLE:2MHz
Basic Transmission Rate	WIFI 802.11b:11,5.5,2,1 Mbps WIFI 802.11g:54,48,36,24,18,12,9,6 Mbps WIFI 802.11n:up to 72Mbps(20MHZ);up to 150Mbps(40MHZ) WIFI 802.11ax:up to 150Mbps(20MHZ) BLE:1Mbps, 2Mbps
Frequency Range	WiFi:2400~2483.5MHZ BT: 2402~2480MHZ
Receive Sensitivity	11b CCK11(PER<8%)< -85dBm;11g OFDM54(PER<10%) < -72dBm; 11n HT20 MCS7(PER<10%) < -69dBm

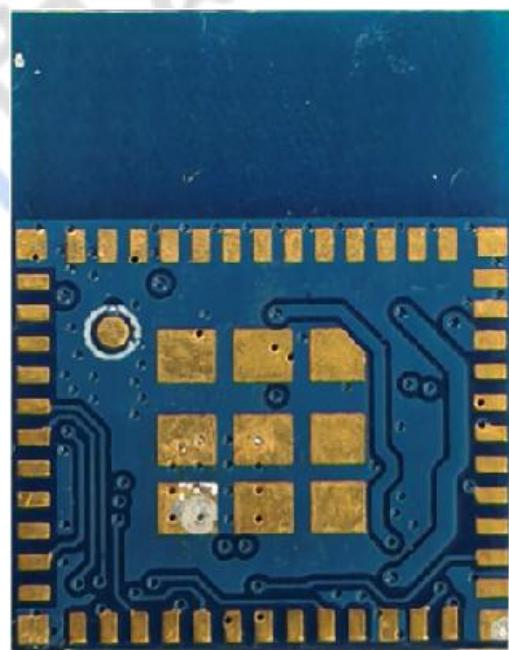
	11n HT40 MCS7(PER<10%) < -67dBm 11ax HT20 MCS7(PER<10%) < -68dBm BLE Receiving Sensitivity@1Mbit/s < -85dBm
Wifi Interface	UART
Encryption Protocol	WEP/WPA-PSK/WPA2-PSK
SPI flash	2M Byte default Embedded
Supply Current	Min: 500 mA
Operating Ambient Temperature	-40~ +85°C ambient temperature
Storage Ambient Temperature	-40 ~ 125°C ambient temperature
Operating Ambient Humidity	5 to 90 % maximum (non-condensing)
Dimension	16.6x 13.2 x 2.4 mm (LxWxH) ±0.2mm

#### 4. Pin Description 、 Dimensions



NO	NAME	DESCRIPTION
1, 2, 11, 14, 36-53	GND	GND
3	VDD33	3.3V 供电
4, 7, 9, 10, 15 17, 24, 25, 27, 28, 29, 32-35	NC	NC

5	GPIO14	GPIO BOOTMODE0/AUX_0/VOUT_QP/PWM_CTRL4/I2S_TXD
6	GPIO15	GPIO BOOTMODE1/AUX_1/VOUT_QN/PWM_CTRL5/I2S_TXWS
8	EN	High Level: Chip Enabled, Low Level: Chip Disabled Note: The EN pin must not be left floating.
12	UART2_TXD	GPIO SD_H_CLK/UART2_TXD I2C_SCL/I2S_RXD/dp11_80M_0
13	UART2_RXD	GPIO WAKEUP/UART2_RXD PWM_CTRL5_SPII_WP/I2S_TXWS
16	GPIO1	GPIO TMS/UART1_RXD/PWM_CTRL1/SPI1_CS0/I2S_RXD
18	GPIO4	GPIO TRST/UART0_RTS/PWM_CTRL4/SPI1_CS1/MSPI_CS1
19	GPIO2	GPIO TDO/UART1_TXD/PWM_CTRL2/SPI1_MOSI/I2C_SCL
20	GPIO0	TCK/UART2_TXD/PWM_CTRL0/SPI1_CLK/I2S_TXSCK
21	GPIO3	GPIO TDI/UART0_CTS/PWM_CTRL3/SPI1_MISO/I2C_SDA
22	GPIO27	GPIO PWM_CTRL3/AUX_2/VOUT_IP/I2S_MCLK
23	RESET	TEST MODE
26	GPIO24	GPIO SD_H_DATA2/UART1_CTS/PWM_CTRL2/I2S_MCLK
30	UART0_RXD	GPIO UART0_RXD/40M_CLK_OUT XTAL_I_32K/I2S_RXWS/IR_OUT
31	UART0_TXD	GPIOUART0_RXD/32K_CLK_OUT/XTAL_O_32K/I2S_RXSCK/COLD_RESET



