



WBLC5 Module Datasheet

Device Development > Module > WiFi&BT Dual Mode Module

Version: 20200629

Contents

1	Product Overview	1
1.1	Features	1
1.2	Applications	1
1.3	Change History	2
2	Module Interfaces	3
2.1	Dimensions and Footprint	3
2.2	Interface Pin Definition	4
2.3	Test Pin Definition	6
3	Electrical Parameters	7
3.1	Absolute Electrical Parameters	7
3.2	Working Conditions	7
3.3	Current consumption during constant transmission and receiving . . .	8
3.4	Working Current	9
4	RF Features	10
4.1	Basic RF Features	10
4.2	TX Performance	10
4.3	RX Performance	11
5	Antenna Information	13
5.1	Antenna Type	13
5.2	Antenna Interference Reduction	13
6	Packaging Information and Production Instructions	14
6.1	Mechanical Dimensions	14
6.2	Recommended PCB Encapsulation-Pin header	15
6.3	Production Instructions	16
6.4	Recommended Oven Temperature Curve	17
6.5	Storage Conditions	19
7	MOQ and Packing Information	20
8	Appendix: Statement	21

1 Product Overview

WBLC5 is a low-power embedded Wi-Fi and BLE module that Tuya has developed. It consists of a highly integrated RF chip (BK7231T) and several peripheral components, with an embedded Wi-Fi network protocol stack and robust library functions. WB3L is embedded with a low-power 32-bit microcontroller unit (MCU), 2 MB flash memory, 256 KB static random-access memory (SRAM), and extensive peripherals. WBLC5 is an RTOS platform that integrates all function libraries of the Wi-Fi MAC and TCP/IP protocols. You can develop embedded Wi-Fi products as required.

1.1 Features

- Embedded low-power 32-bit CPU, which can also function as an application processor
- Dominant frequency: 120 MHz
- Working voltage: 3.0 V to 3.6 V
- Peripherals: 3 GPIOs
- Wi-Fi connectivity
 - 802.11 b/g/n
 - Channels 1 to 14 at 2.4 GHz
 - WPA and WPA2 security modes
 - Up to +17 dBm output power in 802.11b mode
 - STA, AP, and STA+AP working modes
 - EZ and AP net pairing modes for Android and iOS devices
 - Monopole antenna with a gain of 4.6 dBi
 - Working temperature: -40°C to +105°C
- BLE connectivity
 - Support for Bluetooth 4.0
 - Maximum output power of +6 dBm

 - Monopole antenna with a gain of 4.6 dBi

1.2 Applications

- Intelligent building

- Smart household and home appliances
- Smart socket and light
- Industrial wireless control
- Baby monitor
- Network camera
- Intelligent bus

