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Change List

Version	Update Date	Description
v1.0.0	2025/03/01	First version
v1.1.0	2025/08/07	-Support new type RIS 3.5GHz -Add RIS new feature (3D beam control and Tile-up) -New Feature: Device Firmware Upgrade (DFU)

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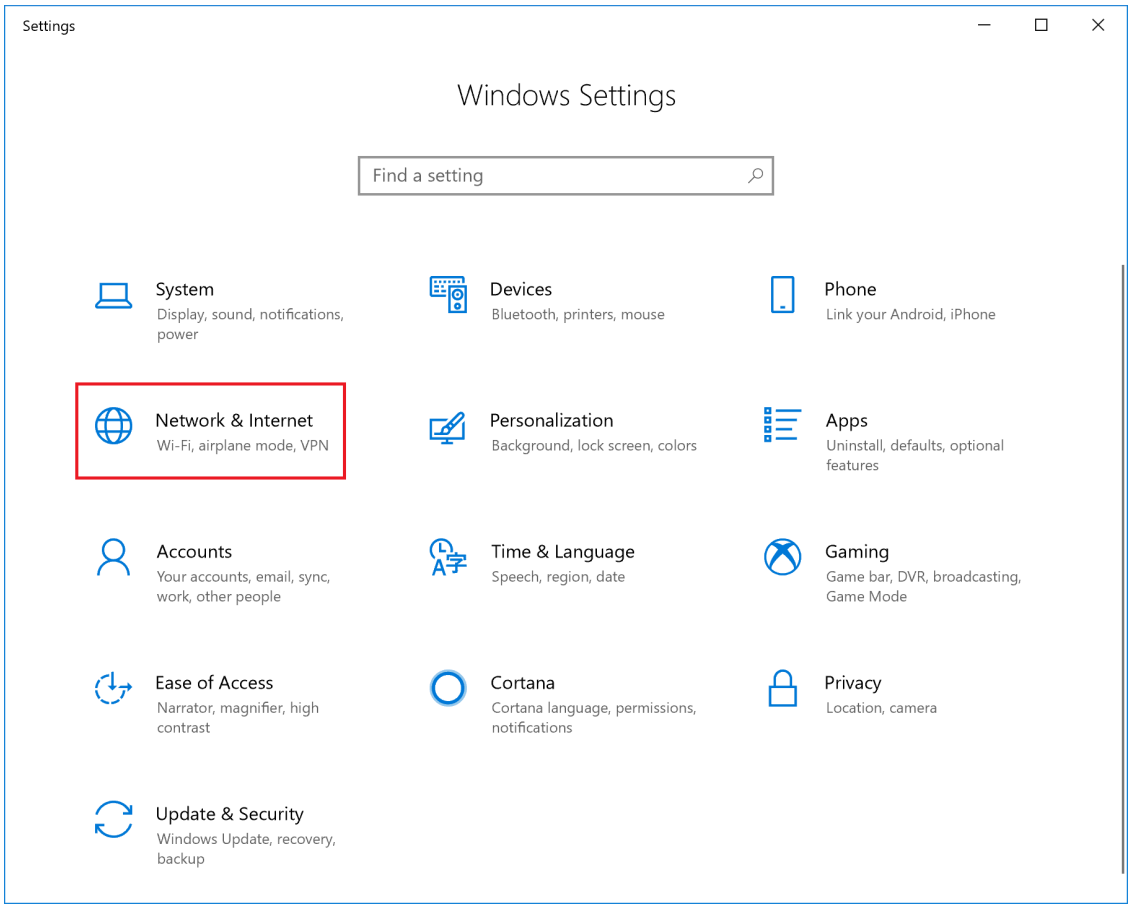
0. Network Environment Setup

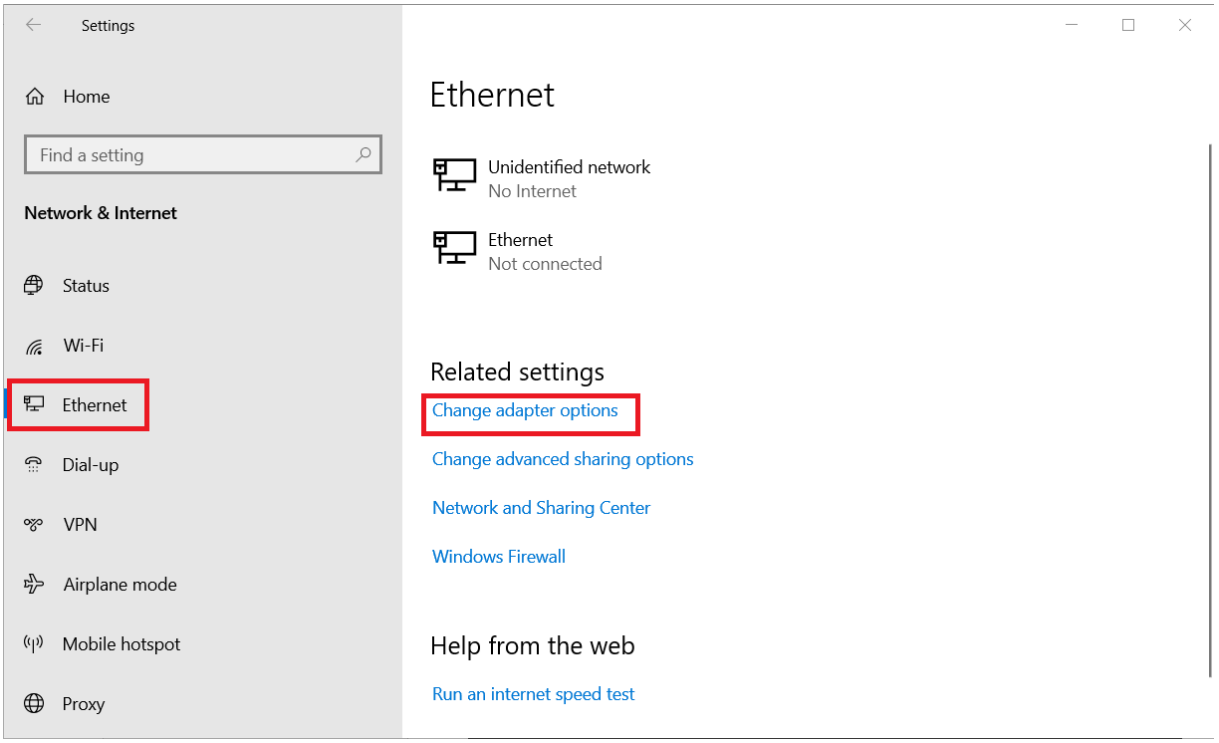
Network Environment Configuration: If the device and PC obtain their IP addresses via DHCP, this step can be skipped. However, if an IP address cannot be assigned through DHCP, the network domain must be set to 192.168.100.xxx.

Note: Avoid using IP addresses in the range **192.168.100.100 to 192.168.100.120**.

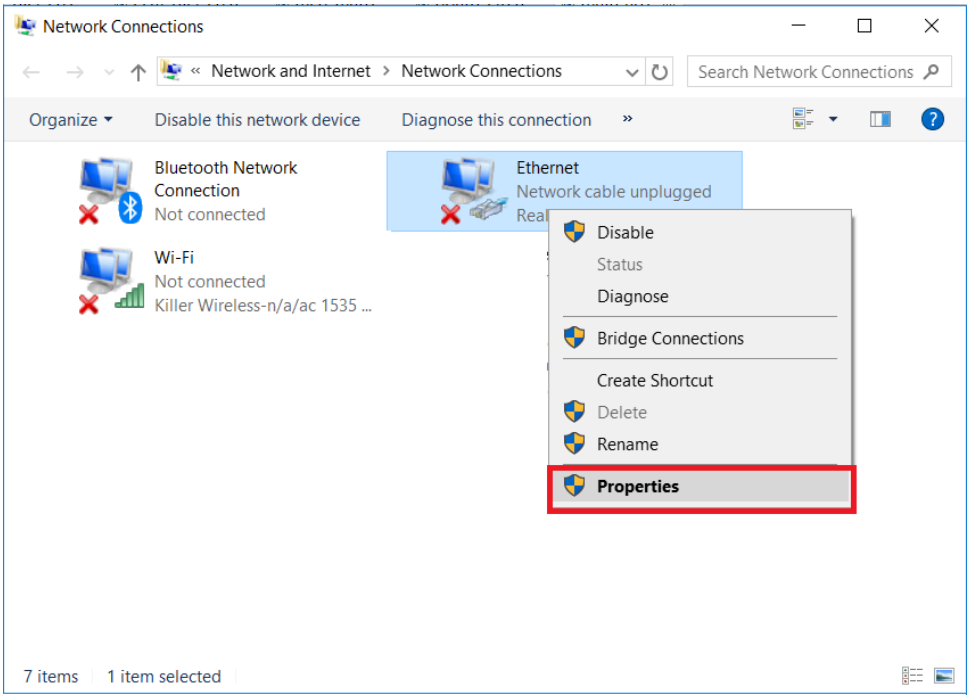
0.1. Windows

(1). Navigate to **Windows Settings > Network & Internet > Ethernet > Change adapter options**.

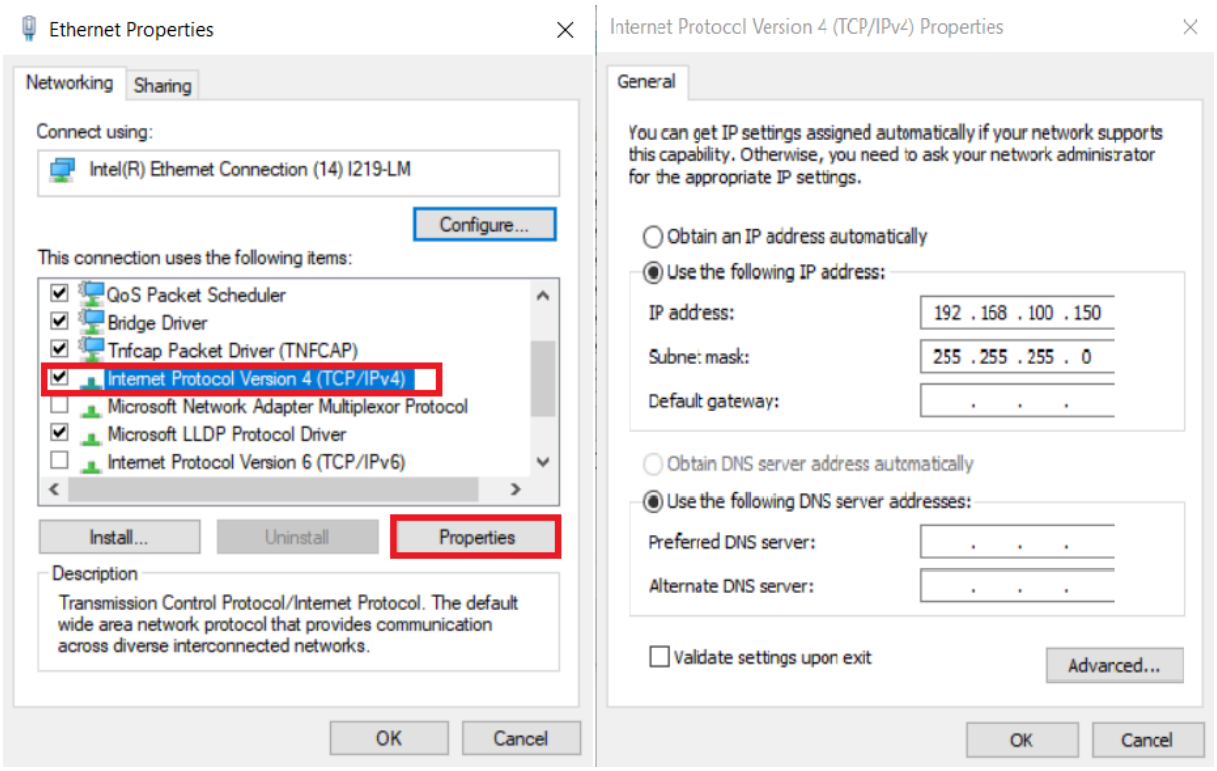



Settings
Home
Find a setting
Network & Internet
Status
Wi-Fi
Ethernet
Dial-up
VPN
Airplane mode
Mobile hotspot
Proxy
Ethernet
Unidentified network
No Internet
Ethernet
Not connected
Related settings
Change adapter options
Change advanced sharing options
Network and Sharing Center
Windows Firewall
Help from the web
Run an internet speed test

(2). Right-click on "**Ethernet**" and select "**Properties**".