## 5. Electrical Characteristics

## 5.1 DC Characteristics

参数		最小值	标准值	最大值	单位
$C_{IN}$	Pin capacitance		2		pf
$V_{IH}$	High-level input voltage	0.7vdd		vdd	V
$V_{IL}$	Low-level input voltage	0		0.3vdd	
$I_{IH}$	High-level input current	-10		10	uA
$I_{IL}$	Low-level input current	-10		10	uA
$V_{OH}$	High-level output voltage	0.9vdd			V
$V_{OL}$	Low-level output voltage			0.1vdd	V
$I_{OH}$	High-level source current	4 mA	2	3.2	mA
$I_{OL}$	Low-level sink current	4 mA	4	5.2	mA
$R_{PU}$	Pull-up resistor	66K	81.1k	110k	$\Omega$
$R_{PD}$	Pull-down resistor	55k	62.7k	82.5k	$\Omega$

## 5.2 Recommended Operating Conditions

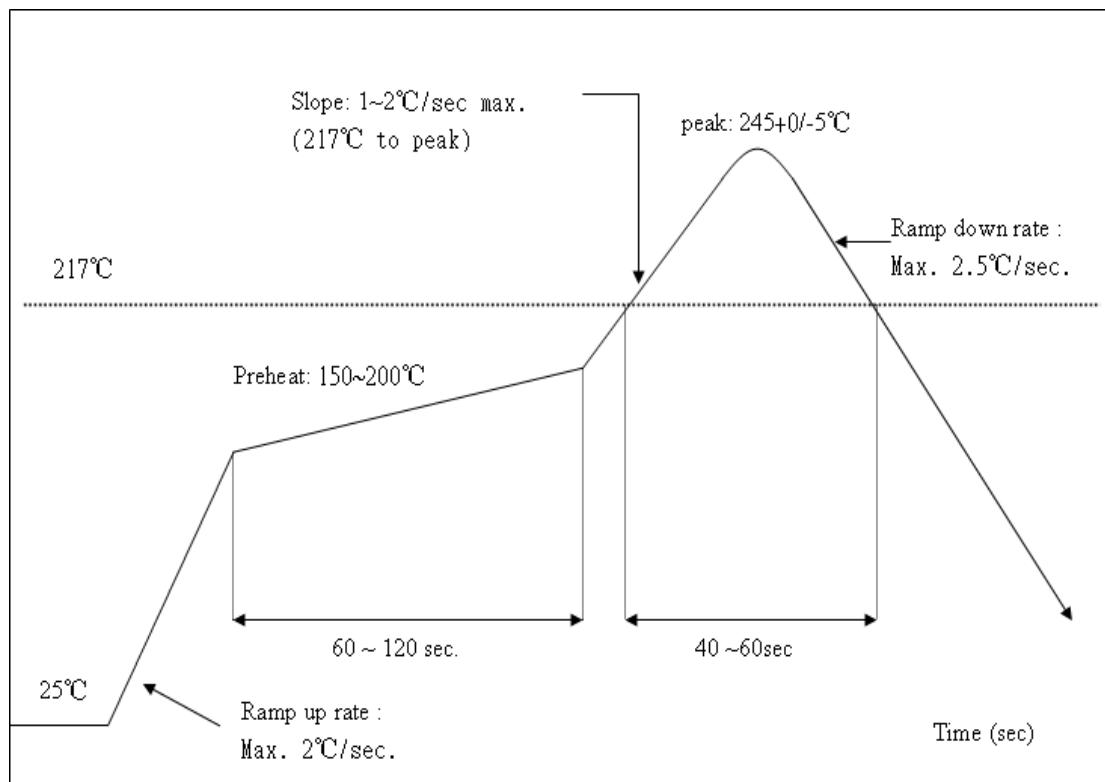
Parameter	Pin Name	Minimum	Typical	Maximum	Units
Operating Voltage	vcc-pin	3	3.3	3.6	V
Operating Temperature		-40		85	$^{\circ}C$

## 6. Recommended Reflow Profile

Referred IPC/JEDEC standard.

Peak Temperature : <250°C

Number of Times : 2 times



## 7.storage temperature

A. Storage life: 12 months. Storage conditions:<40°C. Relative humidity:<90%R.H.

(保存期限: 12个月, 储存环境条件: 温度在: <40°C, 相对湿度: <90%R.H.)

