TwinCat + VT-SW6EC Combinatorial test

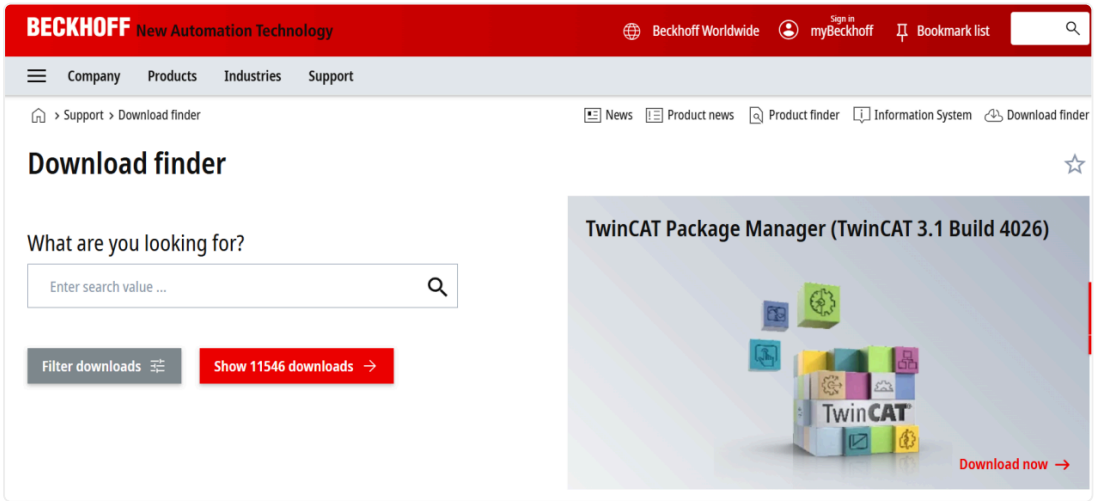
Description of Test Topology and Procedure

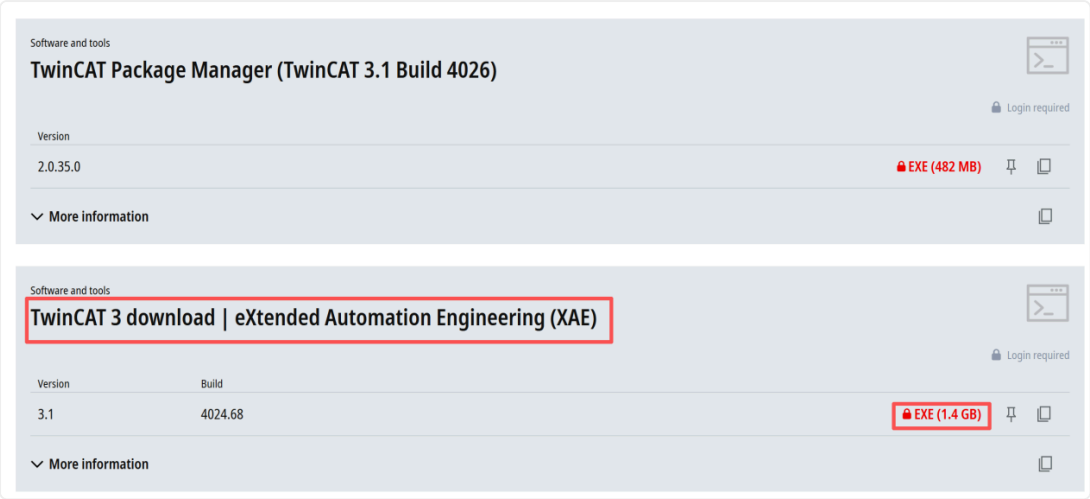


To test the VT-SW6EC product, you must install the TwinCAT 3 software on a PC and import the corresponding product XML file. As this is an unmanaged device, it cannot be accessed directly; instead, operational commands (such as button presses) must be issued via an I/O control module. These actions will be reflected in the TwinCAT software through port topology and signal level changes, which can then be used to verify that a specific port is functioning correctly.

1. Downloading TwinCAT 3 Software

① TwinCAT 3, a standard software used for Beckhoff products and industrial automation systems, can be downloaded from the official Beckhoff website. You will need to register an account; simply provide the required information. Once your registration request is submitted, an activation notification will be sent to your email address. Click the link in the email to activate your account, after which you will be able to log in.