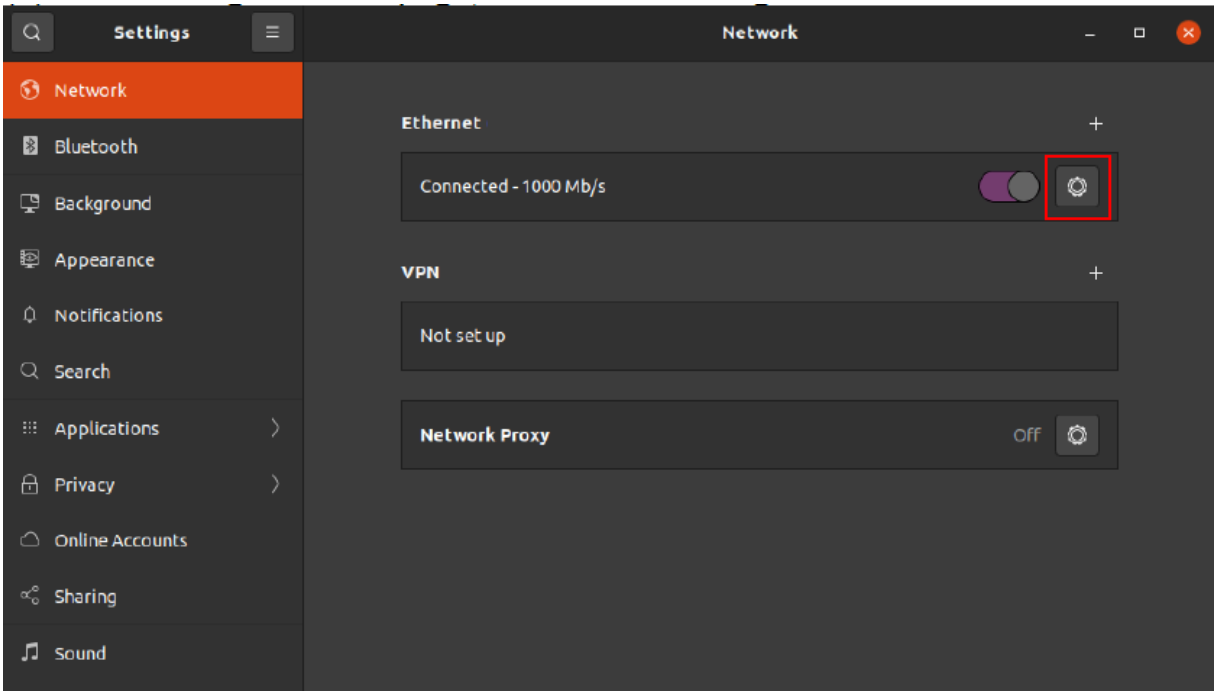


(3). Select "**Internet Protocol Version 4 (TCP/IPv4)**", then click "**Properties**". Set the IP address as **192.168.100.xxx**. and Subnet mask as **255.255.255.0**

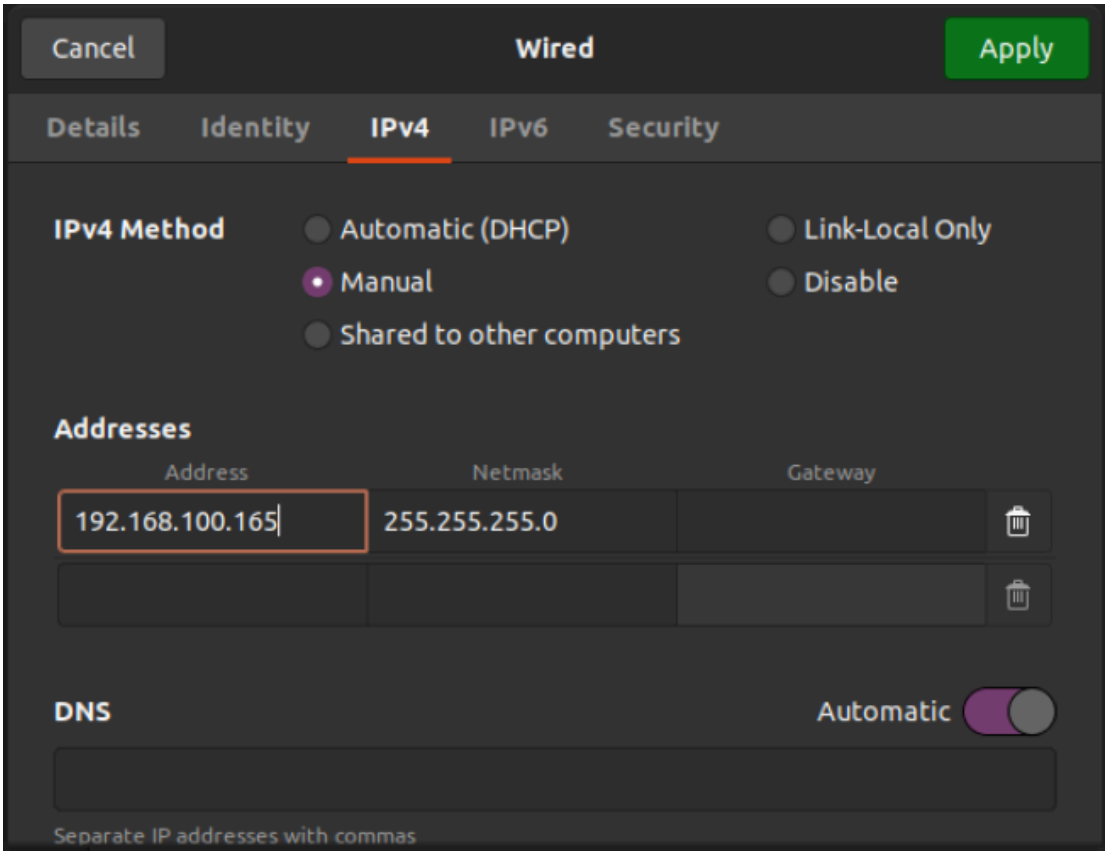


0.2. Ubuntu

(1). Navigate to **Settings > Network**, then click the settings icon under the **Ethernet** sec

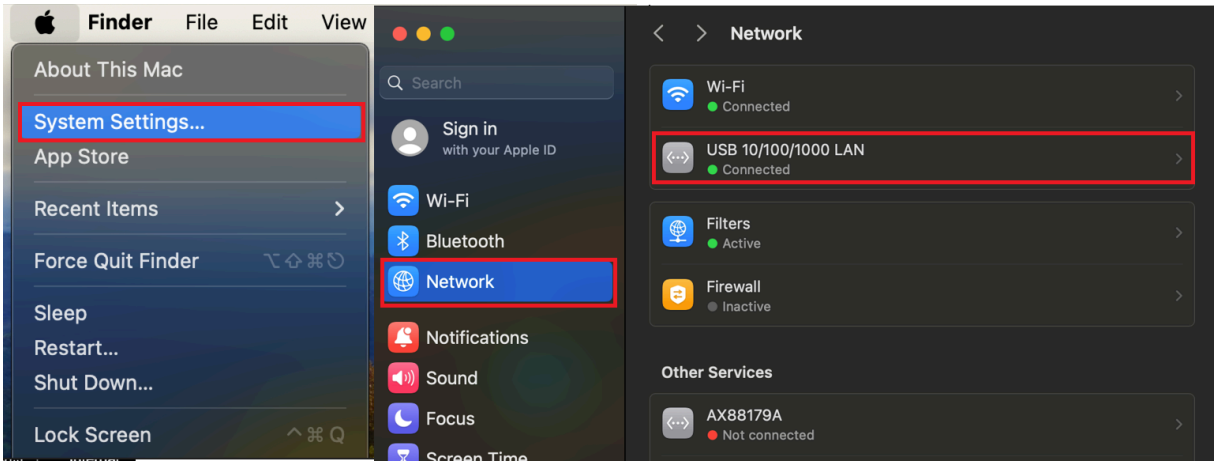


(2). Select the **IPv4** tab, select **Manual** as the IPv4 method, enter **192.168.100.xxx** in the **Addresses** field and Subnet mask as **255.255.255.0**, and click **Apply**.

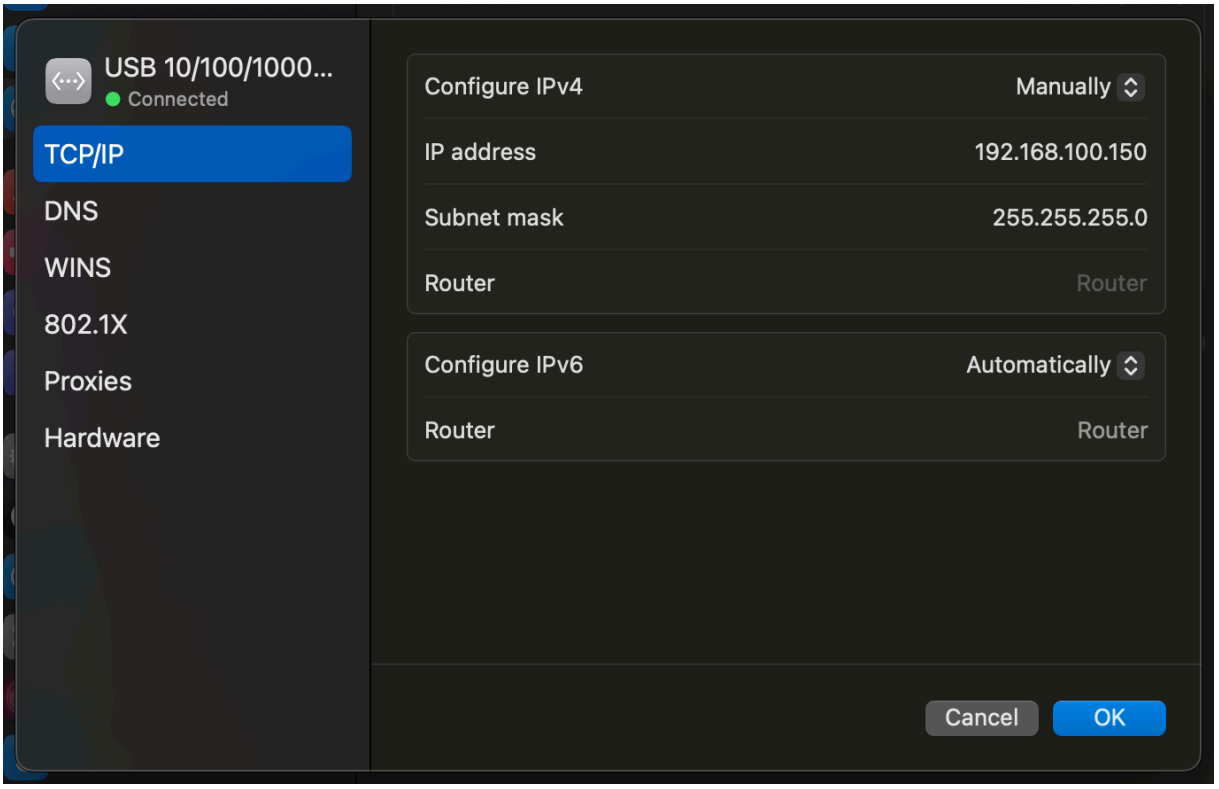


0.3. Mac

(1). Navigate to **System Settings> Network,** check Ethernet name

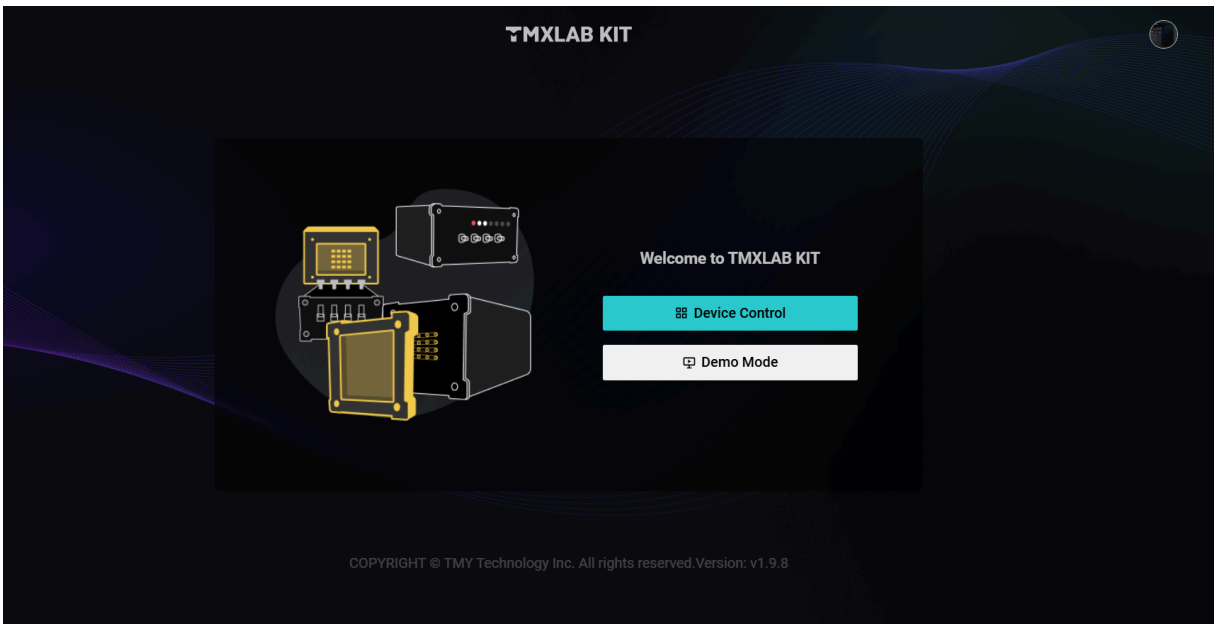


(2). Set IP address as **192.168.100.xxx**. and Subnet mask as **255.255.255.0**



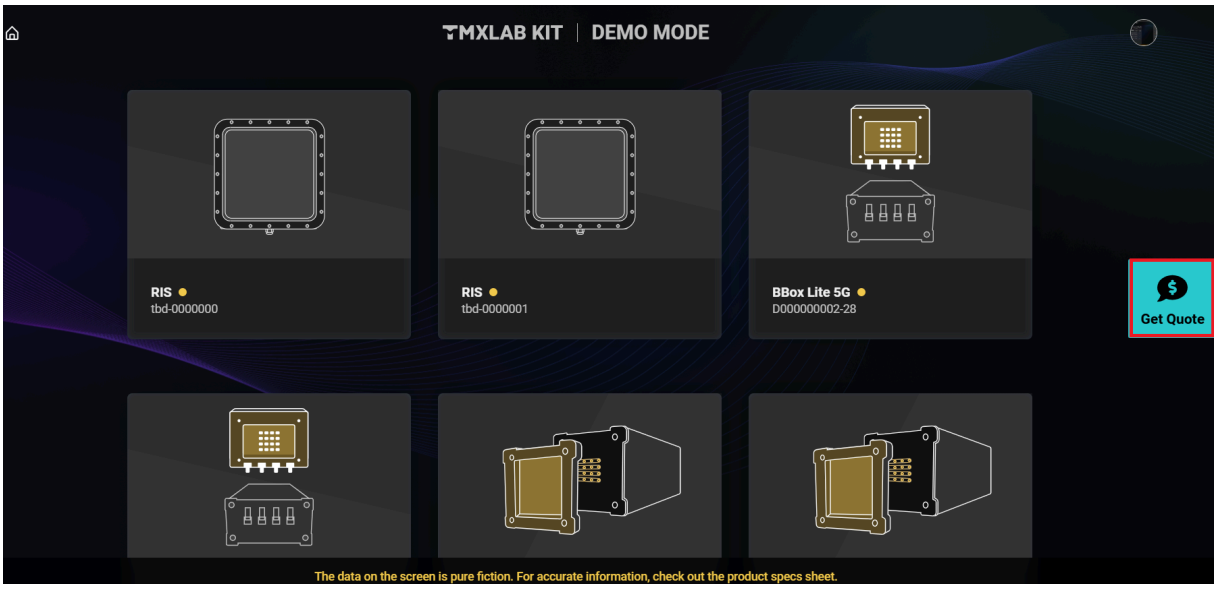
1. TMXLAB Kit Introduce

By integrating the TMXLAB Kit platform with the device, the user can easily operate and access the tools anytime, anywhere through our online version, further enhancing the convenience and flexibility of the development process.