B. After this bag is opened , devices that will be subjected to infrared reflow, vapor-phase reflow, or equivalent processing must be .(模块包装被拆后, SMT 组装之时限)

a. Check the humidity card :stored at  $\leq 20\%$ RH.If :30%~40%(pink)or greater than 40%(red).Labeling module has moisture absorption.( 检查湿度卡: 显示值应小于30% (蓝色) , 如: 30%~40%(粉红色) 或者大于40% (红色) 表示模块已吸湿气.)

b. Mounted within 168 hours at factory conditions of:  $t \leq 30^\circ\text{C}$ ,  $\leq 60\%$ R.H.

(工厂环境温度湿度管制:  $\leq 30^\circ\text{C}$ ,  $\leq 60\%$ R.H, 168小时内。)

c. Once opened, the workshop the preservation of life for168 hours.

(拆封后, 车间的保存寿命为168小时.)

C. Module apart packing after 168 hours, If baking is required, devices may be baked for.

(如在拆封后的168个小时内未使用完, 需要烘烤, 烘烤条件如下: )

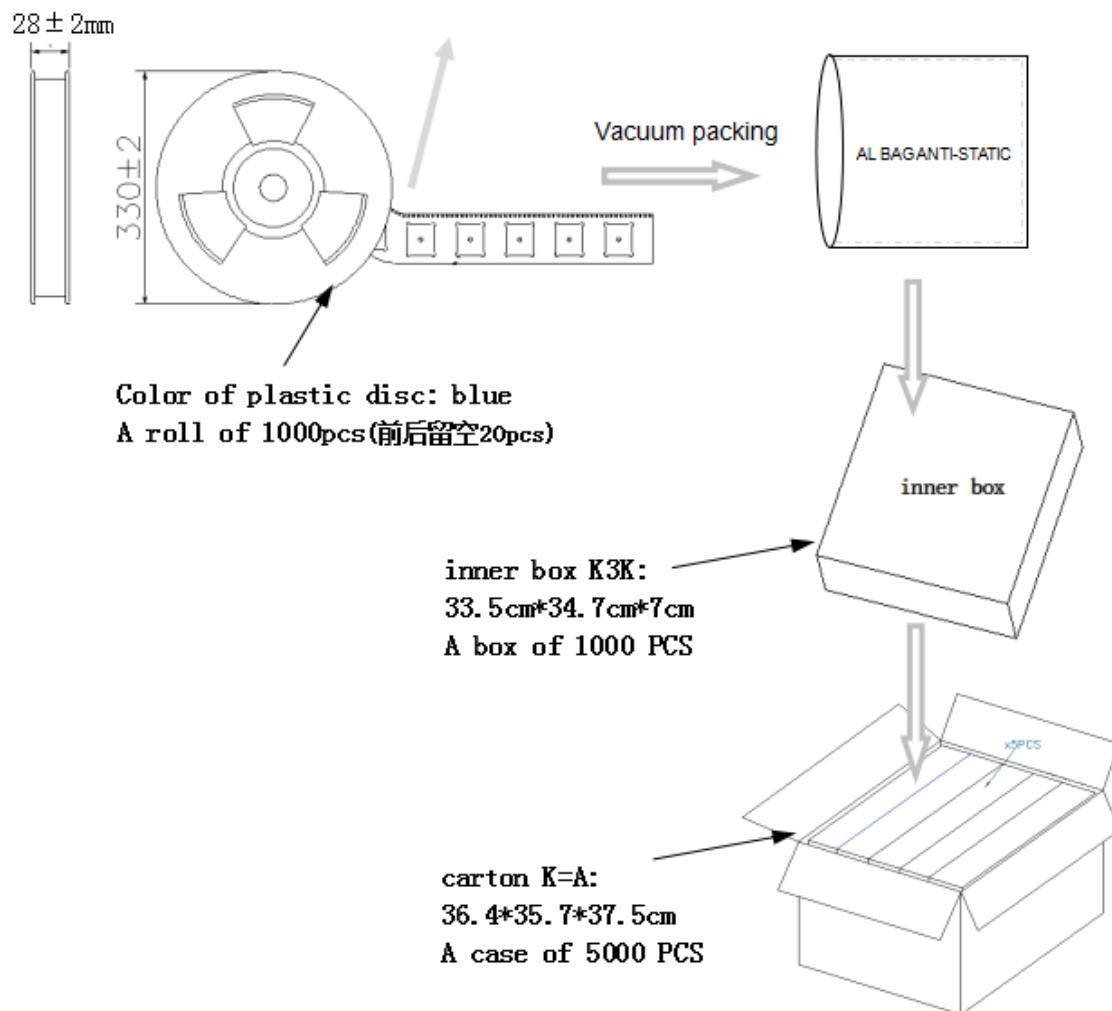
a. Modules must be to remove module moisture problem. (模块须重新烘烤, 以除去模块吸湿问题.)

b. Baking temperature:  $40^\circ\text{C} \pm 5^\circ\text{C}$ , 120 hours. (烘烤温度条件:  $40^\circ\text{C} \pm 5^\circ\text{C}$ , 120小时).

c. After baking, put proper amount of desiccant to seal packages.