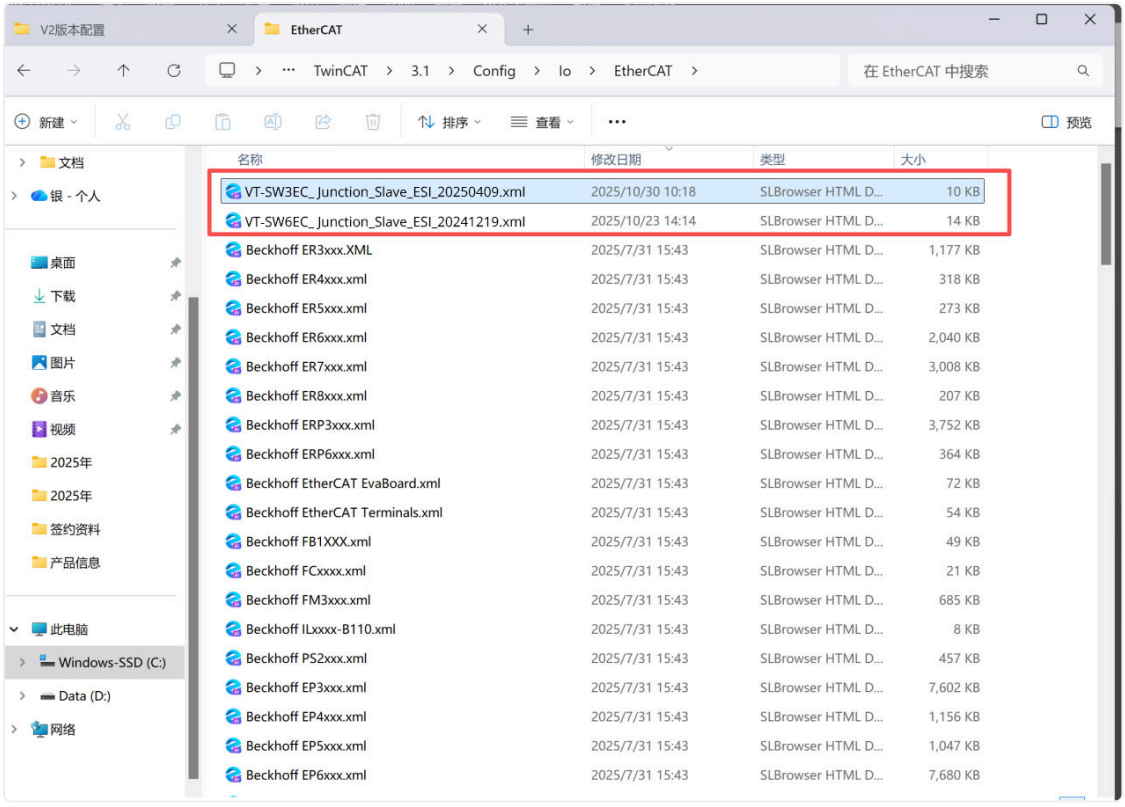
② After downloading the TwinCAT software, you will need to install it properly. Beckhoff's official website provides a video installation tutorial that you can refer to: TwinCAT 3 Installation Tutorial (2 minutes) | Beckhoff Virtual Academy.

Note: We have encountered a prompt/message during our installation process: **"twincatError starting TwinCAT system!Init4\RTime: Start Interrupt: Ticker started >> AdsError: 4132 (0x1024RTIME: incompatible software detected) For further information start the event viewer and open the application109."**
Action: Shut down the virtual machine running the Windows operating system.

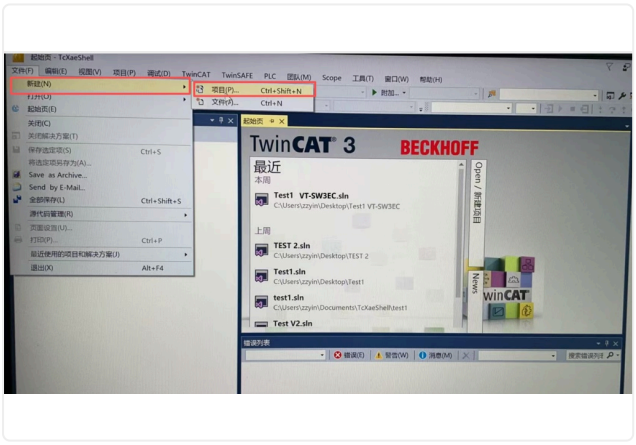
2. Using TwinCAT 3 Software to Test the VT-SW6EC Product