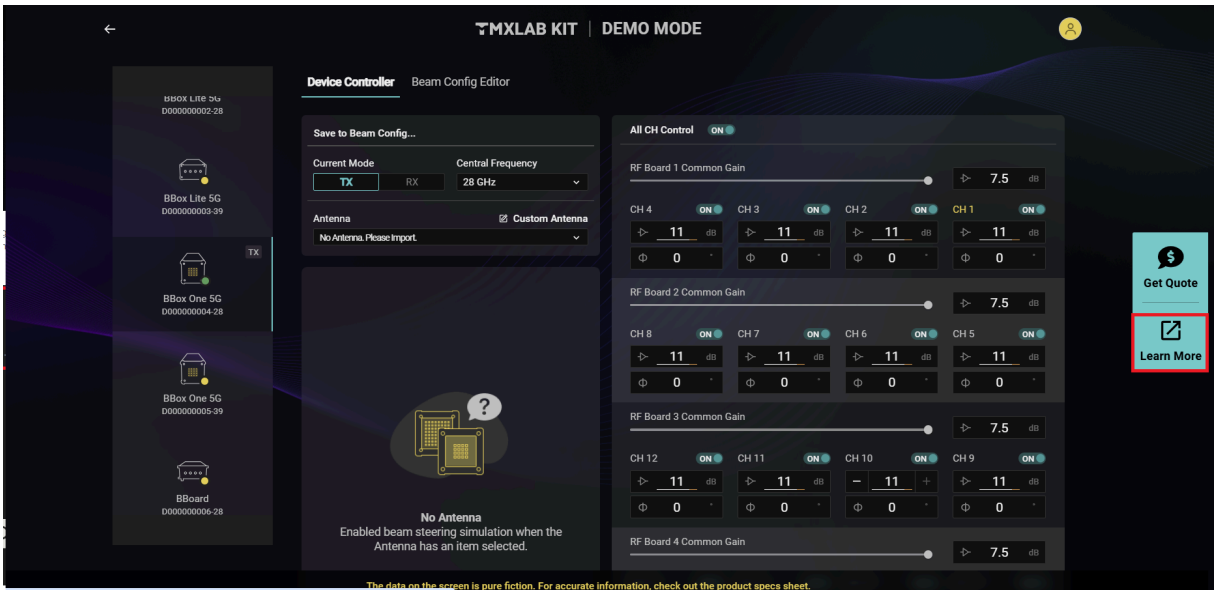


1.1. Demo mode

Our products, including GUI control, are continuously upgraded and improved. We provide a high-quality interactive experience, regular updates, and new product simulations to enhance usability and innovation. The user can seamlessly simulate and operate upcoming products as soon as they are released. The user can also fill in the **"Get Quote"** form, and our team will provide dedicated assistance.

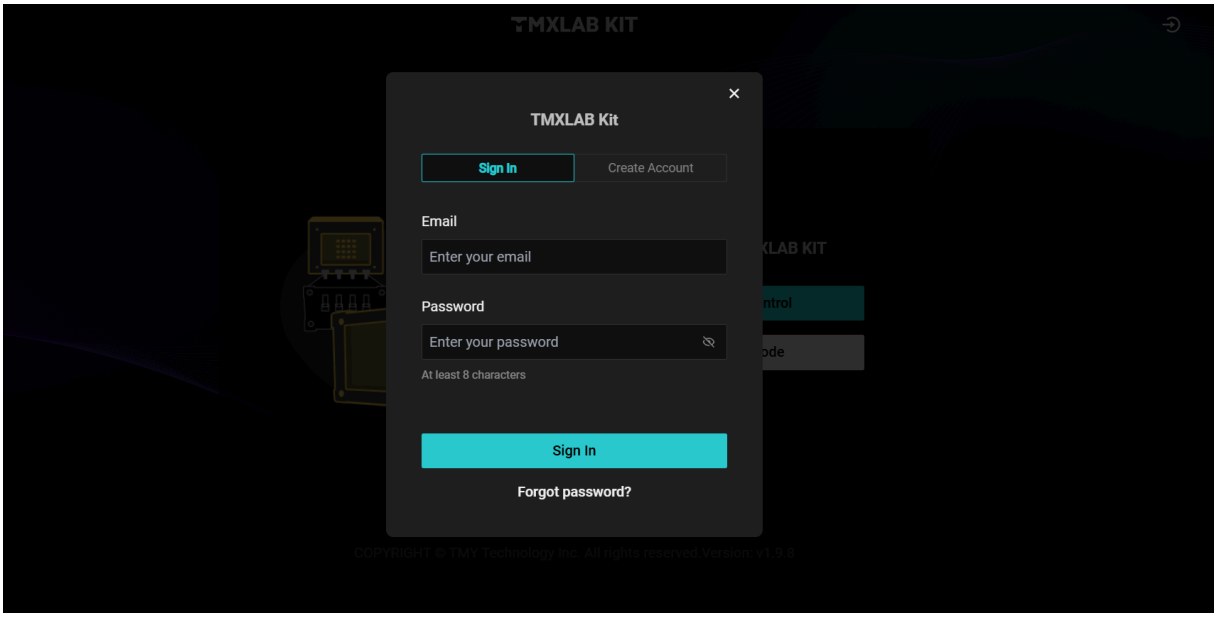


For more information about the product, click **Learn More** to visit the official website for detailed product specifications.



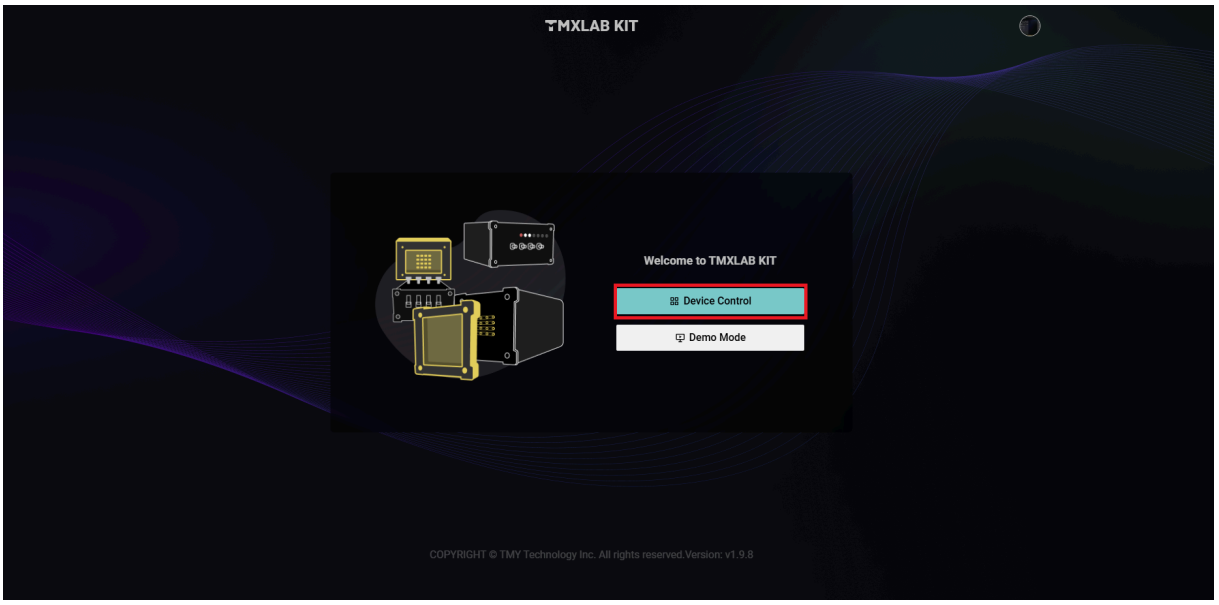
1.2. Log in membership

(1). Sign in to your user account or create an account to access.



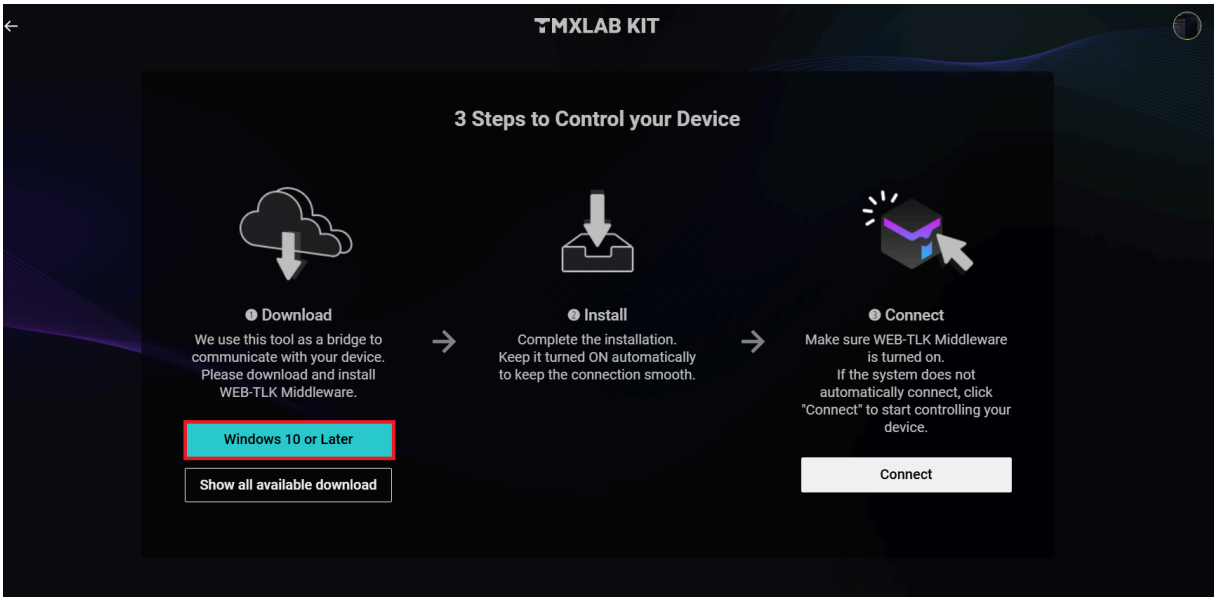
1.3. Install Middleware Application

Click **Device control.**

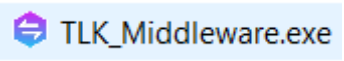


1.3.1. Windows

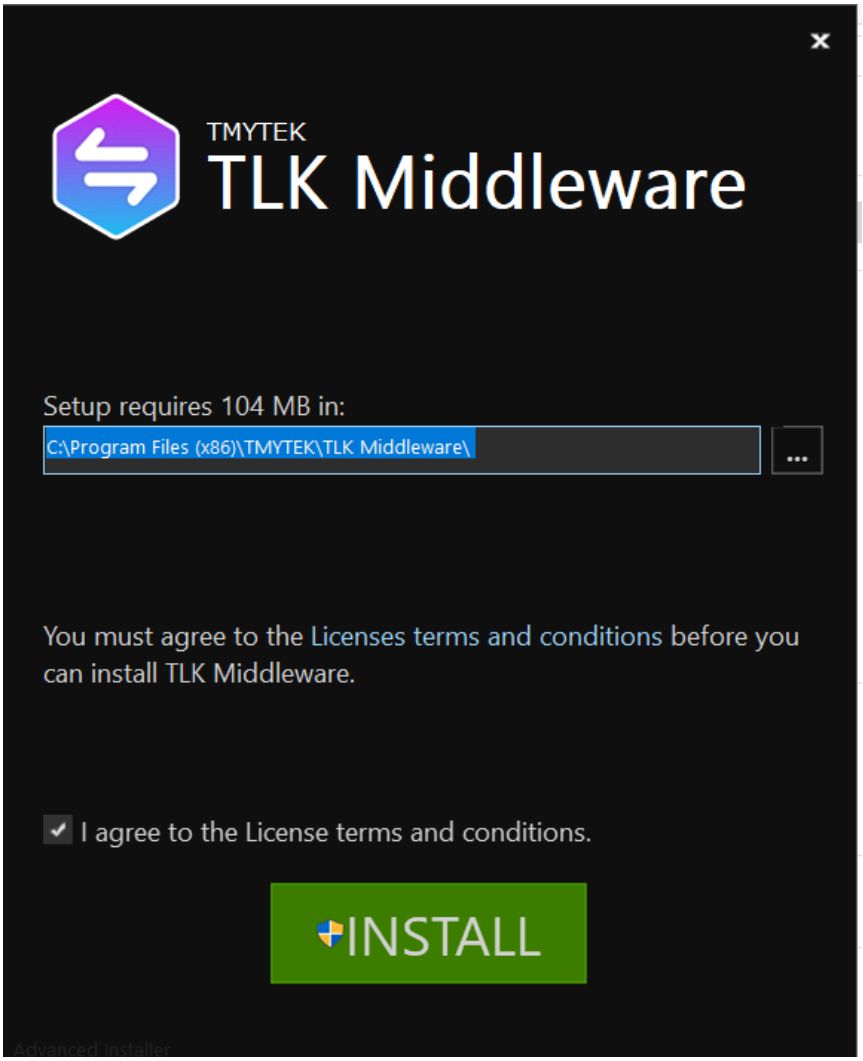
(1). Click the **Download** button (It will detect and display the operating system or allow the user to select a version.).



