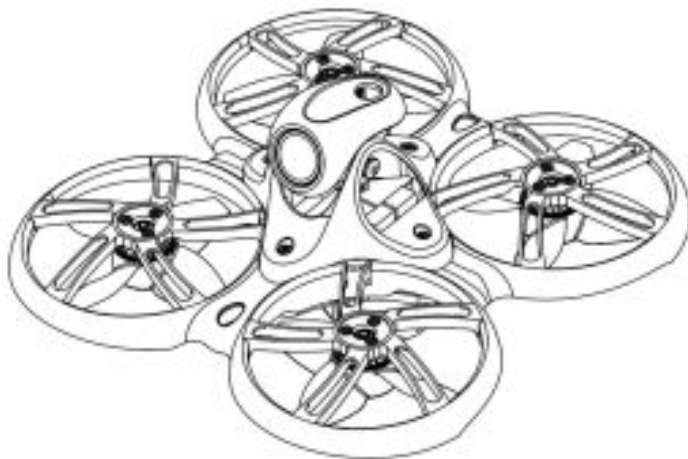




## EMAX TinyHawk III FPV Racing Drone Instruction Manual

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Thanks for purchasing the Tinyhawk III.  
Please follow the instruction manual to assemble and configure your Tinyhawk III.  
Design in California, Made in China

### Disclaimer

1. Please read the disclaimer carefully before using this product.
2. By using this product, you hereby agree to this disclaimer and signify that you have read them carefully and

completely.

3. This product is not suitable for people under the age of 18. Adult supervision is highly recommended for kids under the age of 18.
4. Our Tinyhawk features an open-source flight controller and Electronic Speed Controllers to meet the FPV enthusiasts' need to upgrade their quad. Please read the instruction manual and warnings carefully.
5. Before every flight, make sure the battery is fully charged and power connections are secure.
6. DO NOT fly around crowds, children, animals or objects.
7. EMAX ACCEPTS NO LIABILITY FOR DAMAGE(S) OR INJURIES INCURRED DIRECTLY OR INDIRECTLY FROM THE USE OF THIS PRODUCT.

## Precautions

1. Please follow the instructions to assemble and to operate this product correctly.
2. Do not use this product if you have a physical or mental illness, dizziness, fatigued, or use while under the influence of alcohol or drugs.
3. Please fly in a safe area away from people
4. Do not modify or use other parts and accessories not approved for the use of EMAX.
5. Do not use this product in harsh environments (such as winds, rain, lightning, snow, etc.).
6. Do not use this product in a strong electromagnetic environment.

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## Product specification

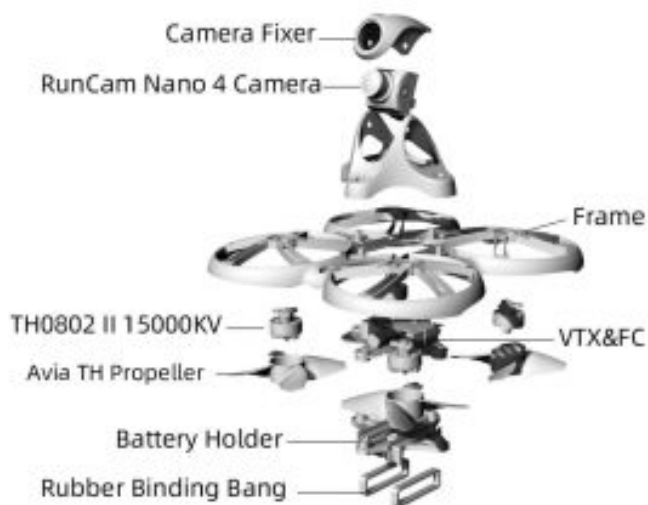
Size and weight	
Diagonal Wheelbase (Without propeller)	76mm
Maximum size of Drone (Without propeller)	L.W*H=105x105x45mm
Drone weight (Without battery)	32g
Motor	TH0802 II 15000KV
Propeller	Avia TH Propeller
Mainboard	F4 ( STM32F411 firmware) 4in1 5A ESC EMAX Tiny receiver (SPI receive mode, Frsky D8 )
Camera	RunCam Nano 4 Camera
VTX	200-100-25MW adjustable frequency 37CH, support SmartAudio
Battery	1S HV 450mAh