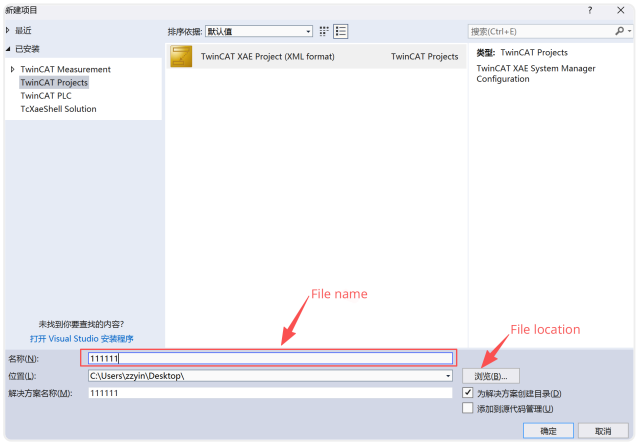
① Once the software is installed, an icon will appear in the system tray (on the taskbar), indicating a successful installation. Right-click this icon and select "TwinCAT XAE (TcXaeShell)" to launch the software.

② Before launching the software, you must place the "XML" file for the VT-SW3EC / VT-SW6EC product into the following directory: `C:\TwinCAT\3.1\Config\Io\EtherCAT` (simply copy and paste the file there). This ensures that the software can recognize the corresponding product configuration when you create a new project for testing.