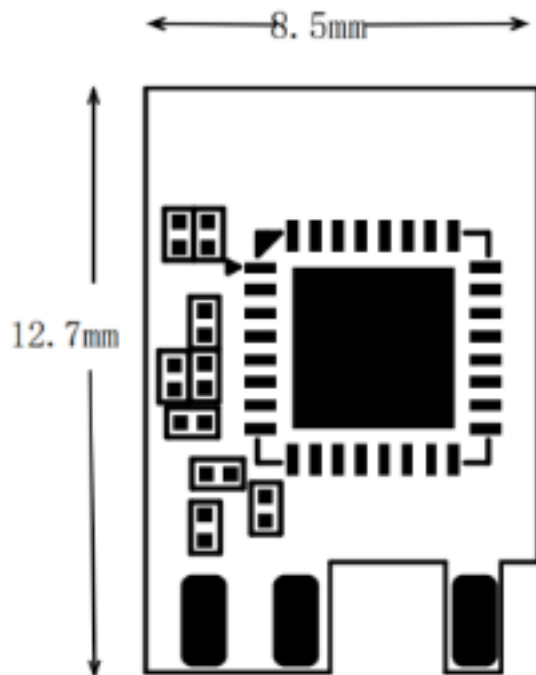
1.3 Change History

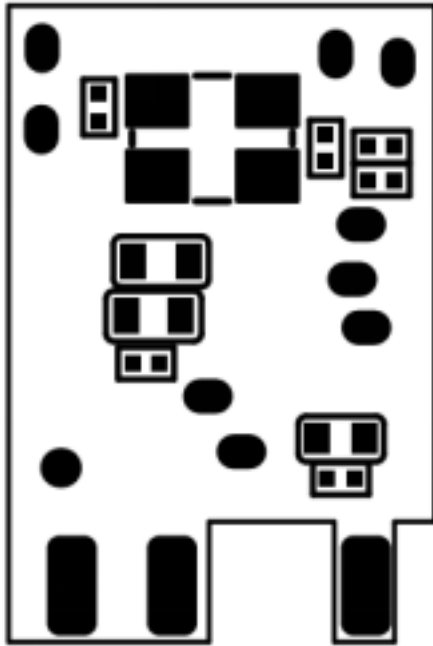
No.	Date	Change Description	Version After Change
1	2019-11-07	This is the first release.	V1.0.0
2	2019-12-10	Modifying typesetting.	V1.0.1
3	2019-12-24	Update BLE related materials	V1.0.2

2 Module Interfaces

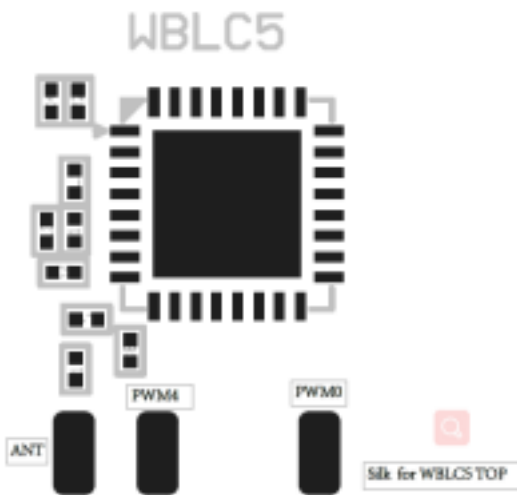
2.1 Dimensions and Footprint

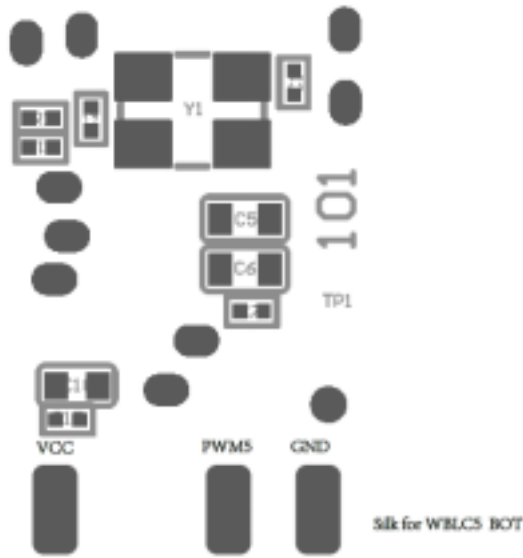
WB3L has two rows of pins with a 2 ± 0.1 mm pin spacing. The WB3L dimensions (W x L x H) are 8.5 ± 0.35 mm (W) x 12.7 ± 0.35 mm (L) x 1 ± 0.15 mm (H).





2.2 Interface Pin Definition





Pin No.	Symbol	I/O Type	Function
1	ANT	O	External antenna pad pin
2	GND	P	Ground pin
3	PWM4	I/O	Hardware PWM pin, which is connected to the P24 pin on the internal IC
4	PWM5	I/O	Hardware PWM pin, which is connected to the P26 pin on the internal IC
5	PWM0	I/O	Hardware PWM pin, which is connected to the P6 pin on the internal IC

Pin No.	Symbol	I/O Type	Function
6	VCC	P	Power supply pin (3.3 V)

Note: P indicates a power supply pin, I/O indicates an input/output pin, and AI indicates an analog input pin.