## Product list

Tinyhawk III .....x 1  
 Emax 1s HV 450 mAh..... x1  
 Charger.....x1  
 Propeller..... (2XCW, 2XCCW)  
 Spareparts..... x 1

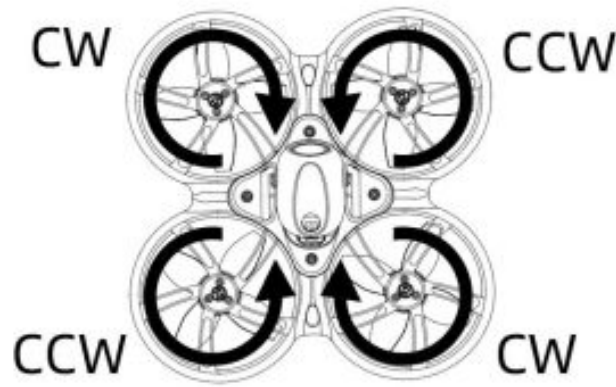
## Tinyhawk III propeller

### Tinyhawk III structure diagram



## Propeller installation & removal

The Tinyhawk III propeller has two directions of rotation: clockwise (CW) and counterclockwise (CCW). When purchasing a set of propellers, please purchase 2 clockwise blades and 2 counterclockwise blades. The blade rotates along the blunt edge of the blade. When installing the propeller blade, please install it in the correct direction of the propeller blade as shown in the figure below.



## Propeller installation

Align the 3 shafts of the propeller with the 3 shafts of the motor, supporting the back of the motor, then press the blade in by hand until it is flush with the motor shaft.

**Note:** If the propeller is installed incorrectly, the Tinyhawk III cannot fly normally and cannot be controlled. Please carefully check whether the propeller is in the correct direction; if there is no support on the back of the motor, it may cause the frame to break; pay attention to safety when installing the propeller.

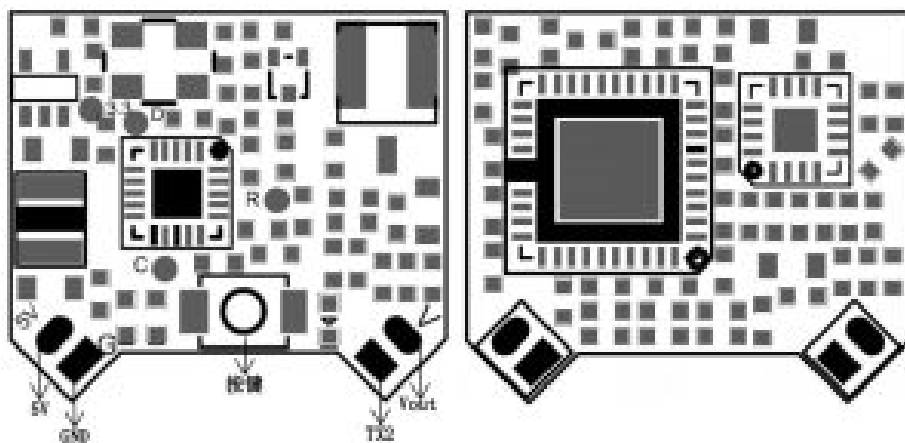
## Propeller disassembly

Use a small tool (such as a 1.5mm hex wrench or a small screwdriver) to press on the metal at the bottom of the motor and Tinyhawk III. Grasp the blade of the propeller with your fingers until the propeller pops out of the motor.

**Note:** It is only necessary to disassemble the propeller when replacing a new propeller; pay attention to safety when dismantling the propeller and when using tools.

## Tinyhawk VTX Settings

Vtx Schematic and Button Diagram



## Changing VTX setting via Betaflight OSD

Tinyhawk III is equipped with SmartAudio and is already configured with stock settings. The SmartAudio line is operated on UART 2 TX.

Follow the prompts on the screen to enter the main setting menu. The throttle is in the middle, the direction is to the left, and the pitch is up (THROTTLE MID+ YAW LEFT+ PITCH UP) to enter the OSD parameter adjustment menu, as shown in Figure 1.