(烘烤后, 放入适量的干燥剂再密封包装)

## 8. Packing information:



ESD CAUTION

The WY16600A-00 module is ESD (electrostatic discharge) sensitive device and may be damaged with ESD or spike voltage. Although WY16600A-00 module is with built-in ESD protection circuitry, please handle with care to avoid the permanent malfunction or the performance degradation.

**FCC WARNING**

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this 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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

**15.105 Information to the user.**

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

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.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

**Radiation Exposure Statement:**

This equipment complies with FCC 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.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

The firmware setting is not accessible by the end user.

The final end product must be labelled in a visible area with the following:

“Contains Transmitter Module FCC ID: ROW-CDIWY16600A”

## Requirement per KDB996369 D03

### 2.2 List of applicable FCC rules

List the FCC rules that are applicable to the modular transmitter. These are the rules that specifically establish the bands of operation, the power, spurious emissions, and operating fundamental frequencies. DO NOT list compliance to unintentional-radiator rules (Part 15 Subpart B) since that is not a condition of a module grant that is extended to a host manufacturer. See also Section 2.10 below concerning the need to notify host manufacturers that further testing is required.3

**Explanation:** This module meets the requirements of FCC part 15C(15.247).

### 2.3 Summarize the specific operational use conditions

Also describe conditions that are applicable to the modular transmitter, such as including for example any limits on antennas. For example, if point-to-point antennas are used that require reduction in power or compensation for cable loss, for professional installed equipment, then this information must be in the instructions. In addition, certain information may also be needed, such as peak gain per frequency band and minimum gain, specifically for master devices in 5 GHz DFS bands.

**Explanation:** The EUT has PCB antenna, the module contains permanently attached antennas. See antenna report for antenna details.

### 2.4 Limited module procedures

The Grantee of a limited module must file with the application for certification a procedure[6] that describes the proposed method used to ensure host compliance when the limited module is installed in the host product.

If a modular transmitter is approved as a “limited module,” then the module manufacturer is responsible for approving the host environment that the limited module is used with. The manufacturer of a limited module must describe, both in the filing and in the installation instructions, the alternative means that the limited module manufacturer uses to verify that the host meets the necessary requirements to satisfy the module limiting conditions.

A limited module manufacturer has the flexibility to define its alternative method to address the conditions that limit the initial approval, such as: shielding, minimum signaling amplitude, buffered modulation/data inputs, or power supply regulation. The alternative method could include that the limited module manufacturer reviews detailed test data or host designs prior to giving the host manufacturer approval. The Grantee can devise a strategy to be approved through a Pre-Approval Guidance (KDB Publication 388624 PAG item MODLIM ) inquiry

This limited module procedure is also applicable for RF exposure evaluation when it is necessary to demonstrate compliance in a specific host. The module manufacturer must state how control of the product into which the modular transmitter will be installed and maintained such that full compliance of the product is always ensured. For additional hosts other than the specific host originally granted with a limited module, a Class II permissive change is required on the module grant to register the additional host as a specific host also approved with the module.

**Explanation:** The module is a single module.

## 2.5 Trace antenna designs

If trace antenna designs are applicable, full-detail design specifications are required per D02 Module Q&A Question 11.

For a modular transmitter with trace antenna designs, see the guidance in Question 11 of KDB Publication 996369 D02 FAQ – Modules for Micro-Strip Antennas and traces. The integration information shall include for the TCB review the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.<sup>4</sup>

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiple(s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

The module grantee shall provide a notice that any deviation(s) from the defined parameters of the antenna trace, as described by the instructions, require that the host product manufacturer must notify the module grantee that they wish to change the antenna trace design. In this case, a Class II permissive change application is required to be filed by the grantee, or the host manufacturer can take responsibility through the change in FCC ID (new application) procedure followed by a Class II permissive change application.