2.3 Test Pin Definition

Pin No.	Symbol	I/O Type	Function
TP1	TP1	I/O	RF Test Pin

Note: The test pin is not recommended to use.

3 Electrical Parameters

3.1 Absolute Electrical Parameters

Parameter	Description	Minimum Value	Maximum Value	Unit
Ts	Storage temperature	-20	105	°C
VBAT	Power supply voltage	3.0	3.6	V
Static electricity voltage (human body model)	TAMB-25°C	-	2	KV
Static electricity voltage (machine model)	TAMB-25°C	-	0.5	KV

3.2 Working Conditions

Parameter	Description	Minimum Value	Typical Value	Maximum Value	Unit
Ta	Working temperature	-40	-	105	°C
VBAT	Power supply voltage	3.0	3.3	3.6	V

Parameter	Description	Minimum Value	Typical Value	Maximum Value	Unit
VIL	I/O low-level input	-0.3	-	VCC*0.25	V
VIH	I/O high-level input	VCC*0.75	-	VCC	V
VOL	I/O low-level output	-	-	VCC*0.1	V
VoH	I/O high-level output	VCC*0.8	-	VCC	V
I _{max}	I/O drive current	-	-	12	mA

3.3 Current consumption during constant transmission and receiving

Working Status	Mode	Rate	TX Power/ Receiving	Typical Value	Maximum Value	Unit
TX	11b	11Mbps	+17dBm	292	354	mA
TX	11g	54Mbps	+13.5dBm	256	307	mA
TX	11n	MCS7	+13dBm	257	286	mA
RX	11b	11Mbps	Constant receiving	95	102	mA
RX	11g	54Mbps	Constant receiving	98	100	mA
RX	11n	MCS7	Constant receiving	98	100	mA

3.4 Working Current

Working Mode	Working Status (Ta = 25°C)	Average Value	Maximum Value	Unit
EZ	The module is in EZ mode, and the Wi-Fi indicator blinks quickly.	106	386	mA
AP	The module is in AP mode, and the Wi-Fi indicator blinks slowly.	98	405	mA
Connected	The module is connected to the network, and the Wi-Fi indicator is steady on.	58	138	mA
Disconnected	The module is disconnected from the network, and the Wi-Fi indicator is steady off.	40	210	mA

4 RF Features

4.1 Basic RF Features

Parameter	Description
Frequency band	2.412~2.484GHz
Wi-Fi standard	IEEE 802.11b/g/n(channels1-14)
Data transmission rate	11b:1,2,5.5, 11 (Mbps); 11g:6,9,12,18,24,36,48,54(Mbps); 11n: HT20 MCS0~7; HT40 MCS0~7
Antenna type	Monopole antenna with a gain of 1.1 dBi

4.2 TX Performance

Performance during constant transmission

Parameter	Minimum Value	Typical Value	Maximum Value	Unit
Average RF output power,802.11b CCK Mode 11M	-	16	-	dBm
Average RF output power,802.11g OFDM Mode 54M	-	14	-	dBm

Parameter	Minimum Value	Typical Value	Maximum Value	Unit
Average RF output power, 802.11n OFDM Mode MCS7	-	12	-	dBm
Frequency error	-10	-	10	ppm

4.3 RX Performance

RX sensitivity

Parameter	Minimum Value	Typical Value	Maximum Value	Unit
PER<8%, RX sensitivity, 802.11b DSSS Mode 11M	-	-85	-	dBm
PER<10%, RX sensitivity, 802.11g OFDM Mode 54M	-	-72	-	dBm
PER<10%, RX sensitivity, 802.11n OFDM Mode MCS7	-	-68	-	dBm

5 Antenna Information

5.1 Antenna Type

WBLC5 uses a monopole antenna.