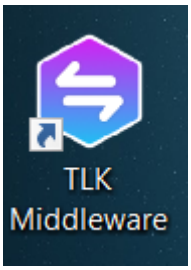
(2). Get an execution file on Download folder, click execution file then install as below:

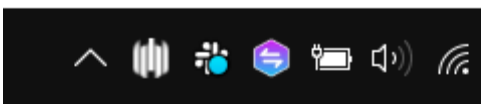


(3). Install TLK Middleware application.



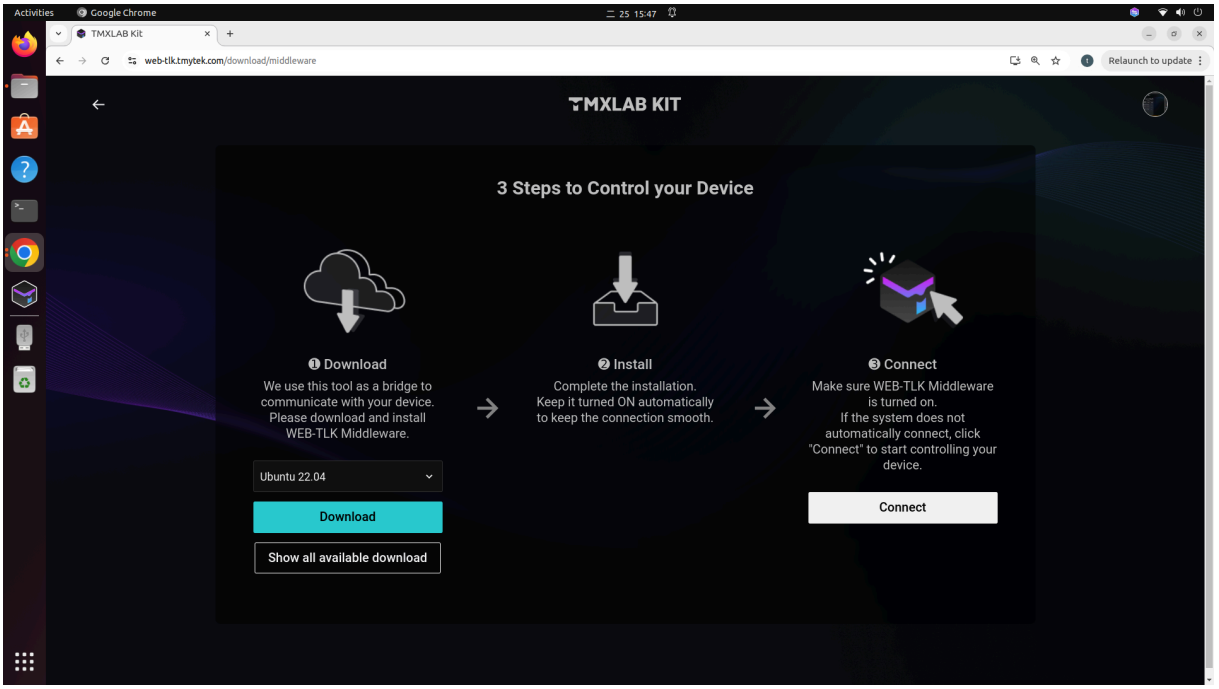
(4). On Desktop click **TLK Middleware** shortcut, The middleware icon will appear in the toolbar at the bottom right corner.



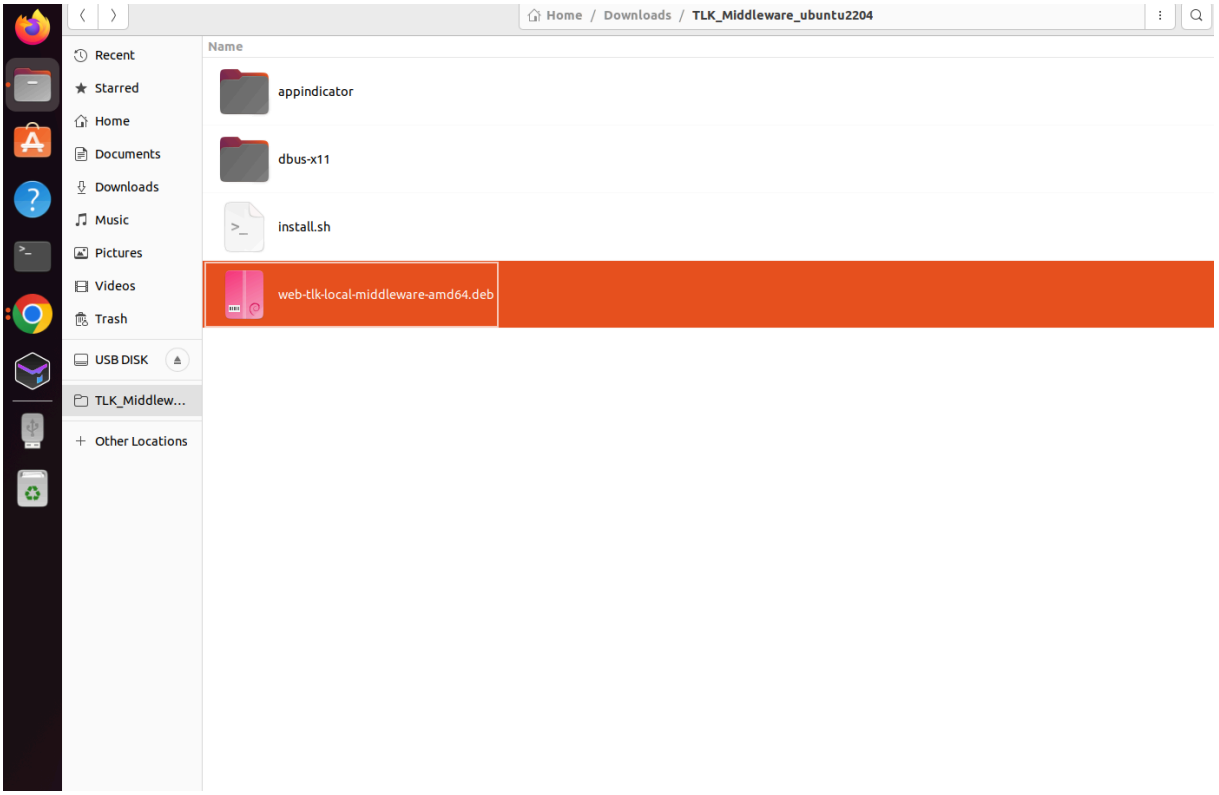


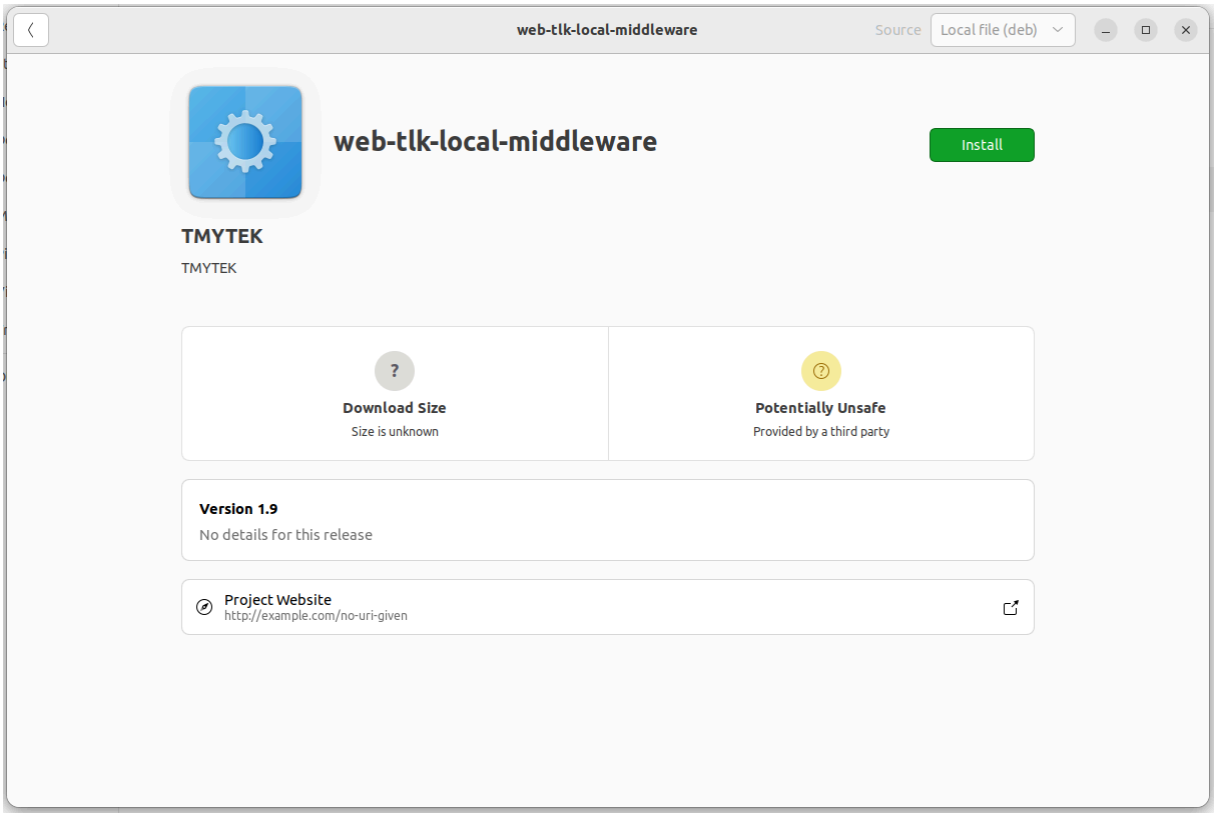
1.3.2. Ubuntu

(1). Click the **Download** button (It will detect and display the operating system or allow the user to select a version.).

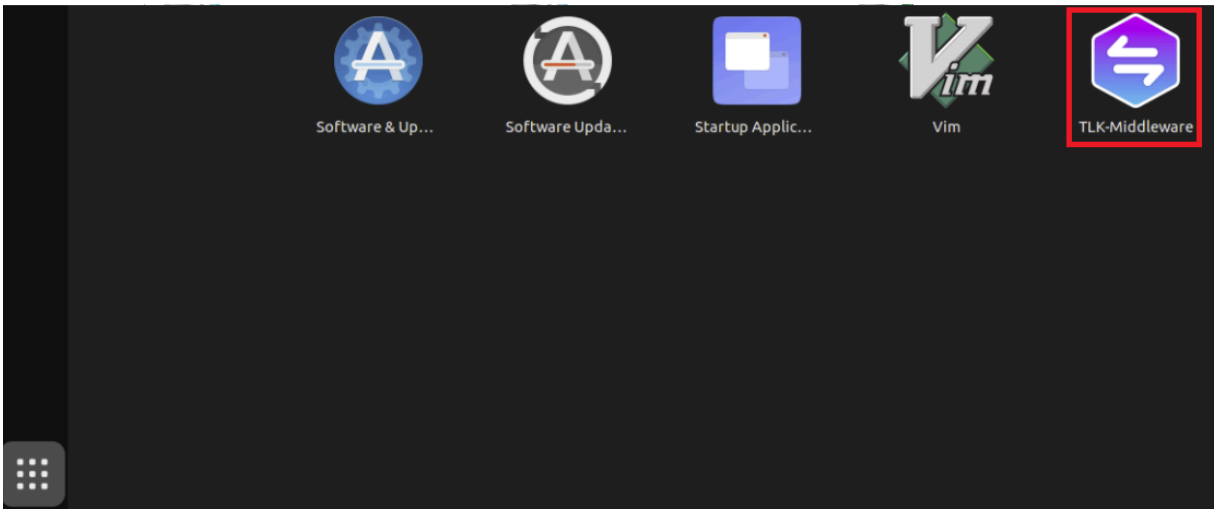


(2). Get zip file before extract file and via deb to install middleware.