**Explanation:** The module with PCB antenna designs, See antenna report for antenna details.

## 2.6 RF exposure considerations

It is essential for module grantees to clearly and explicitly state the RF exposure conditions that permit a host product manufacturer to use the module. Two types of instructions are required for RF exposure information: (1) to the host product manufacturer, to define the application conditions (mobile, portable – xx cm from a person's body); and (2) additional text needed for the host product manufacturer to provide to end users in their end-product manuals. If RF exposure statements and use conditions are not provided, then the host product manufacturer is required to take responsibility of the module through a change in FCC ID (new application).

Module Grantees are required to provide an RF exposure ( RFX) exhibit for CoU related to fixed, mobile or portable configurations, as defined §2.1091 and §2.1093, as well as per further specification in by KDB Publication 447498. This exhibit shall include an RF exposure compliance statement, as well as references to Maximum Permissible Exposure (MPE) or Specific Absorption Rate (SAR) test reports, as required per KDB 447498.

Modules can only be used in a host for the conditions that it was granted for. To be used in any other way them granted, such as mobile to portable or with other transmitters simultaneously, requires additional evaluation, testing, or testing and Class 2 permissive change.

**Explanation:** This module complies with FCC RF radiation exposure limits set forth for an uncontrolled environment, this equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body." This module is designed to

comply with the FCC statement, FCC ID is: ROW-CDIWY16600A.

## 2.7 Antennas

For Part 15 and licensed CMRS Client devices a list of antennas included in the application for certification must be provided in the instructions. For modular transmitters approved as limited modules, all applicable professional installer instructions must be included as part of the information to the host product manufacturer. The antenna list shall also identify the antenna types (monopole, PIFA, dipole, etc. (note that for example an “omni-directional antenna” is not considered to be a specific “antenna type”)).

For situations where the host product manufacturer is responsible for an external connector, for example with an RF pin and antenna trace design, the integration instructions shall inform the installer that unique antenna connector must be used on the Part 15 authorized transmitters used in the host product. The module manufacturers shall provide a list of acceptable unique connectors.

Licensed (non-client station) Modules for a base, fixed station can be stated as conducted, and antenna data is not required when it is clear that the licensee is responsible for the applicable limits under the rules and or license.

**Explanation:** The EUT has PCB antenna, the module contains permanently attached antennas. See antenna report for antenna details.

## 2.8 Label and compliance information

Grantees are responsible for the continued compliance of their modules to the FCC rules. This includes advising host product manufacturers that they need to provide a physical or e-label stating “Contains FCC ID” with their finished product. See Guidelines for Labeling and User Information for RF Devices – KDB Publication 784748.

**Explanation:** The host system using this module, should have label in a visible area indicated the following texts: "Contains FCC ID: ROW-CDIWY16600A"

## 2.9 Information on test modes and additional testing requirements

Additional guidance for testing host products is given in KDB Publication 996369 D04 Module Integration Guide. Test modes should take into consideration different operational conditions for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

The grantee should provide information on how to configure test modes for host product evaluation for different operational conditions for a stand-alone modular transmitter in a host, versus with multiple, simultaneously transmitting modules or other transmitters in a host.

Grantees can increase the utility of their modular transmitters by providing special means, modes, or instructions that simulates or characterizes a connection by enabling a transmitter. This can greatly simplify a host manufacturer's determination that a module as installed in a host complies with FCC requirements.

**Explanation:** Can increase the utility of our modular transmitters by providing instructions that simulates or characterizes a connection by enabling a transmitter.

## 2.10 Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.<sup>6</sup>

**Explanation:** The module is only FCC authorized for the specific rule parts listed on the grant. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed. If the final product contains circuits of other FCC PART 15 Subparts, the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

## 2.11 Note EMI Considerations

Note that a 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

**Explanation:** The host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host. This module is a 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, the host manufacturer has to consult with the module manufacturer for the installation method in the end system. Host manufacturer is recommended to use D 04 Module Integration Guide. The final host product may also need to be evaluated against FCC rule part 15 Subpart B (criteria for unintentional radiators) in order to be properly authorized for operation as part 15B

## 2.12 How to make changes

Since only Grantees are permitted to make permissive changes, it is recommended that module manufacturers provide contact information and some guidance to host providers in the integration instructions if they expect their module will be used differently than granted.

**Explanation:** Module manufacturer contact: Tel: 0755-81449967,

E-mail: Info@cdtech.cn

Antenna information:

	ANT Type	Manufacturer	Model	Peak Gain
Antenna	PCB antenna	CHINA DRAGON TECHNOLOGY LIMITED	CDI-WY16600A	0.45dBi