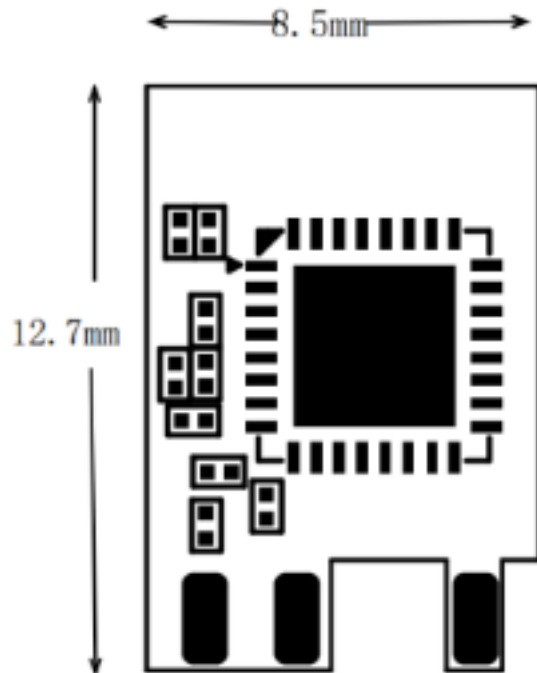
5.2 Antenna Interference Reduction

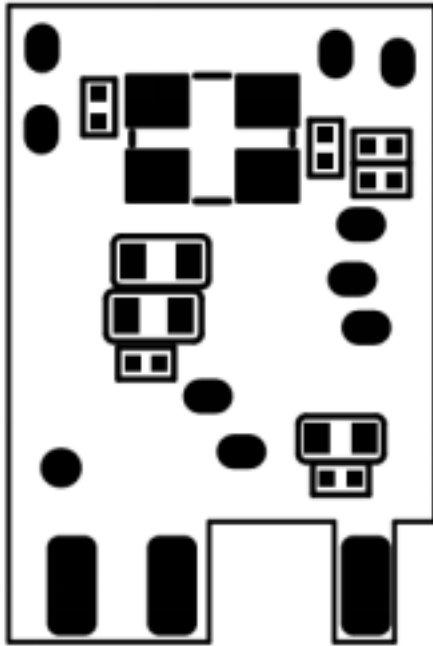
To ensure optimal Wi-Fi performance when the Wi-Fi module uses a monopole antenna, it is recommended that the antenna be at least 15mm away from other metal parts.

6 Packaging Information and Production Instructions

6.1 Mechanical Dimensions

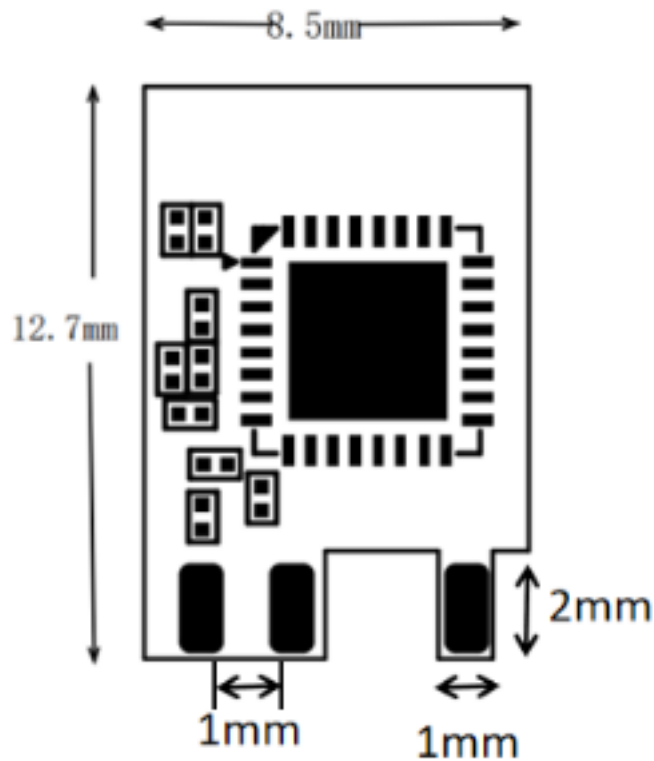
The PCB dimensions: $8.5\pm 0.35\text{mm}$ (W) $\times 12.7\pm 0.35\text{mm}$ (L) $\times 1\pm 0.15\text{mm}$ (H)。