In the menu interface, switch the pitch up/down (PITCH) and select the menu option. Move the cursor to "FEATURES" and stir the ROLL lever to the right to enter the next menu. as shown in Figure 2. Use the PITCH

joystick to move the cursor to “VTX SA”, as shown in Figure 3. Then pull the roll (ROLL) lever to the right to enter the VTX configuration menu. as shown in figure. In the menu of VTX SA, we can configure BAND, CHAN and POWER. Pull the PITCH lever to move the cursor up and down to select the VTX option that needs to be set. Once the parameters are set, move the cursor to “SET”, then turn the joystick to the right, enter “SET” and select “YES”, turn the joystick to the right to save the set parameters, as shown in Figure 5.

In the VTX SA menu, move the cursor to “CONFIG” to enter the menu; move the cursor to “PIT FMODE” and pull the ROLL lever to the right to turn off the VTX power supply.as shown in figure6.



Figure 1



Figure 2



Figure 3

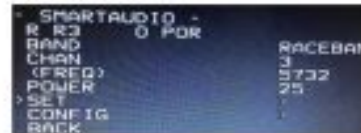


Figure 4

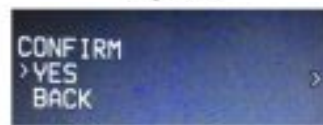


Figure 5



Figure 6

## Press the key to set the VTX channel

**Note:** You must “disable” the VTX Smart Audio on UART 2 in order for the push-button VTX adjustment to work as described below.



## Normal display

All LEDs on the VTX are normally off until the button is pressed. To check the band and channel status clicks the button once quickly, and the LED starts to indicate frequency band and frequency channel. First, indicate the frequency band and then indicate the frequency channel. After both 2 rounds of LED display cycles, all LEDs will turn off.

Press and hold the button for 5 seconds to enter the menu. After entering the menu, the band LED lights up.

Press the button again for 5 seconds to save the parameters and exit the menu.

After saving and exiting the menu, all LED indicators are off.

## Menu Entry / Exit

1. Press the button and hold for 5s to enter the menu. After entering the menu, BAND LED lights up.
2. Press the button and hold for 5s again to save parameters and exit the menu. After saving and exiting the menu, all LED goes out.

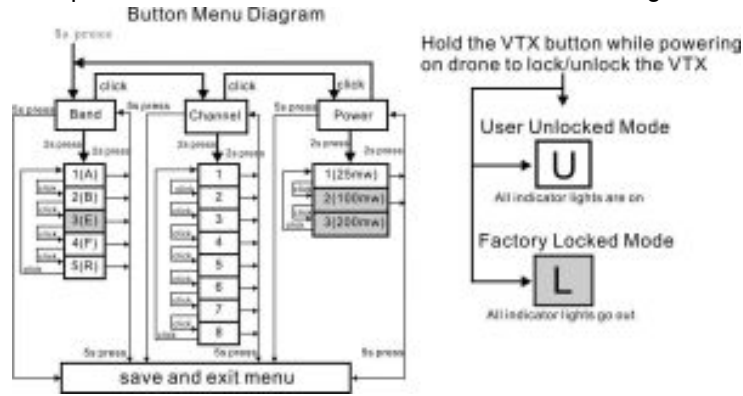
## Band and Channel parameter change

After entering the menu, a short click button to switch frequency group band(b)/frequency channel (C), and the LED of the corresponding menu is lit.

## Enter/Exit Parameters

After choosing the menu, press the button and hold for 2s to enter the parameter option.

Notice: If you use SmartAudio to switch to an illegal channel, Tinyhawk III will not have video transmission. To switch back to a legal channel, press the button on vtx and follow the vtx menu guide shown below.



## Default ≤ 25mW Output)

FR/CH	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	
A	5865	5845	5825	5805	5785	5765	5745	—	MHz
B	5733	5752	5771	5790	5809	5828	5847	5866	MHz
L	—	—	—		—	—	—	—	MHz
	5710	5760	5780	5800	5820	5840	5860	—	MHz
li _	—	—		5769	5806	5843	—	—	MHz

FCC: Ham radio license is required for use in North America.

EU/CE: The frequency is restricted to prevent transmission outside the specified CE frequency.