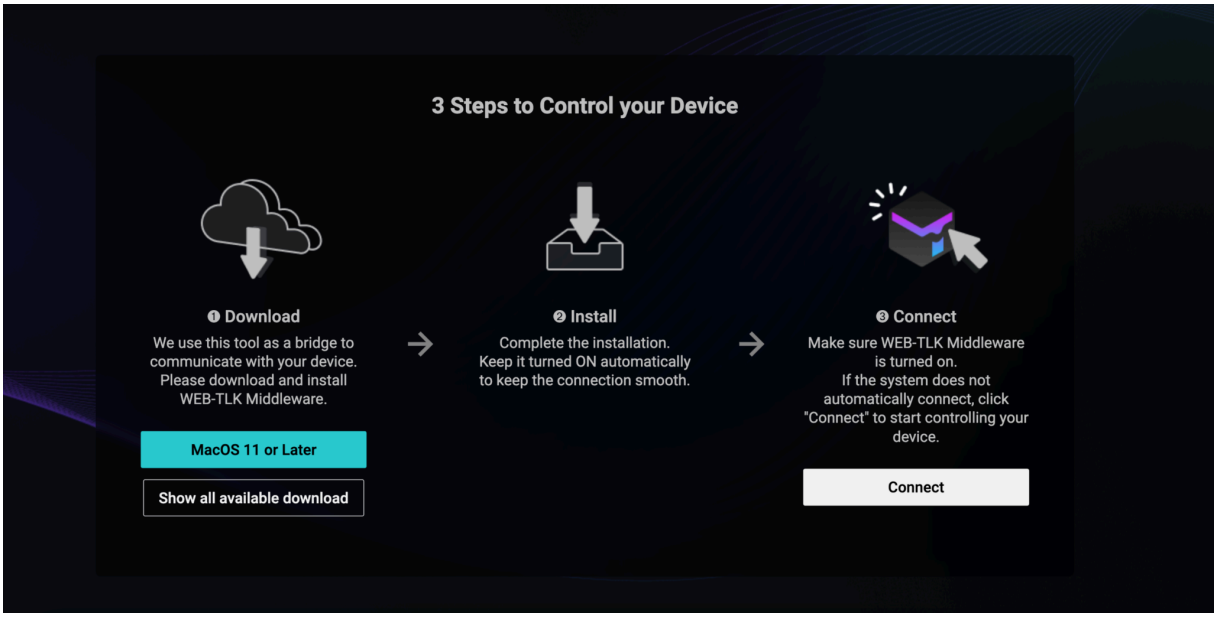
(3). Click Middleware application on the Application Menu.



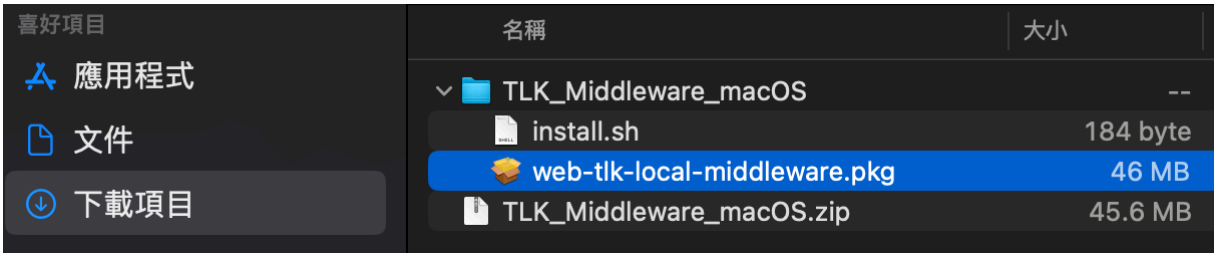
(4). The middleware icon will appear in the toolbar.

1.3.3. Mac

(1). Click the **Download** button (It will detect and display the operating system or allow the user to select a version.).



(2). Extract file and via pkg to install middleware.



(3). After installation, click to open the middleware application on launchpad.

(4). The middleware icon will appear in the toolbar.

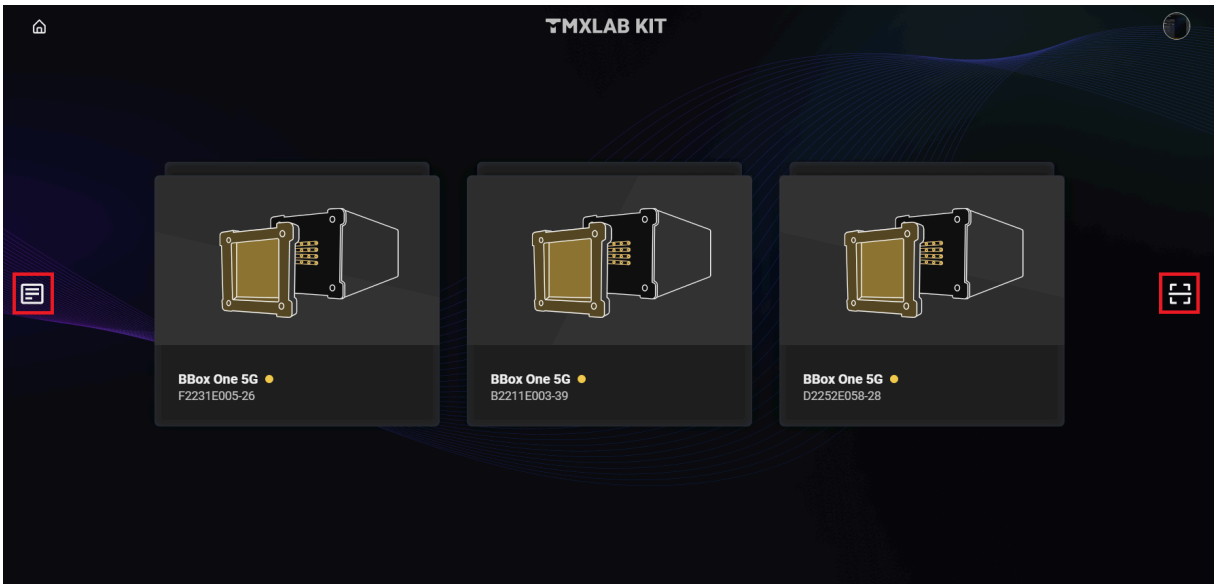
2. Device Control

(1). Connect Device (e.g.BBox One 5G) and PC with Ethernet, and turn on the power of Device.

(2). Click **Device Control** before the product card will be displayed.

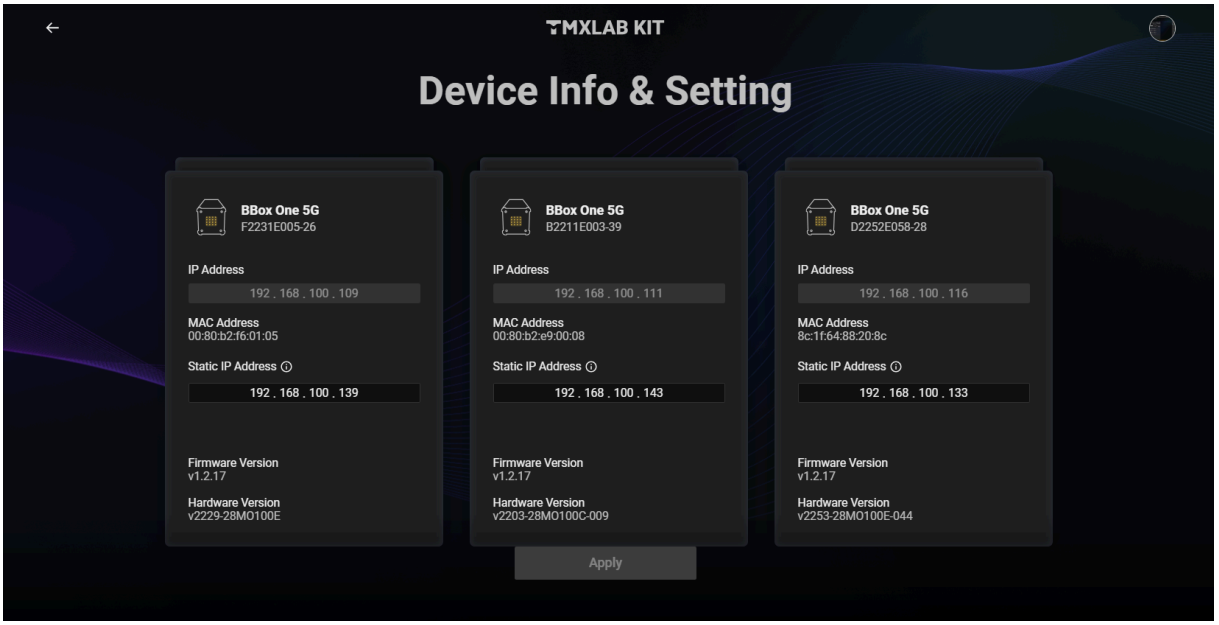
2.1. Device IP Setting and Re-scan

If the device and PC obtain an IP address via DHCP, this step can be skipped. If DHCP fails and multiple identical devices are connected (e.g., 2+ BBoxes), TMXLAB Kit will attempt to assign unique static IPs. If unsuccessful, manual setup is required.



(1). Left icon- Device info & Setting: There is more information about device, can change IP manually.

Note: The IP to be modified should be in the same network subnet as the user's PC.



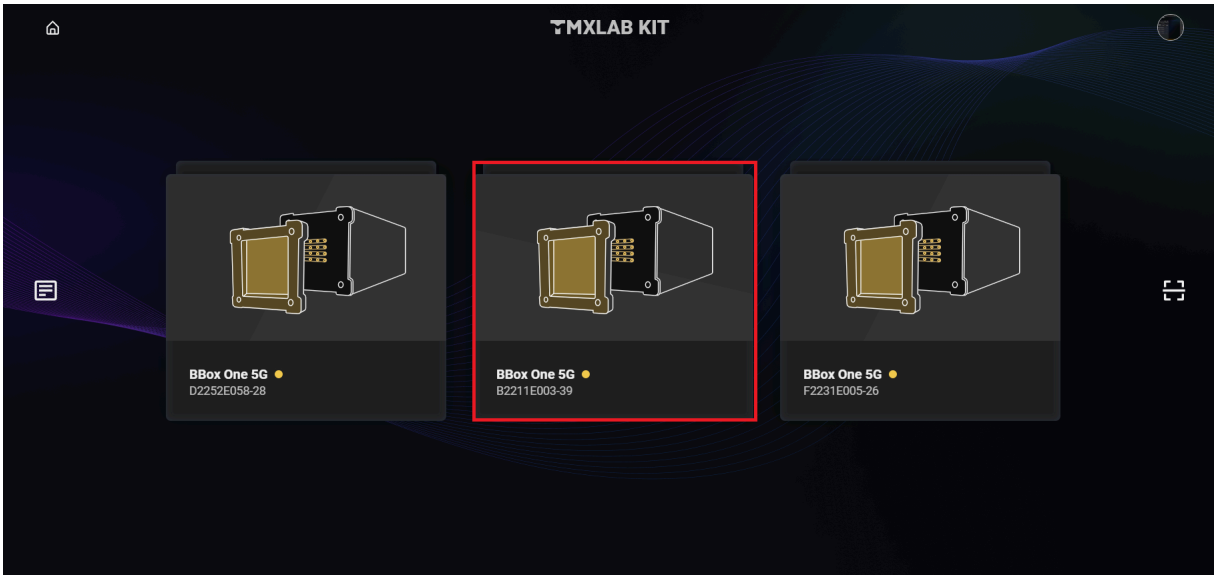
(2). Right icon- Re-scan: If a new device is connected during use, the user can try **Rescan** to view the new product card.

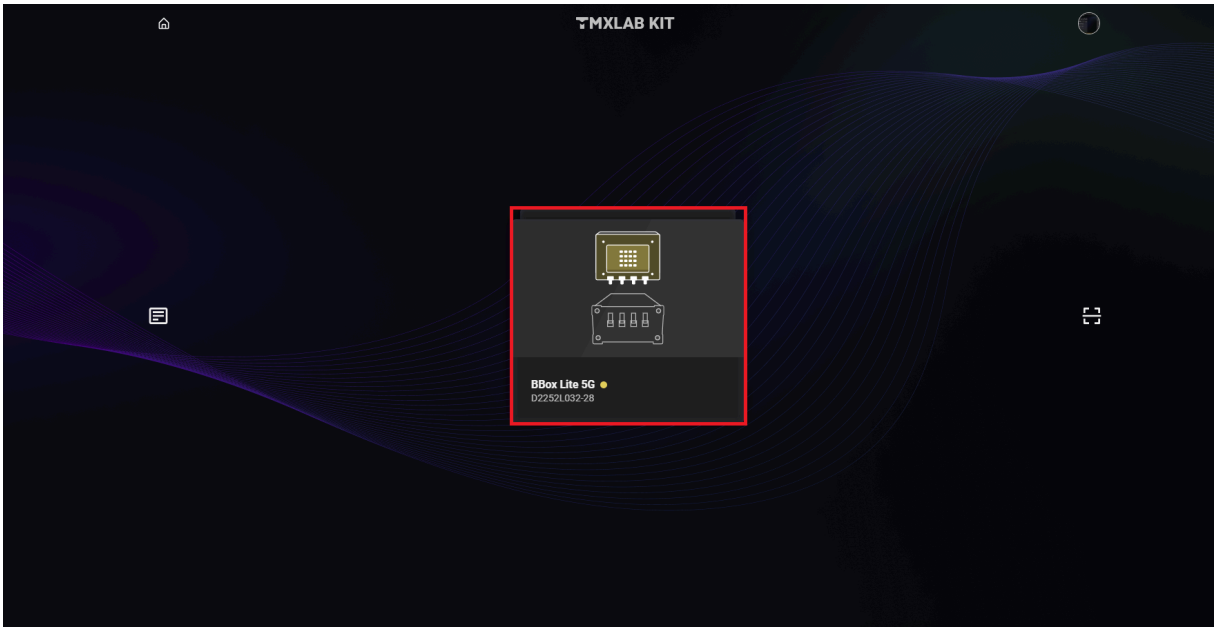
Note: If the user Re-scans the device, all devices will be reinitialized.

2.2. BBox One 5G/ BBox Lite 5G

Normally, the light indicator behind the product name shows yellow (not initialized), red (Device is faulty or there is a configuration error), and green (initialized successfully).

(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.