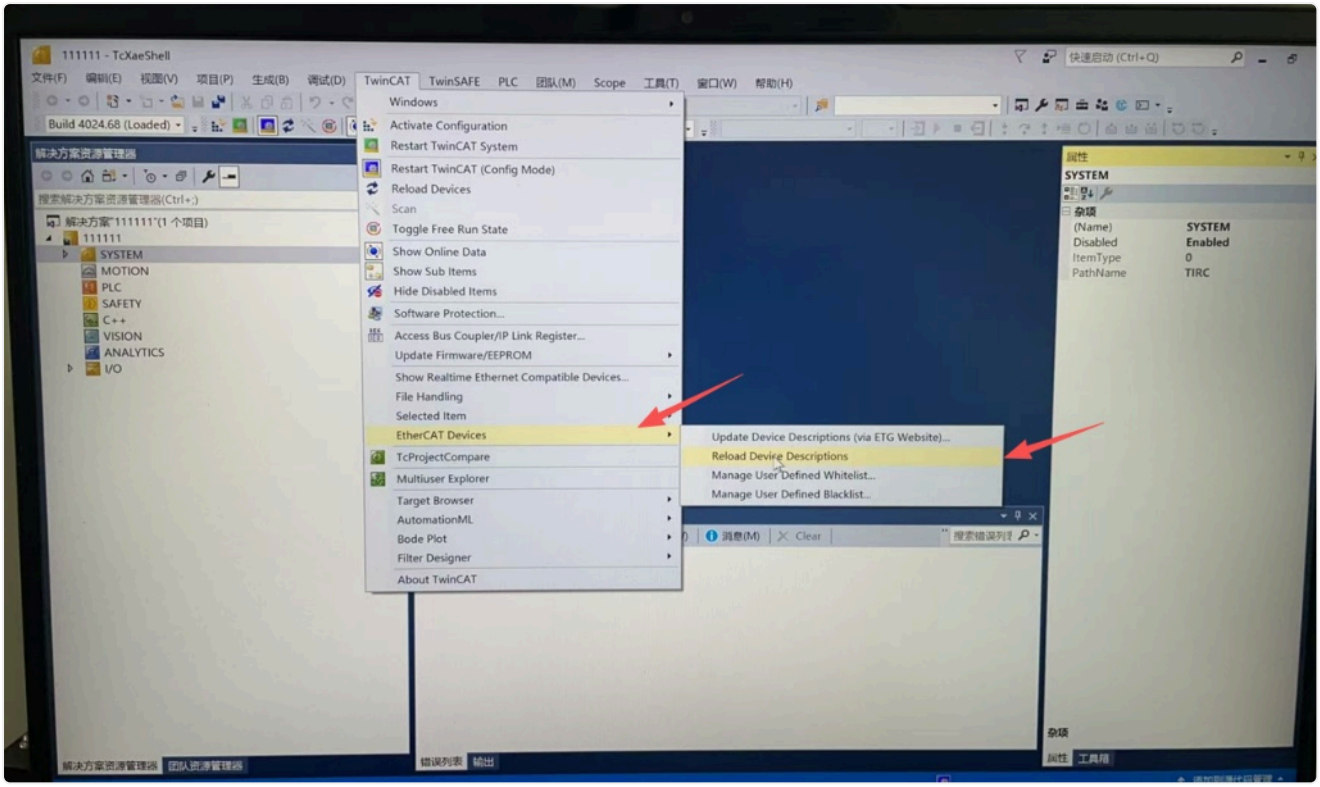


③ To create a new project, go to "File > New > Project." You can specify the file location and name, then simply click "OK" to create the new project.