## Unlock configuration

FR/ CH	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	
A	5865	5845	5825	5805	5785	5765	5745	5725	MHz
B	5733	5752	5771	5790	5809	5828	5847	5866	MHz
E	5705	5685	5665	5885		5905	—	—	MHz
F	5740	5760	5780	5800	5820	5840	5860	5880	MHz
li	5658	5695	5732	5769	5806	5843	5880	5917	MHz

FCC: Ham radio license is required for use in the USA.

EU/Europe: Do not use unlock configuration.

E-band channels 4, 7, and 8 are restricted to prevent transmission outside the designated amateur radio frequencies. Adjustable video output power is only applicable to specific models.

\* When the user purchases this product, it means that he/she understands these responsibilities and will operate the equipment legally. EMAX does not assume any responsibility for the user's purchase and/or use of this product in violation of government regulations.



## Binding Procedure

Binding is the process of uniquely associating a particular receiver to a transmitter module.

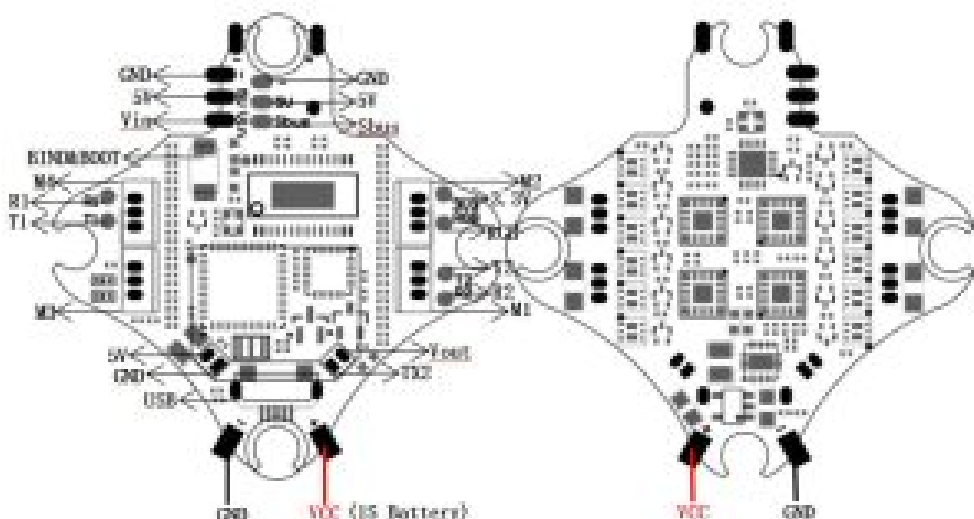
A transmitter

the module can be bound to multiple receivers (not to be used simultaneously). A receiver can only be bound to one transmitter module.

1. Hold the bind button while powering on the receiver. When the BLUE LED is on, it means the receiver is in BIND MODE
2. Turn on the transmitter, make sure it is set to D8 mode, and then set it into bind status. When the BLUE LED of the receiver starts flashing, it means bind successfully.
3. Turn on the transmitter again, the BLUE LED receiver will be on, it means the receiver is receiving data from transmitter. Transmitter bind with receiver no need a repetitive operation, unless you change either receiver or transmitter.

The receiver can be instructed to enter the binding mode through the Betaflight configurator. Type the following command in the CLI tab: `bind_rx` Click the Enter key, your receiver will enter the binding mode, and then follow the binding steps 2 and 3 to complete the binding process.

## Tinyhawk III Flight Control Diagram



This flight controller has an MCU(STM32F411CEU6) with an MPU6000 gyro. Tinyhawk III flight controller comes pre-programmed and properly tuned for optimal flight. For a full tune and configuration setting file (CLI dump file) please visit <https://emax-usa.com/> for the CLI dump file.

Stock Flight Controller Settings

PID profile 1 is tuned and optimized for Tinyhawk III and Emax 1S HV 450 mAh for proper flight indoors and outdoors. Please do not change these values.

This configuration has been professionally adjusted by many parties, and EMAX strongly recommends not to change these values arbitrarily.



## Adjusting Software Settings (Betaflight Configurator)

Betaflight Configurator can be used to change programmed settings on Tinyhawk III.