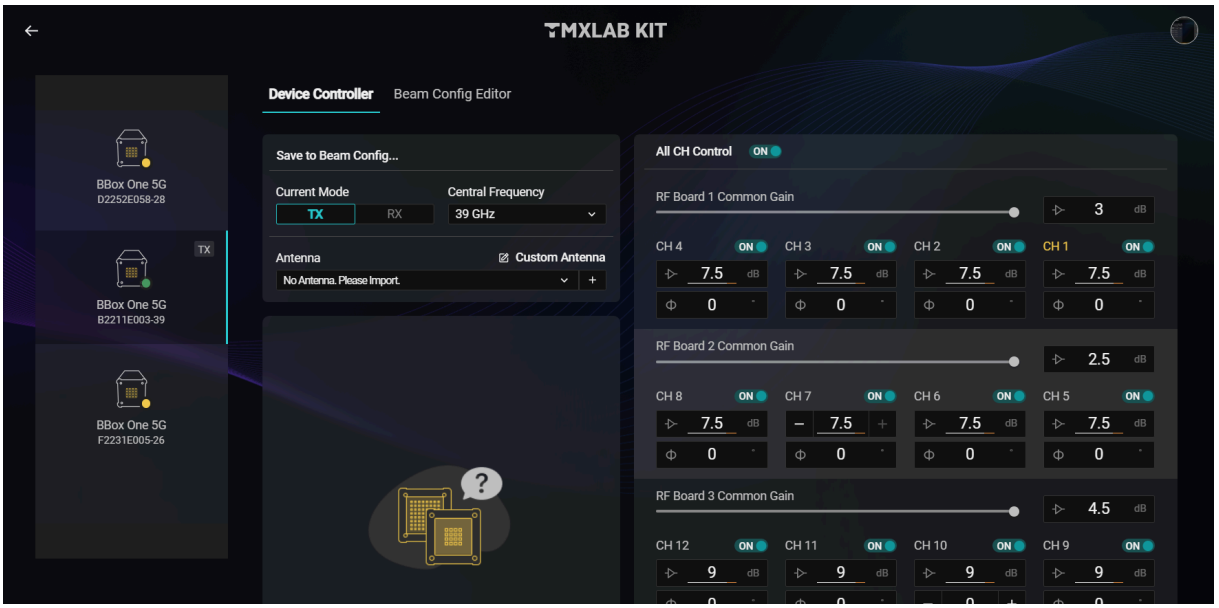




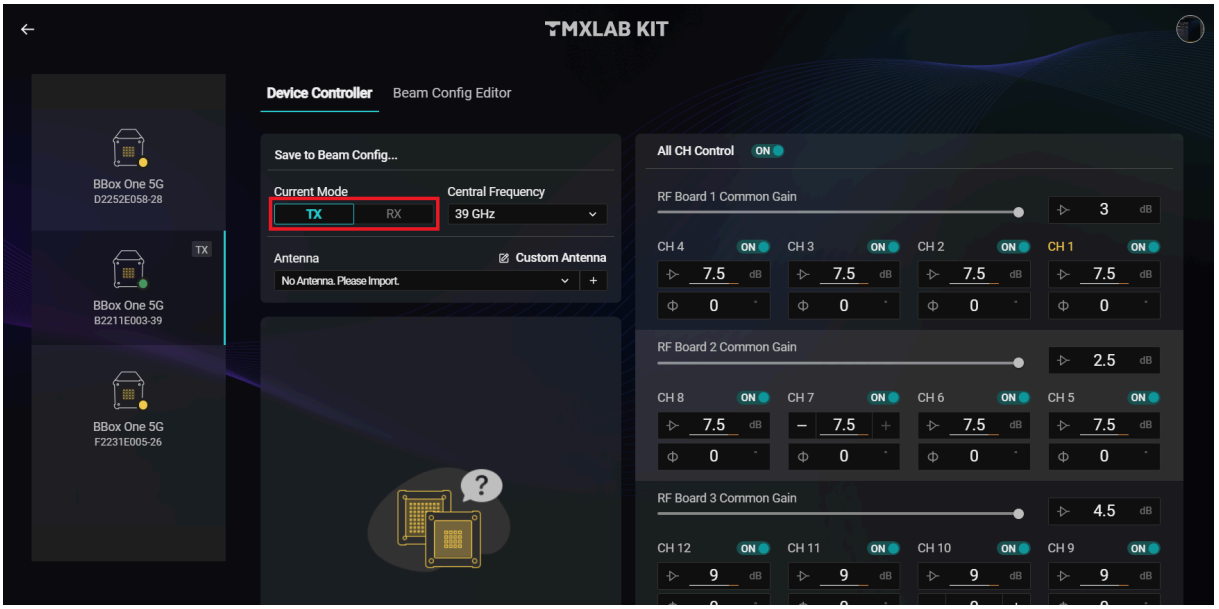
2.2.1. Device Controller

BBox One 5G will be used as an example.

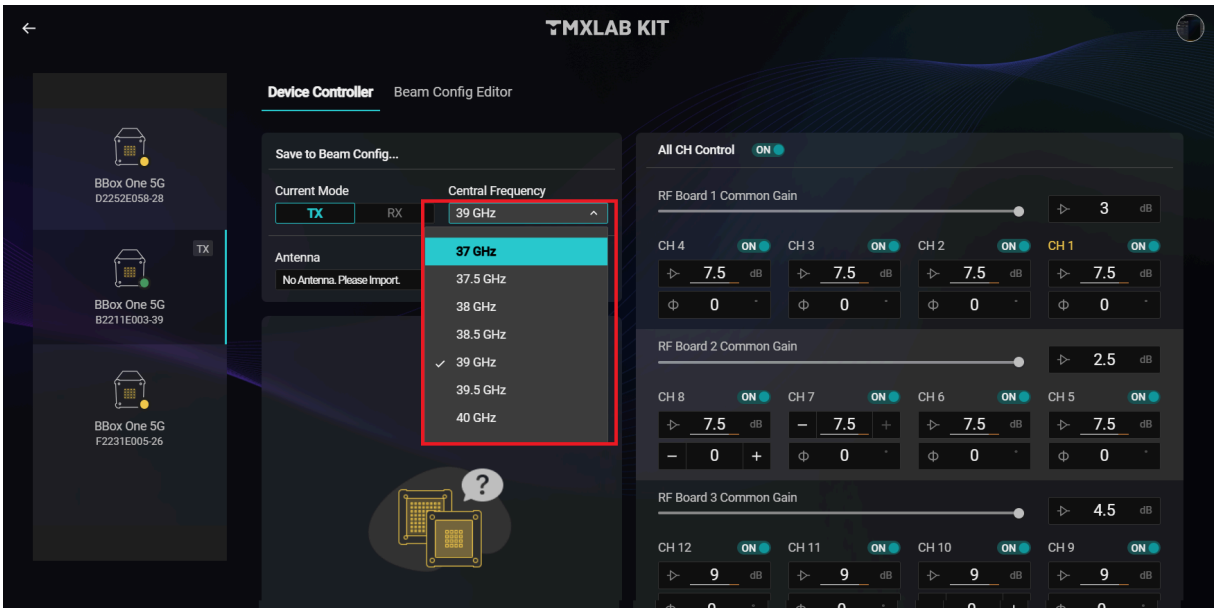
(1). Start initialization. Once completed, the user can proceed.



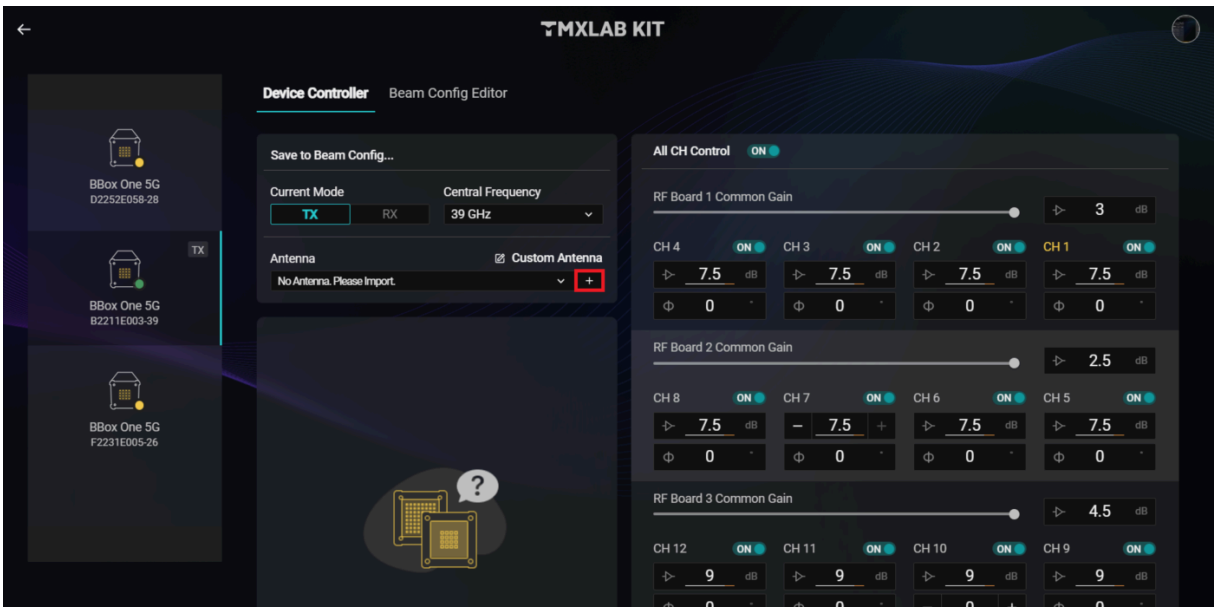
(2). The **Current Mode** allows the user to select either **TX** or **RX** mode.

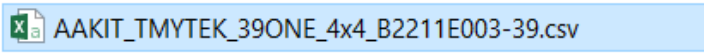


(3). All available frequency points are listed in the **Central Frequency** drop-down menu. The user can select the desired frequency.

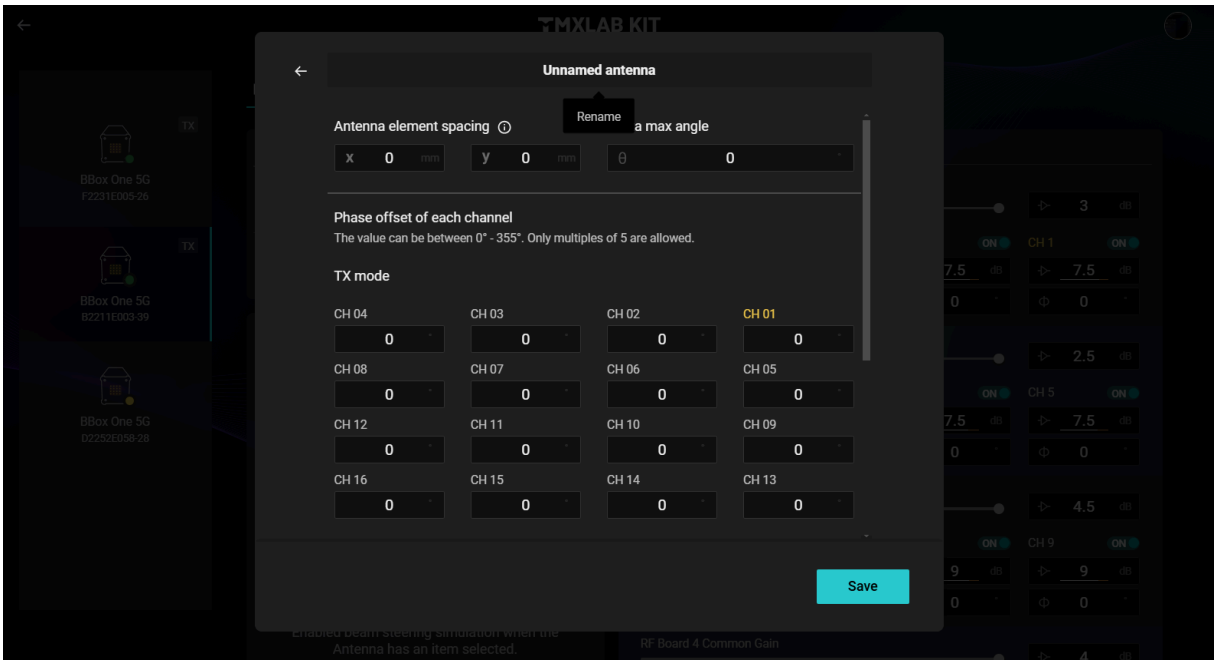


(4). Without selecting an antenna, only the channel control mode is functional.
Move to "**+**" "**+Import**" and click it to open the file selection window. Select the file(s) to import and click "**Open**" **to load the antenna data** into the antenna menu.