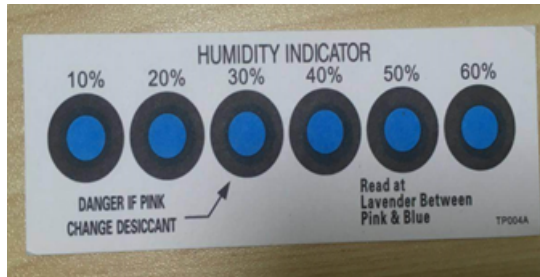
6.2 Recommended PCB Encapsulation-Pin header

WBLC5 module is inserted and welded.



6.3 Production Instructions

1. Use an SMT placement machine to mount components to the stamp hole module that Tuya produces within 24 hours after the module is unpacked and the firmware is burned. If not, vacuum pack the module again. Bake the module before mounting components to the module. A.SMT placement equipment: a)Reflow soldering machine; b)Automated optical inspection (AOI) equipment; c)Nozzle with a 6 mm to 8 mm diameter; B. Baking equipment: a)Cabinet oven; b)Anti-static heat-resistant trays; c)Anti-static heat-resistant gloves;
2. Storage conditions for a delivered module are as follows: A.The moisture-proof bag is placed in an environment where the temperature is below 30°C and the relative humidity is lower than 70%. B.The shelf life of a dry-packaged product is six months from the date when the product is packaged and sealed. C.The package contains a humidity indicator card (HIC).