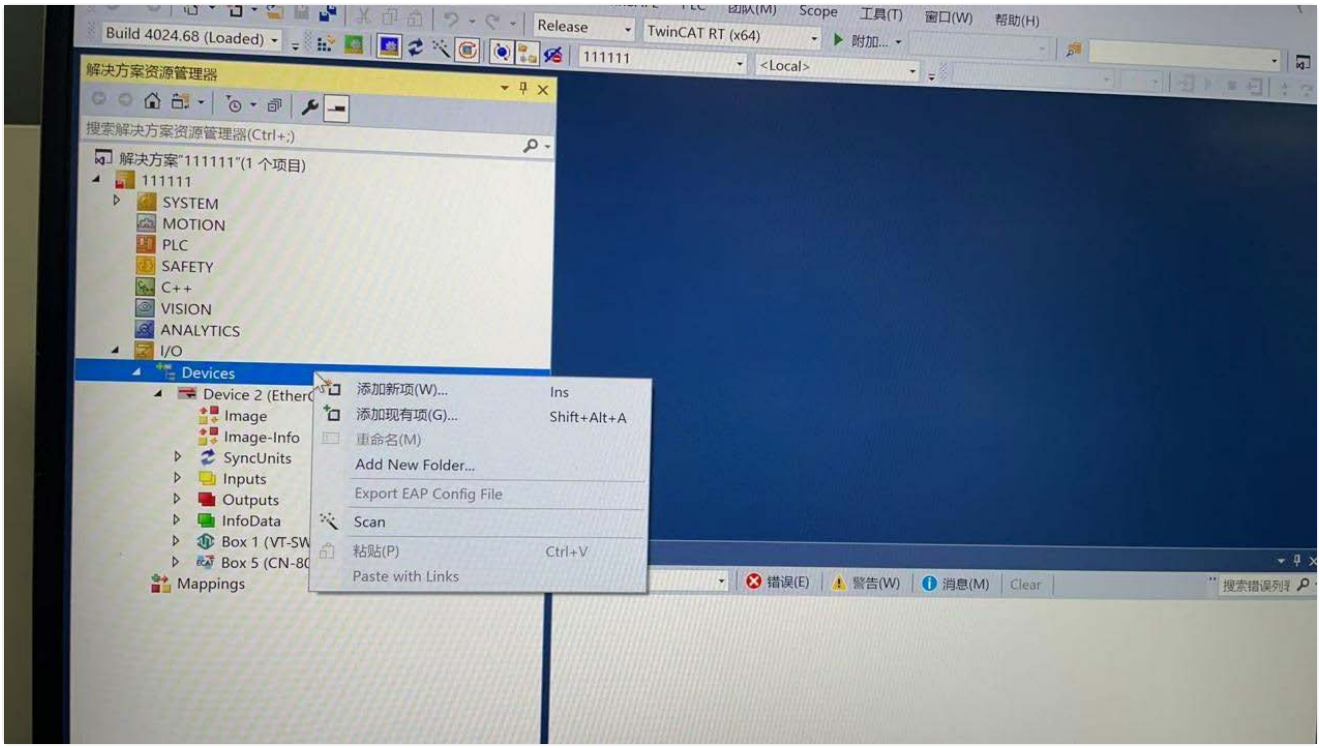




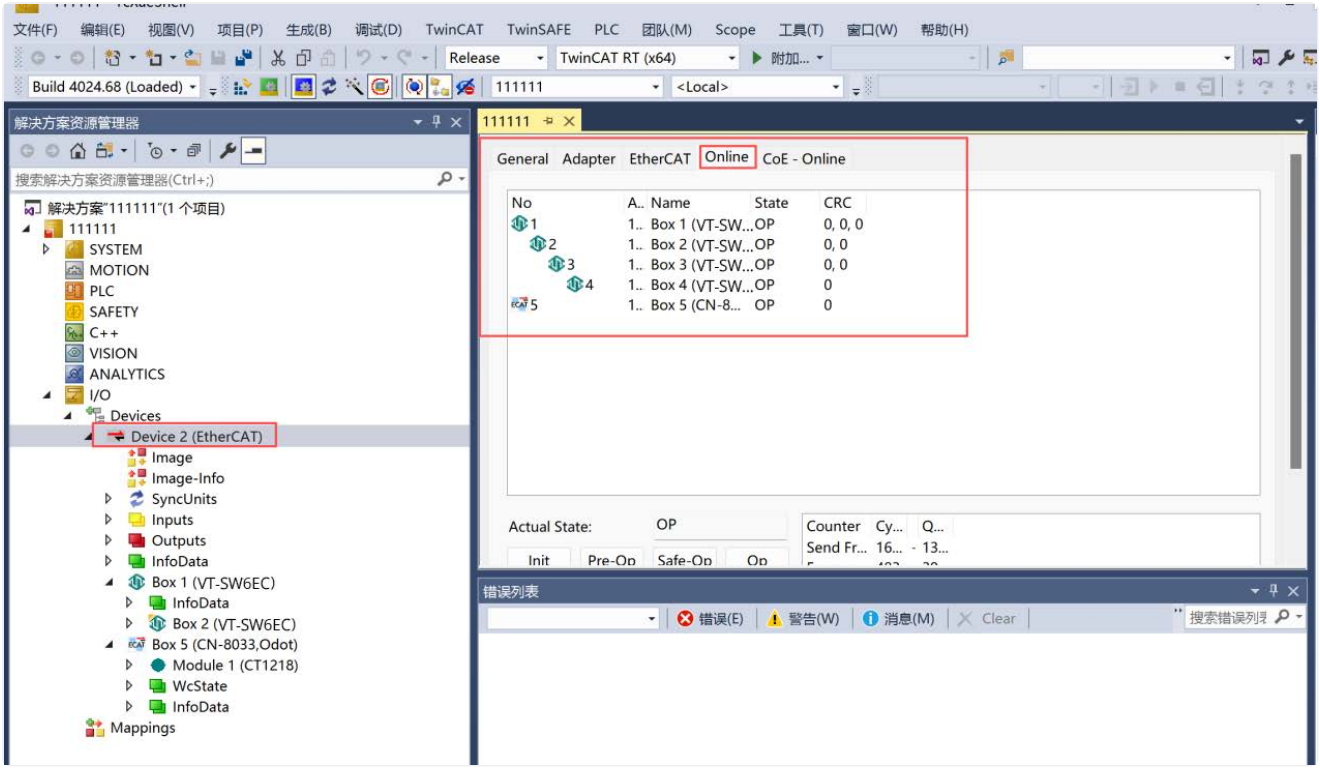
④ After importing the XML file, it is best to reload it to ensure the program can be read; simply select "TwinCAT-EtherCAT Devices-Reload Device Descriptions" from the top toolbar and click it.