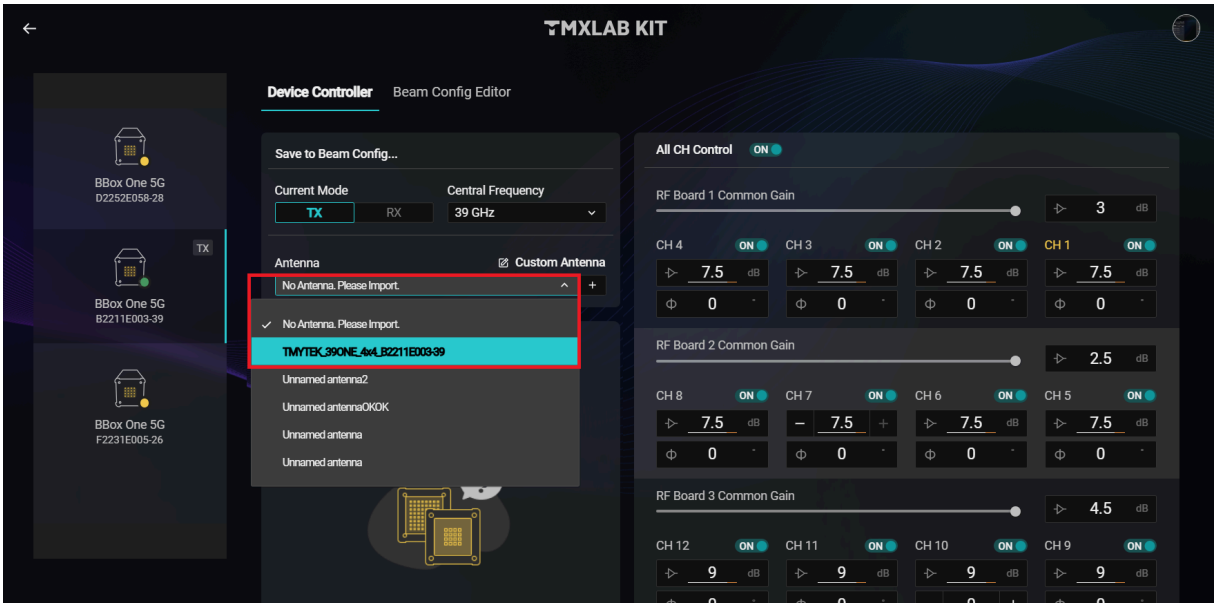




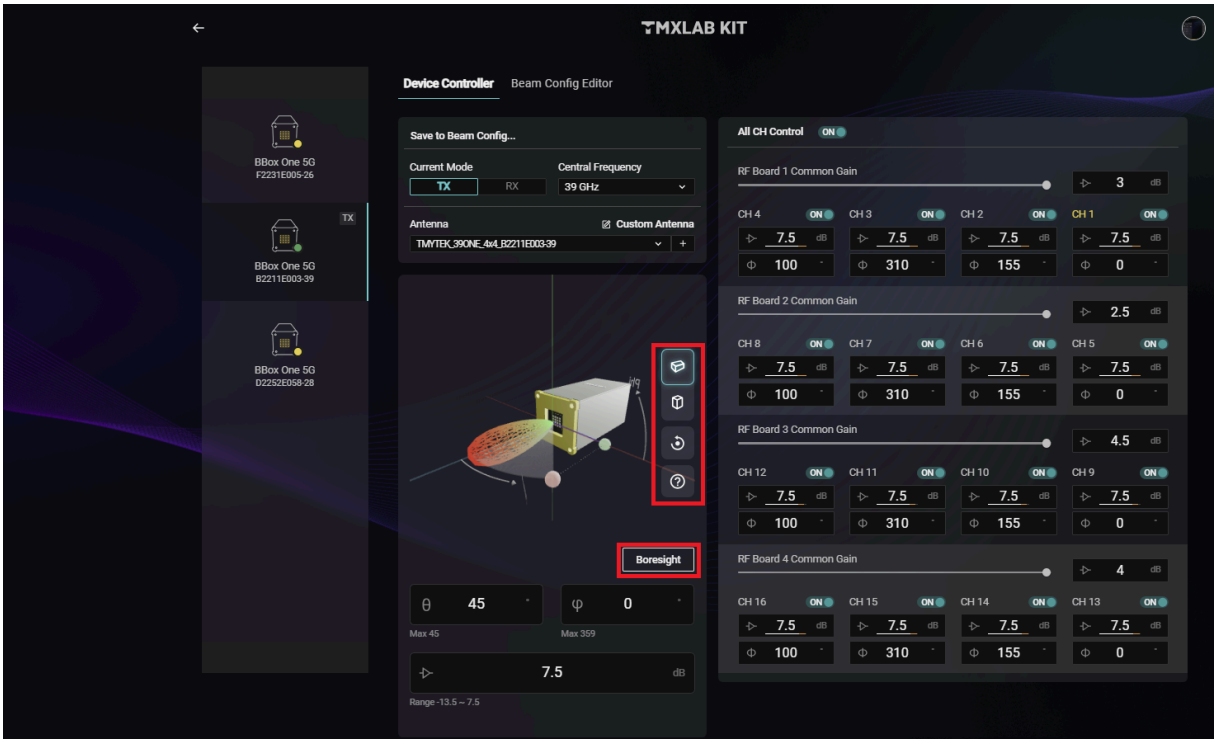
The user can also click **Custom Antenna** and enter the following in order: antenna name (unique for identification), SpacingX (pitch-to-pitch spacing on the X-axis, Unit: mm), SpacingY (pitch-to-pitch spacing on the Y-axis, Unit: mm), max theta angle, and phase offset for each channel. Click the arrow to expand/collapse the offset input box. A maximum of 50 custom antennas can be added.



(5). The user can select an antenna by importing an antenna file or choosing a custom antenna.

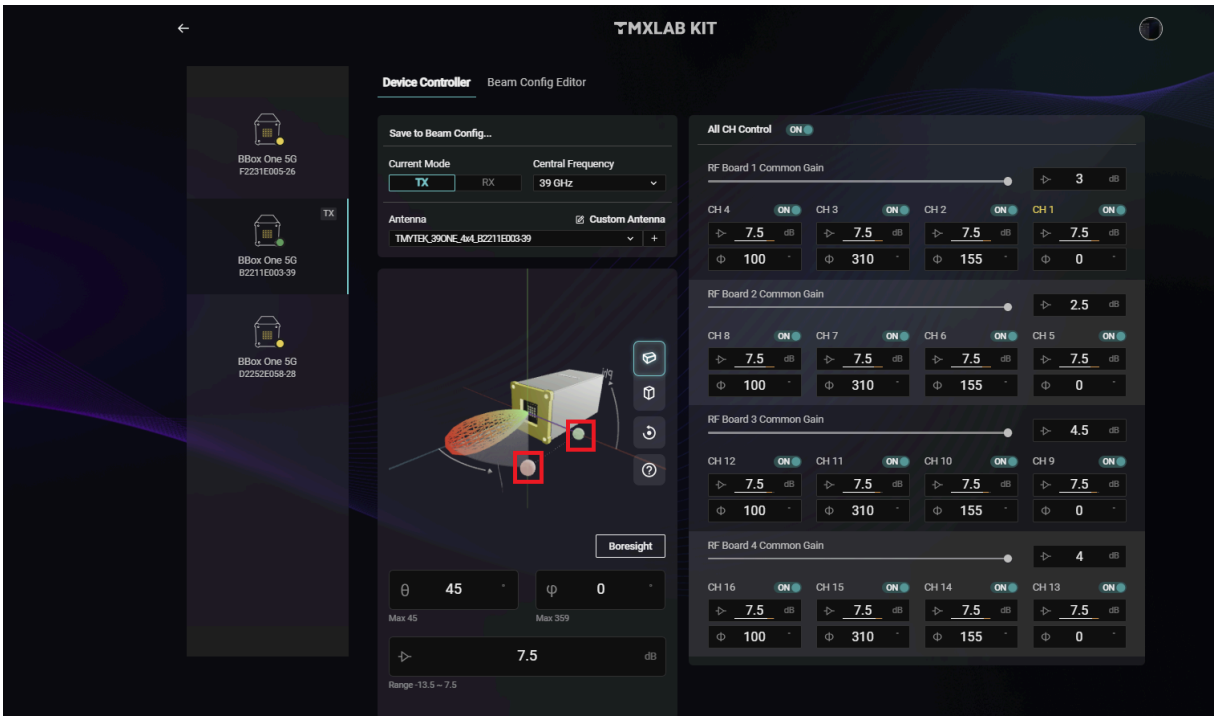


(6). The beam steering function becomes available once an antenna is selected. The device can be rotated to any angle and guild to use, controlling the four icons on the right. The **Boresight** button can set θ and φ back to 0 degrees.

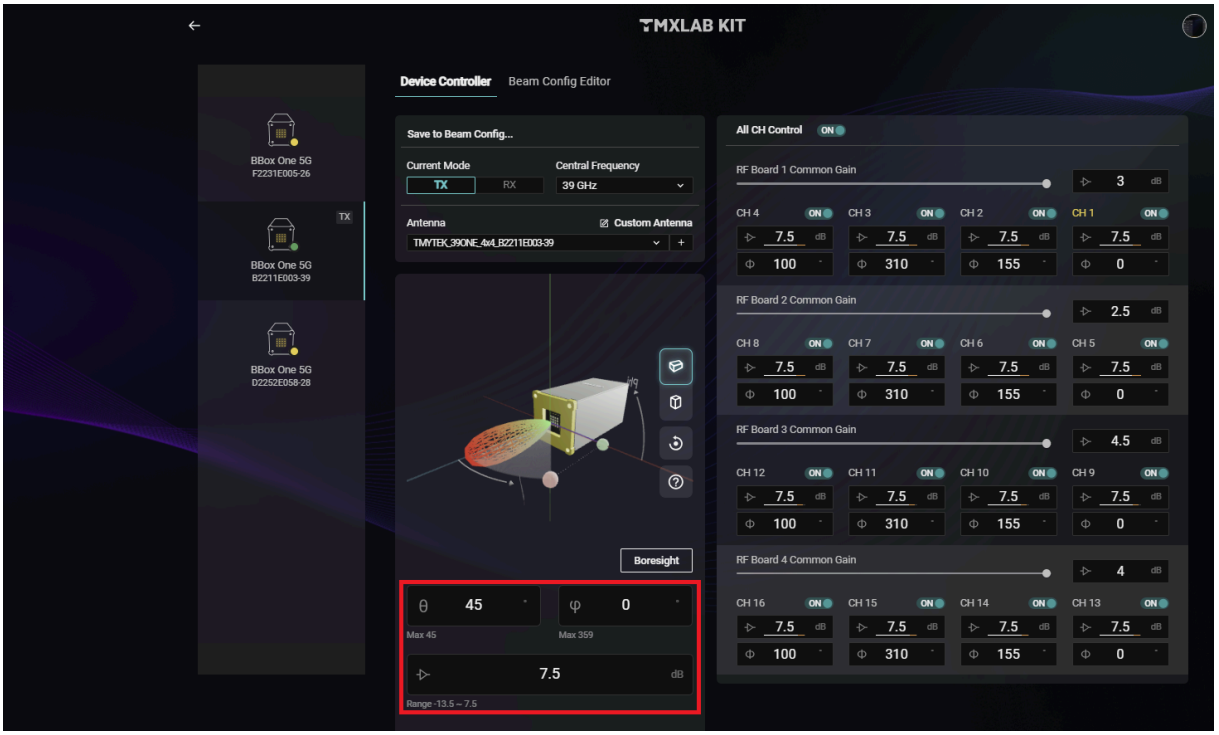


(7). θ is the angle between the positive Z-axis and the vector (0 ≤ θ ≤ max angle). For example, in this screenshot, the max θ is 45°. Press and hold the red dot on the beam tip to rotate the beam and adjust θ and φ.

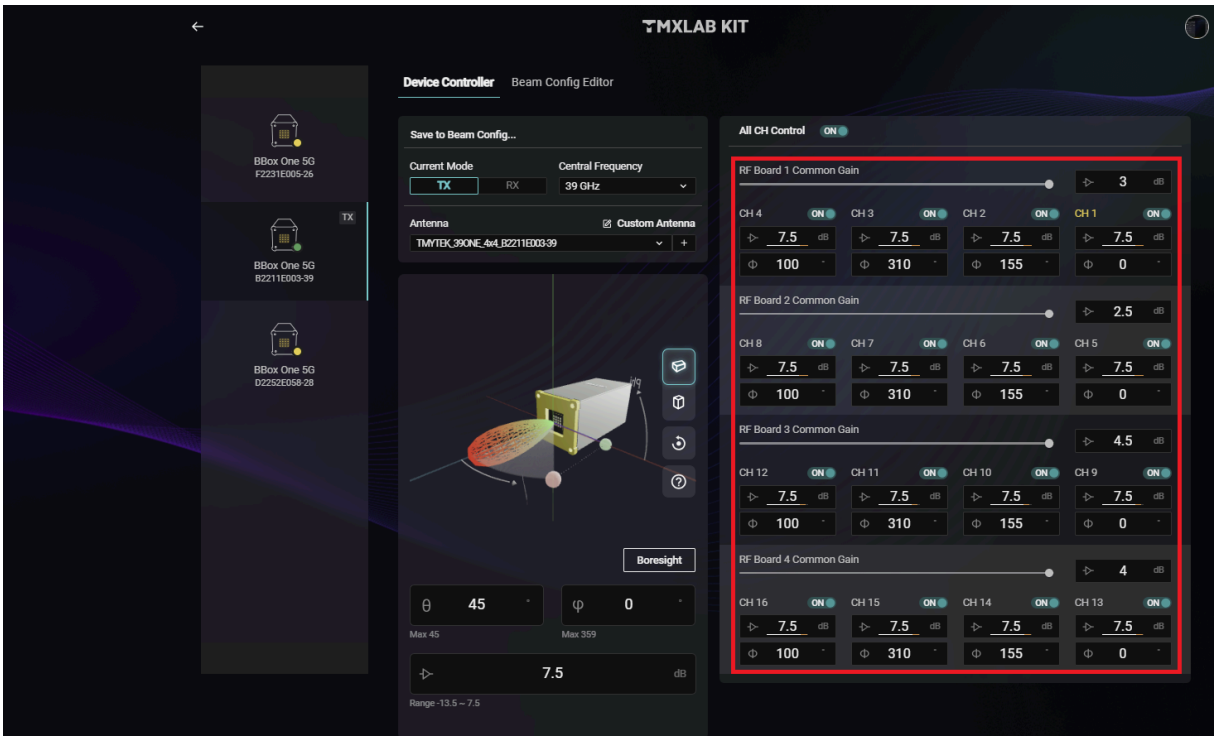
φ is the angle between the vector's projection on the xy-plane and the positive X-axis (0 ≤ φ < 360°). Press and hold the green dot on the xy-plane to adjust φ.