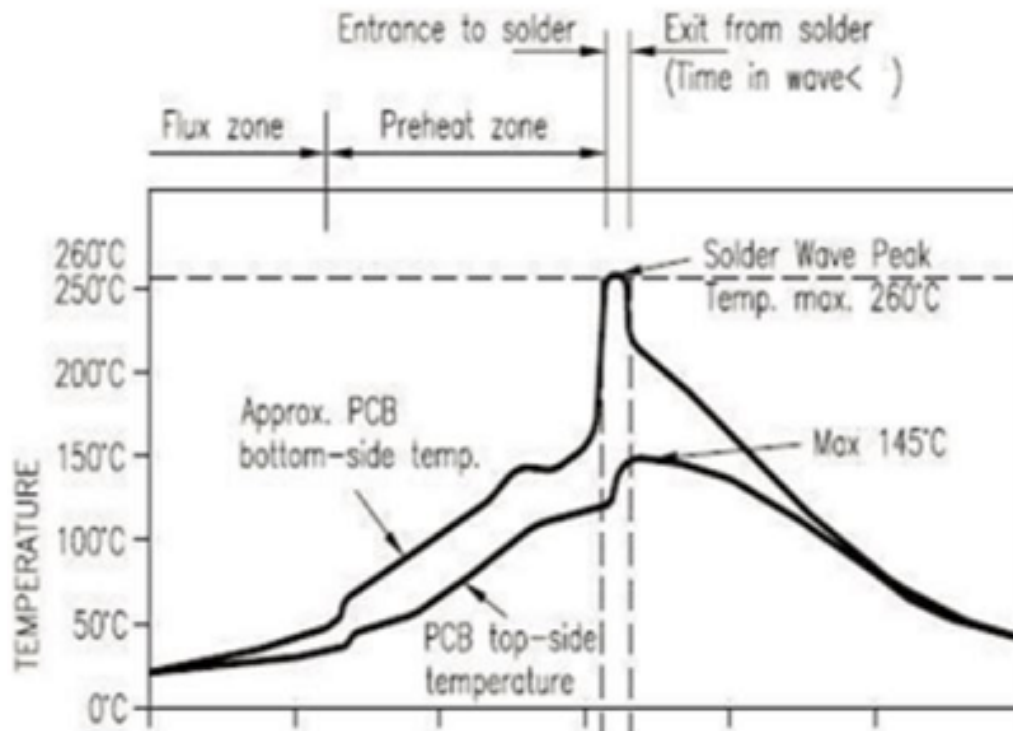


3. Bake a module based on HIC status as follows when you unpack the module package: A.If the 30%, 40%, and 50% circles are blue, bake the module for 2 consecutive hours. B. If the 30% circle is pink, bake the module for 4 consecutive hours. C.If the 30% and 40% circles are pink, bake the module for 6 consecutive hours. D.If the 30%, 40%, and 50% circles are pink, bake the module for 12 consecutive hours.
4. Baking settings: A.Baking temperature: $125 \pm 5^{\circ}\text{C}$; B.Alarm temperature: 130°C ; C.SMT placement ready temperature after natural cooling: $< 36^{\circ}\text{C}$; D.Number of drying times: 1; E.Rebaking condition: The module is not soldered within 12 hours after baking. 5.Do not use SMT to process modules that have unpacked for over three months. Electroless nickel immersion gold (ENIG) is used for the PCBs. If the solder pads are exposed to the air for over three months, they will be oxidized severely and dry joints or solder skips may occur. Tuya is not liable for such problems and consequences.
5. Before SMT placement, take electrostatic discharge (ESD) protective measures.
6. To reduce the reflow defect rate, draw 10% of the products for visual inspection and AOI before first SMT placement to determine a proper oven temperature and component placement method. Draw 5 to 10 modules every hour from subsequent batches for visual inspection and AOI.

6.4 Recommended Oven Temperature Curve

Please insert the parts according to the reflow welding curve. Peak temperature is 245°C :

DIP Type Product Pass Wavesolder Graph



6.5 Storage Conditions



CAUTION
This bag contains
MOISTURE-SENSITIVE DEVICES

LEVEL
3

If Blank, see adjacent bar code label

1. Calculated shelf life in sealed bag: 12 months at < 40°C and < 90% relative humidity (RH)
2. Peak package body temperature: 260 °C
If Blank, see adjacent bar code label
3. After bag is opened, devices that will be subjected to reflow solder or other high temperature process must
 - a) Mounted within: 168 hrs. of factory conditions
If Blank, see adjacent bar code label
 ≤ 30°C/60%RH, OR
 - b) Stored at <10% RH
4. Devices require bake, before mounting, if:
 - a) Humidity Indicator Card is > 10% when read at 23 ± 5°C
 - b) 3a or 3b not met.
5. If baking is required, devices may be baked for 48 hrs. at 125 ± 5°C

Note: If device containers cannot be subjected to high temperature or shorter bake times are desired, reference IPC/JEDEC J-STD-033 for bake procedure

Bag Seal Date: _____
If Blank, see adjacent bar code label

Note: Level and body temperature defined by IPC/JEDEC J-STD-020

7 MOQ and Packing Information

Product Model	MOQ (pcs)	Packing Method	Number of Modules in Each Reel Pack	Number of Reel Packs in Each Box
WBLC5	4000	Carrier tape and reel packing	1000	4

8 Appendix: Statement

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.

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.

Radiation Exposure Statement

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 and your body.

Important Note

This radio module must not be installed to co-locate and operating simultaneously with other radios in host system except in accordance with FCC multi-transmitter product procedures. Additional testing and equipment authorization may be required to operating simultaneously with other radio.

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 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. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed. The end user manual shall include all required regulatory information/warning as shown in this manual, including: This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

The RF module is considered as a limited modular transmitter according to FCC rules. Even though the RF module get a FCC ID, the host product manufacturer can not use the FCC ID on the final product directly. In these circumstances, the host product manufacturer integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining the FCC authorization by a Class II permissive change application or a new application.

Declaration of Conformity European notice



Hereby, Hangzhou Tuya Information Technology Co., Ltd declares that this module product is in compliance with essential requirements and other relevant provisions of Directive 2014/53/EU, 2011/65/EU. A copy of the Declaration of conformity can be found at <https://www.tuya.com>



This product must not be disposed of as normal household waste, in accordance with EU directive for waste electrical and electronic equipment (WEEE- 2012/19/EU). Instead, it should be disposed of by returning it to the point of sale, or to a municipal recycling collection point.

The device could be used with a separation distance of 20cm to the human body.