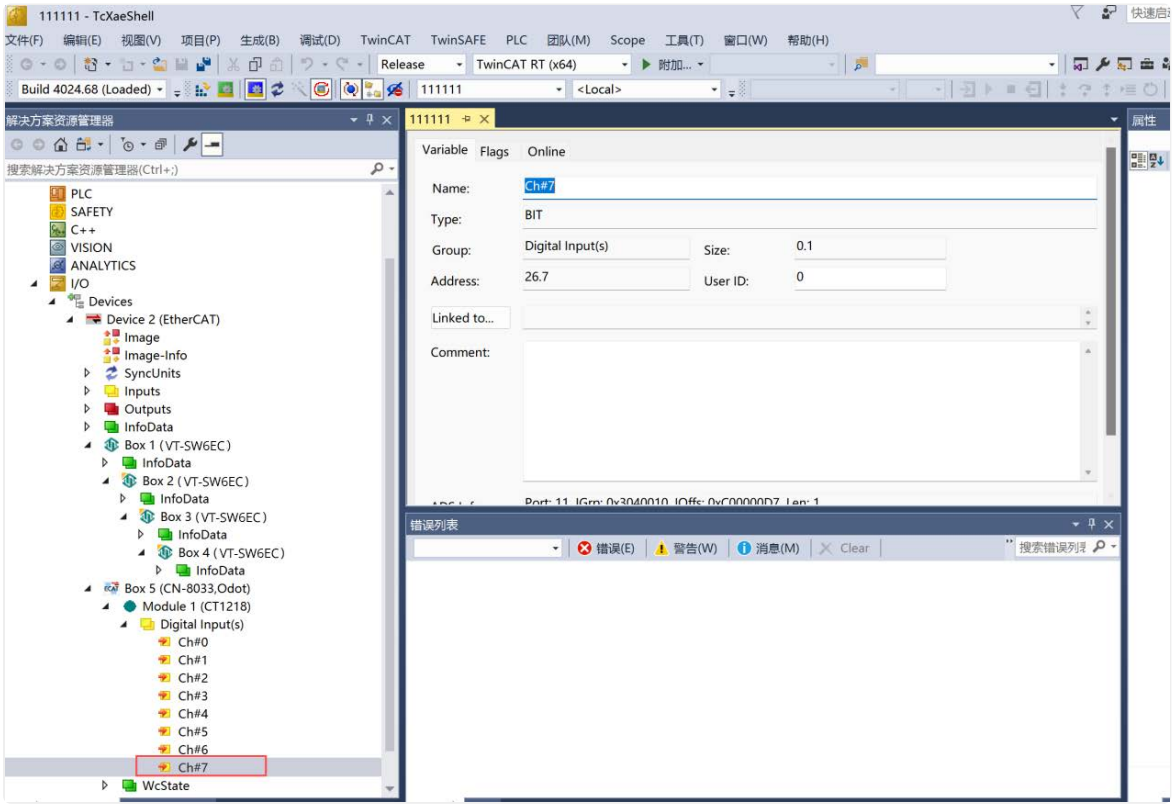
⑤ In your new project, right-click on "IO-devices" and select "Scan." Then, click "Confirm/Yes/OK" as prompted to get the entire test setup running.



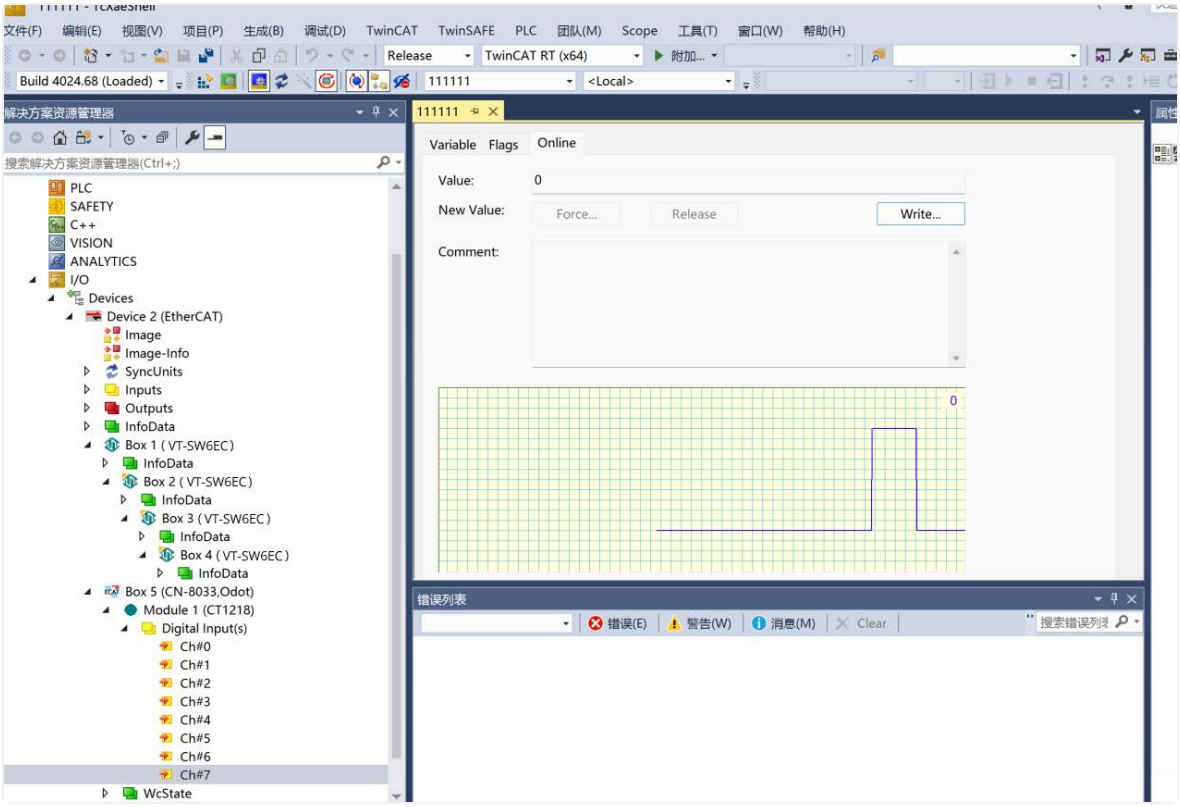
⑥ Double-click "Device 2(EtherCAT)-Online" to view the topology in the center of the software interface (displayed as "Topology 2" in newer versions, or "Topology 4" in older versions).