Betaflight Configurator and flight controller firmware can be downloaded at <https://github.com/betaflight/>. The hardware target for Tinyhawk Flight Controller is MatekF411

### DISCLAIMER:

We do not suggest changing any PID settings on TinyhawkIII or upgrading the firmware to new versions. Tinyhawk III comes stock with an optimal tune for proper flight performance. Changing this can affect flight time, overall speed, control of the aircraft, and excessive heat within the motors.

## Reprogramming Tinyhawk Flight Controller

Put the Flight Controller in DFU mode by pressing the BOOT button while plugging in the micro USB cable to a computer.

Select STM32F411 as the target and then select the firmware. Select Manual Baud Rate with 256000 in the drop-down menu

Select Load Firmware(Online) to download the firmware

Select Flash Firmware to program the flight controller

### Set the Correct Settings

Download the latest CLI Dump File from <https://emax-usa.com/>

Connect Tinyhawk to Betaflight configurator and select the CLI tab

Open the CLI Dump File in a text editor and copy all the text.

Paste the settings into the command bar and press enter

Tinyhawk III will reconnect to Betaflight when completed



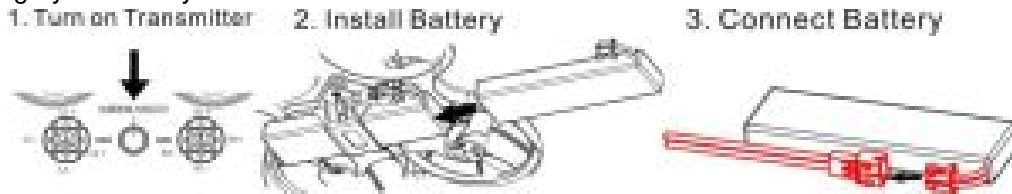
## How To Fly Tinyhawk III



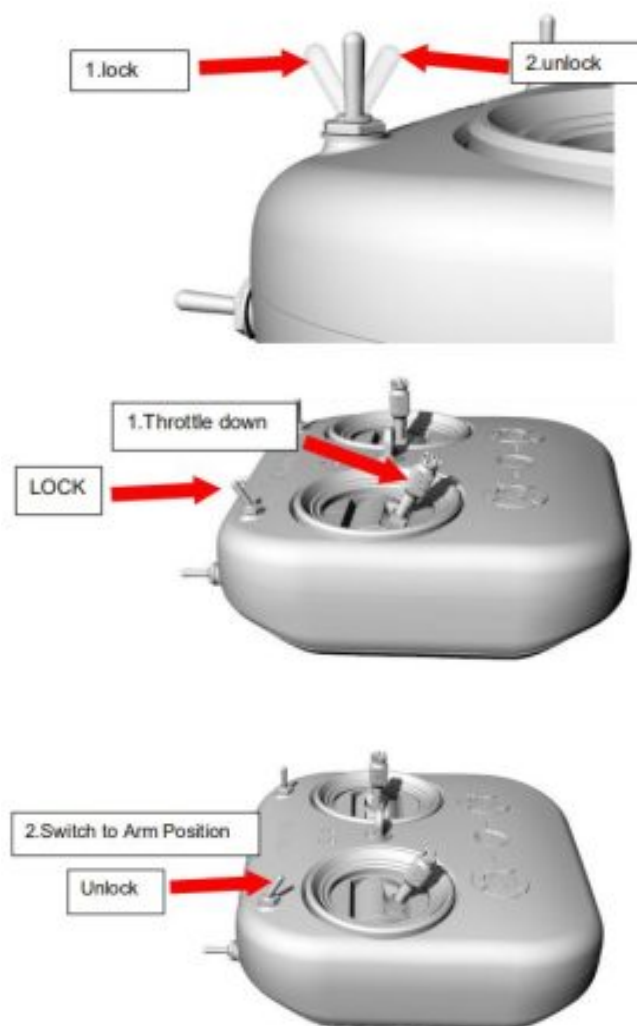
Before turning on the drone, please learn the controls first, and then turn on the drone. Be cautious when flying and operate in an open and controllable area. (Take EMAX's E8 Transmitter and Transporter 2 Goggles as examples).