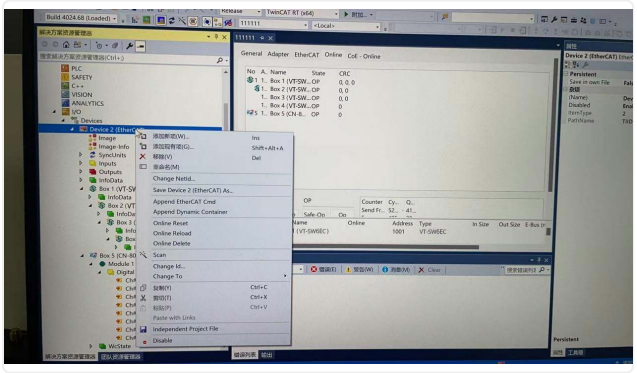
⑦ Click on "Box 5 (CN-8033.Odot) - Module 1 (CT1218) - Digital Input(s) - ch#7" (note: the specific port depends on where the switch is connected to the I/O module; for this test, it is connected to the DI7 port). You will see terminal information in the middle of the page, and the signal level can be observed under the "Online" status.

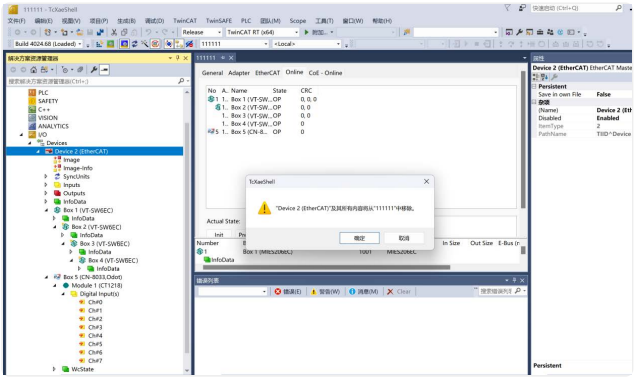


⑧ Enter "Online" mode; you can observe the signal level change by operating the switch (button). The level shifts between 0 and 1, with the state becoming "1" when the switch is pressed.



⑨ This test is conducted via port 2 of the industrial Ethernet switch. If you wish to test a different port, you must first remove the existing configuration and perform a new scan: right-click "Device 2 (EtherCAT)" and select "Remove," then confirm. To test another port, simply run a new "scan."