First, turn on the power of E8 Transmitter and Transporter 2. Tinyhawk III has been bound to E8 Transmitter and matched with your Transporter 2 on the correct video channel. Turn on your Tinyhawk III by sliding the battery into the battery tray and plugging in the power source. After the battery is inserted, place the Tinyhawk III on a level and stable surface so that it can be calibrated.

Calibration takes a few seconds, and then Tinyhawk III can fly. Tinyhawk III can fly for up to 4 minutes when the battery is fully charged. When the battery power reaches 3.2v, please land the Tinyhawk III; flying longer will seriously damage your battery and is not recommended.



Unlock



Arming refers to setting Tinyhawk III to begin flying. When Tinyhawk III is powered on for the first time, it will not spin the propeller until it is armed.

1. First move the throttle to the bottom position to control the aircraft,
2. Then move the left switch of the E8 Transmitter to the third position.

When Tinyhawk III is successfully armed, you will see the propellers spinning.

**Note:** In the event of a collision, Tinyhawk III must stop flying immediately. Failure to stop the flight in time will damage Tinyhawk III. Before handling Tinyhawk III, be sure to switch the switch to an unarmed position.

**Flight**



The AUX 2 switch is set as a 3-level switch to change this model. When AUX 2 is in the first position, Tinyhawk III will be in Angle Mode and stabilize the aircraft. When the switch is in the middle 2nd position, Tinyhawk III will be in Horizon Mode, allowing the drone to perform acrobatics by tilting roll or pitch all the way to the end. The third position is Rate Mode which will turn off Gyro Stabilization which is recommended for experienced pilots who wish to perform acrobatics and professional maneuvers.

1. **Beginner Mode (Angle Mode):** The maximum angle of Tinyhawk III is limited during flight to help limit speed and make flying easier. In this mode, the control of the aircraft is based on attitude. The pitch and roll input from the remote control controls the pitch and roll angle of the aircraft. For example, a 20-degree tilt of the joystick will be converted into a 20-degree tilt of the Tinyhawk III.
2. **Intermediate mode (Horizon Mode):** This mode has a higher angle limit and is used for higher speed flight with the same attitude control. The only difference is that at the end of the gimbal for pitch and roll, it will cause the aircraft to flip in that direction.
3. **Advanced mode (Rate Mode):** This mode allows you to fully control the aircraft. There are no more angle restrictions, and control is based on rate. This means that the control input from the joystick sets a rotation rate on the axis.

## Straight Flight

To learn how to fly Tinyhawk III, you must first fly within sight (without wearing a Transporter 2 Goggles). Turn on the power of Tinyhawk III and place it in a safe and empty room. Start Tinyhawk III, then use the left stick to raise the throttle to the hovering position. First try to maintain a stable altitude, the left and right thumbs control the throttle pitch angle of the joystick, so that the Tinyhawk III can fly normally. You need to practice many times until you have reached a level of proficiency.

## Advanced Flight-First Person View (FPV) Flight

After you have certain basic operating skills, you can try to fly with the Transporter 2. Make sure that the Tinyhawk III and Transporter 2 goggles are on the same VTX channel, choose an open and safe place to fly, and operate according to your experience. Control the throttle to keep the aircraft level and fly slowly, which makes it easier to learn to fly FPV. When you have enough flying experience, you can control Tinyhawk III freely in the air. The Transporter 2 screen display (OSD) image data from the Tinyhawk III camera. OSD displays important information such as flight time and battery voltage. During the flight, please always pay attention to these numbers to understand the remaining battery time. Tinyhawk III can fly up to 4 minutes. When the battery reaches 3.2v, let Tinyhawk III land. It is not recommended that the battery voltage be below 3.2v, otherwise, the battery will be damaged.

### Warning:

Try to maintain a controllable altitude flight. Do not slam the joystick when controlling Tinyhawk III, as this will make the aircraft difficult to control; do not let the battery be lower than 3.2v; when the default AUX3 switch is set

to the second position (middle), A buzzer will be activated to find Tinyhawk III.  
Thank you for purchasing our product! Enjoy your flight with EMAX.




### Warning

REMINDER Please pay attention to the safety of your surrounding. Not Recommended for persons under 18 years of age!



## Documents / Resources

	<p><a href="#">EMAX TinyHawk III FPV Racing Drone</a> [pdf] Instruction Manual TinyHawk III, FPV Racing Drone</p>
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