Special Note (R&D Documentation)

Regarding the internal interfaces of the VT-SW6EC

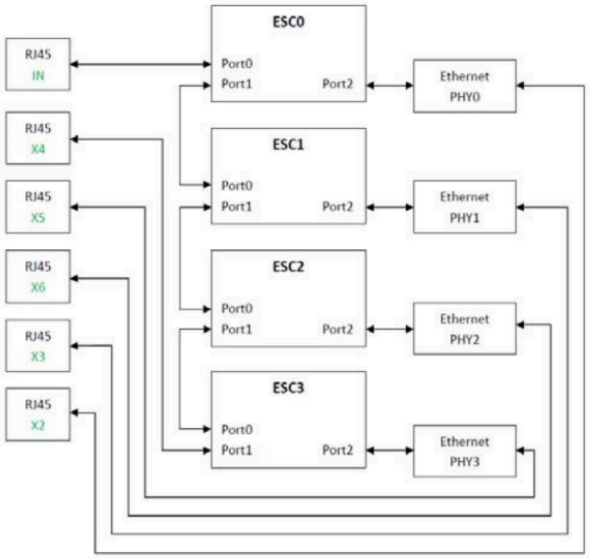


图 1：V1 设备内部拓扑

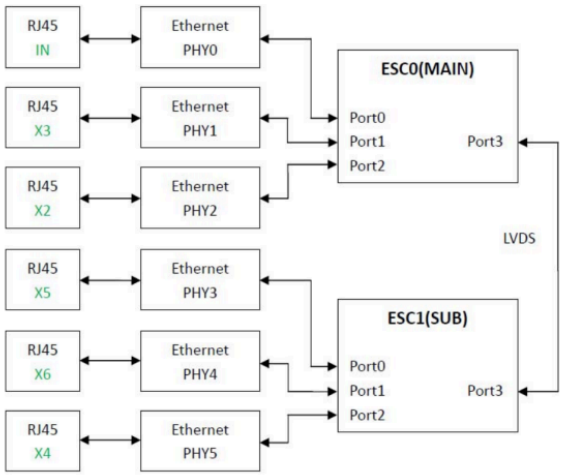
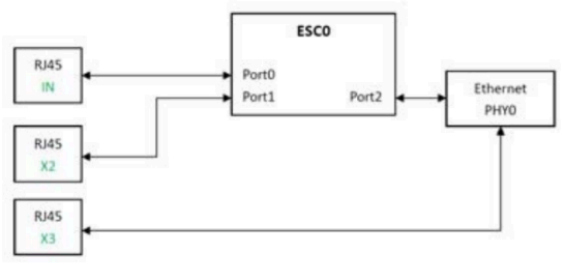


图 2：V2 设备内部拓扑

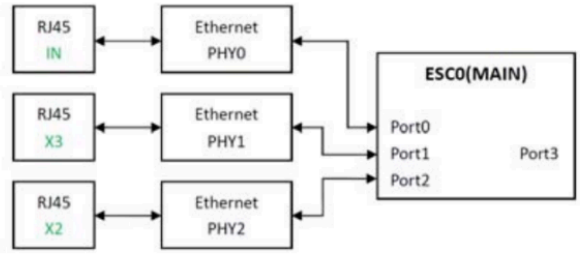
1. As shown in the figure above, in the V1 version, the four ESC chips are arranged in a hierarchical (parent-child) relationship. Furthermore, the external PHY chip connected to Port 2 of each ESC chip resides at the same hierarchical level as that ESC chip. Consequently, the topological relationship between the slave device (tentatively designated as "A") and the switch is as follows:
① If connected to X2, the topology shows "A" at the same level as Box1.
② If connected to X3, the topology shows "A" at the same level as Box2.
③ If connected to X6, the topology shows "A" at the same level as Box3.
④ If connected to X5, the topology shows "A" at the same level as Box4.
⑤ If connected to X4, the topology shows "A" as a child (subordinate) of Box4.

2. As shown in the figure above, in the V2 version, the two ESC chips are arranged in a hierarchical (parent-child) relationship. In this version, the external PHY chip connected to each ESC chip resides at a lower hierarchical level (as a child) relative to that ESC chip. Consequently, the topological relationship between the slave device (tentatively designated as "A") and the switch is as follows:
① If connected to X2, the topology shows "A" as a child of Box1.
② If connected to X3, the topology shows "A" as a child of Box1.
③ If connected to X4, the topology shows "A" as a child of Box2.
④ If connected to X5, the topology shows "A" as a child of Box2.
⑤ If connected to X6, the topology shows "A" as a child of Box2.

Regarding the internal interface specifications for the VT-SW3EC:



V1 设备内部拓扑



V2 设备内部拓扑

1. The switch topology is the same for both V1 and V2 versions.
2. In the V2 version, the X2 and X3 interfaces are at the same level; the data return flow is consistent, so no path modifications are required.