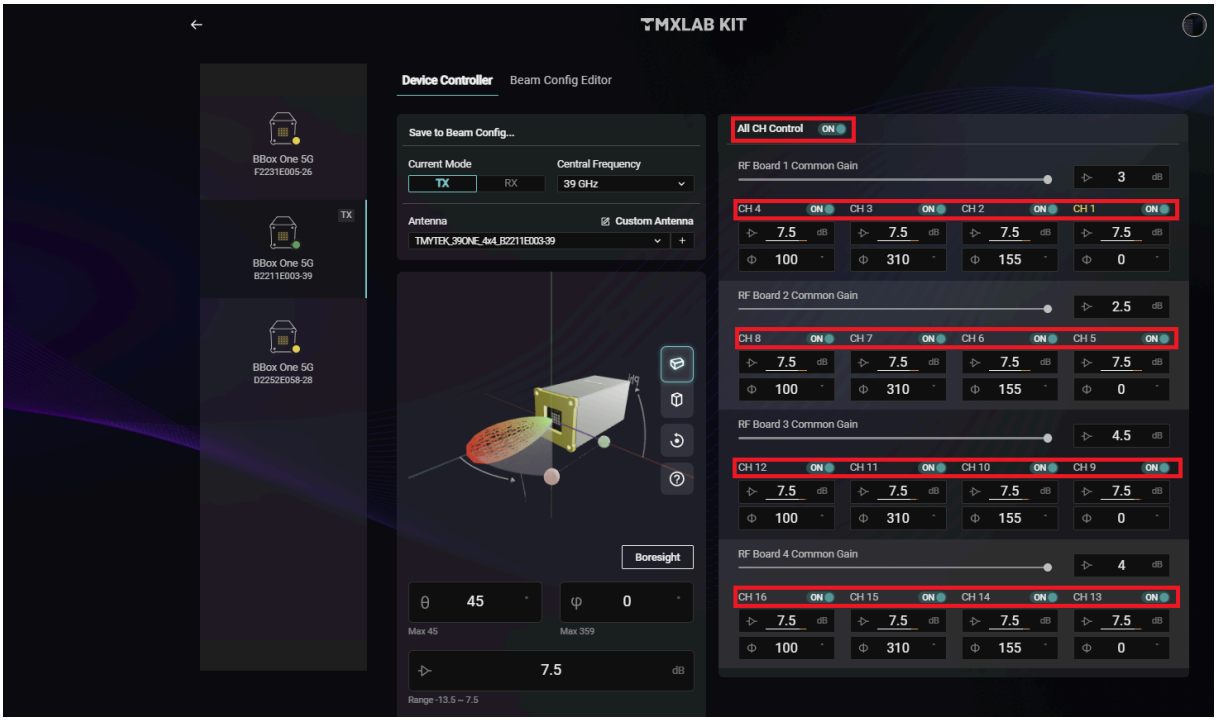
(8). On the panel, adjust the dB value to control the beam gain. and also adjust θ and φ.



(9). There are 16 channels, with every four channels corresponding to one RF board: CH1 to CH4 for RF Board 1 Common Gain, CH5 to CH8 for RF Board 2 Common Gain, and so on. Adjusting the common gain affects all 4 channels on the board. Afterward, the common and individual channel gains can be adjusted separately.



(10). Toggle switch icon of **All CH Control** and **CH1~16** to turn the adjustment mode on or off.

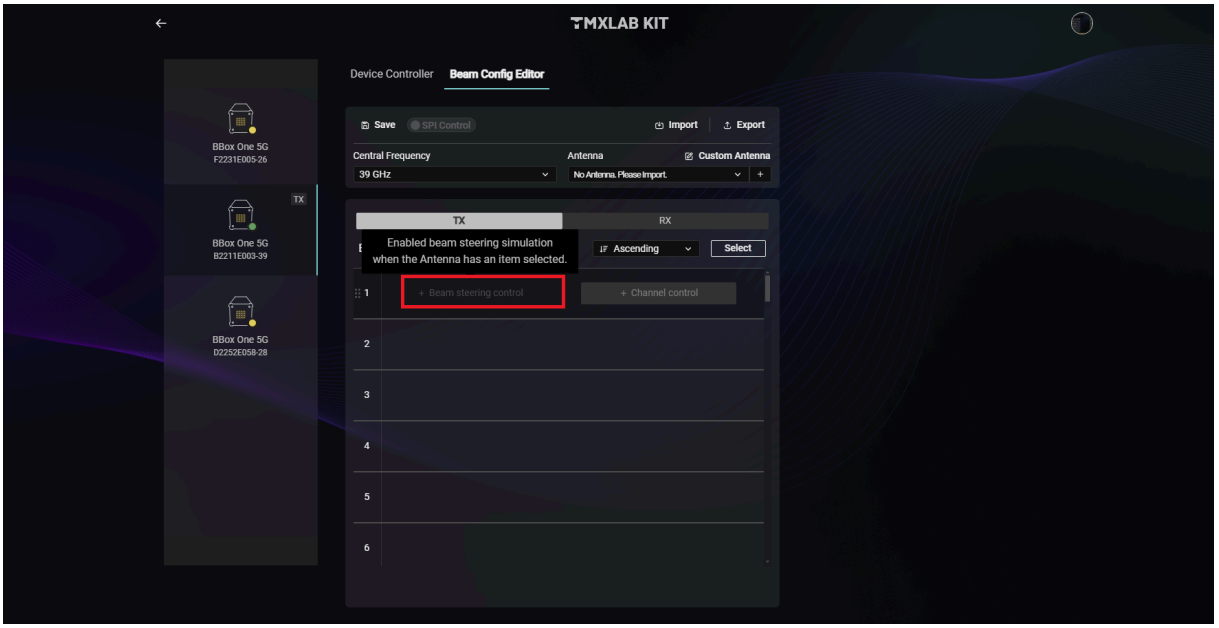


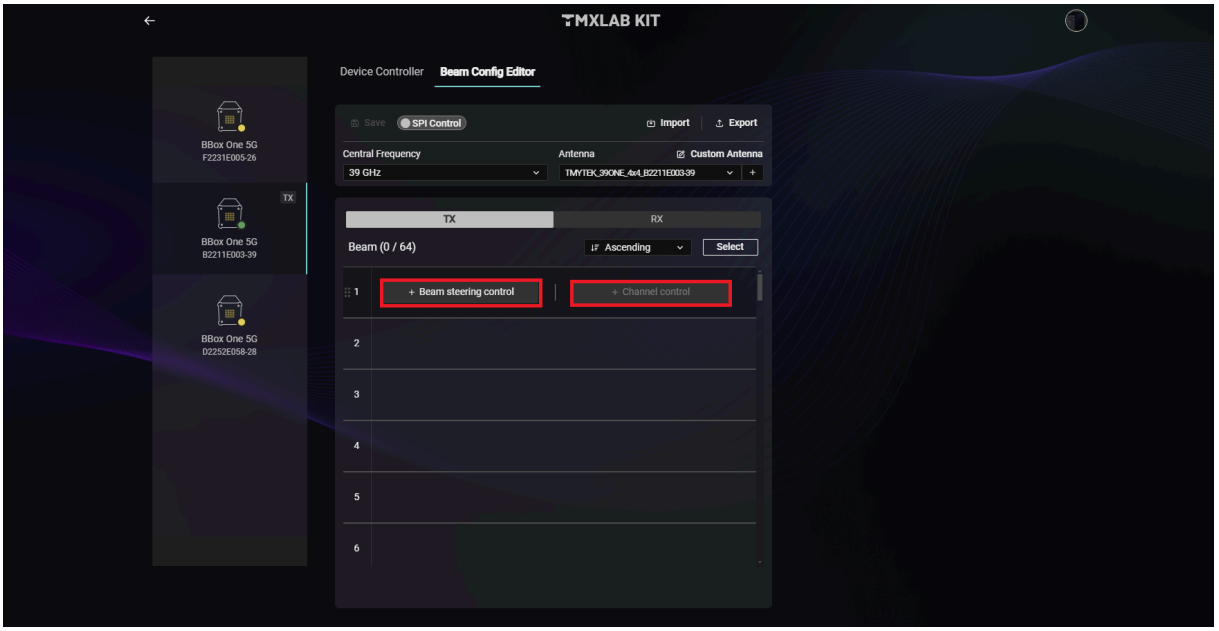
2.2.2. Beam Config Editor

The Beam Config Editor allows the user to pre-edit up to 64 sets of beams in both Tx and Rx modes, and write the beam table into the BBox. Within the same power cycle, the user can switch between pre-written beam IDs via the SPI interface.

(1). Add **Beam Configuration.**

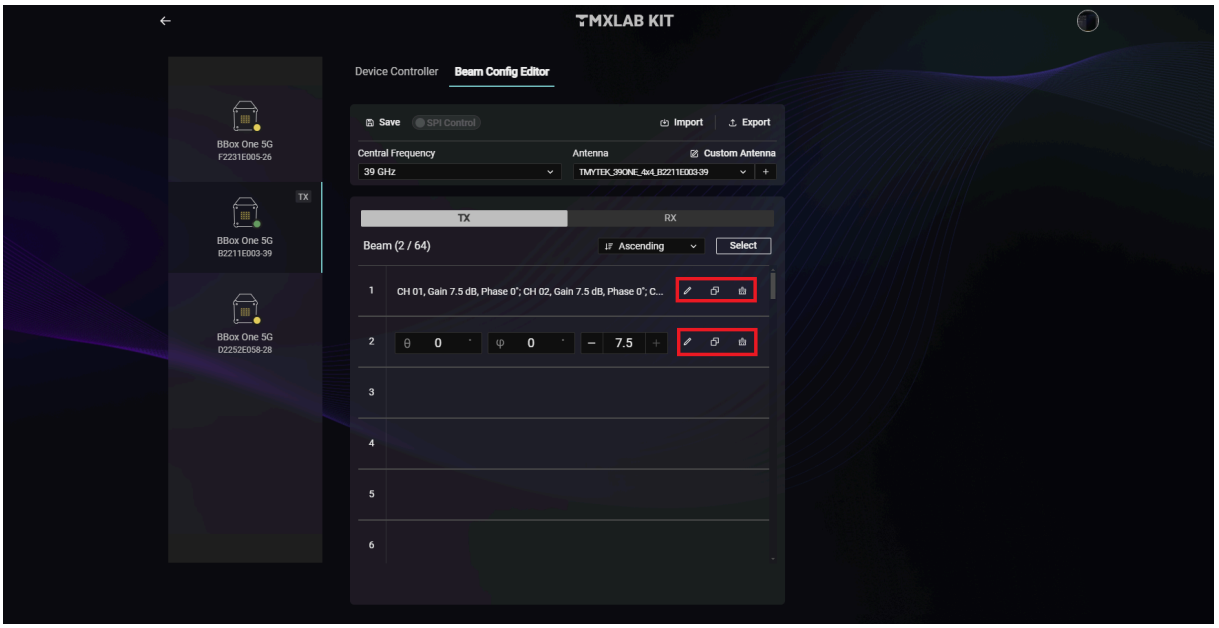
If no antenna is selected, beam steering control cannot be added in the Beam Config. When an antenna is selected, both beam steering and channel control can be added in the Beam Config.

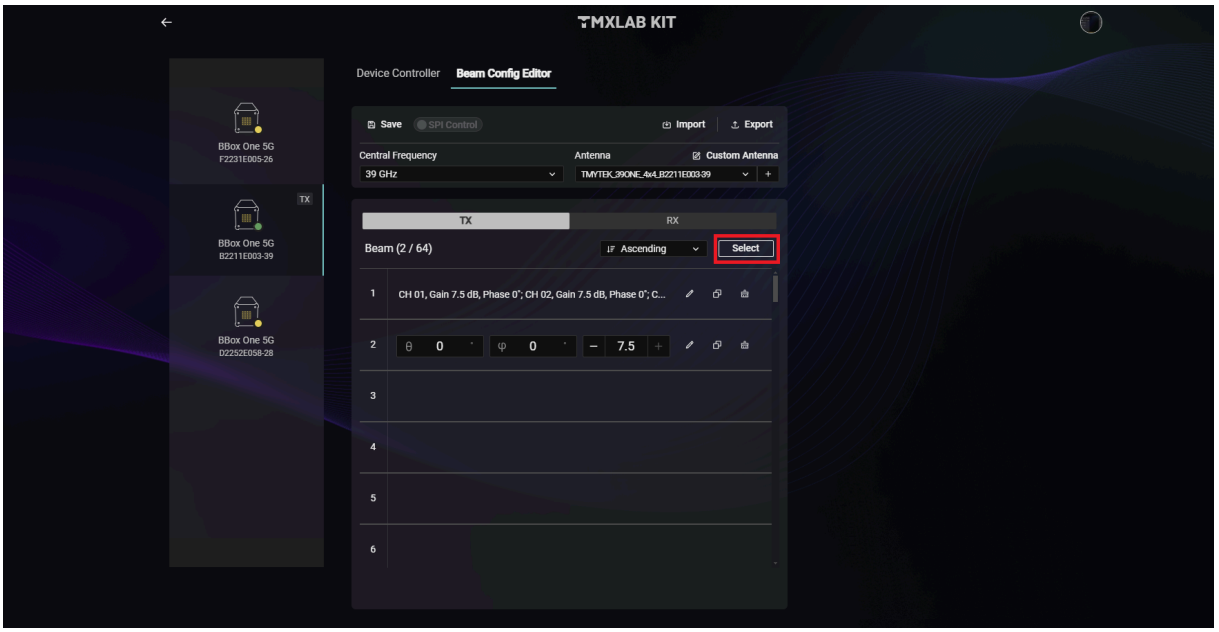




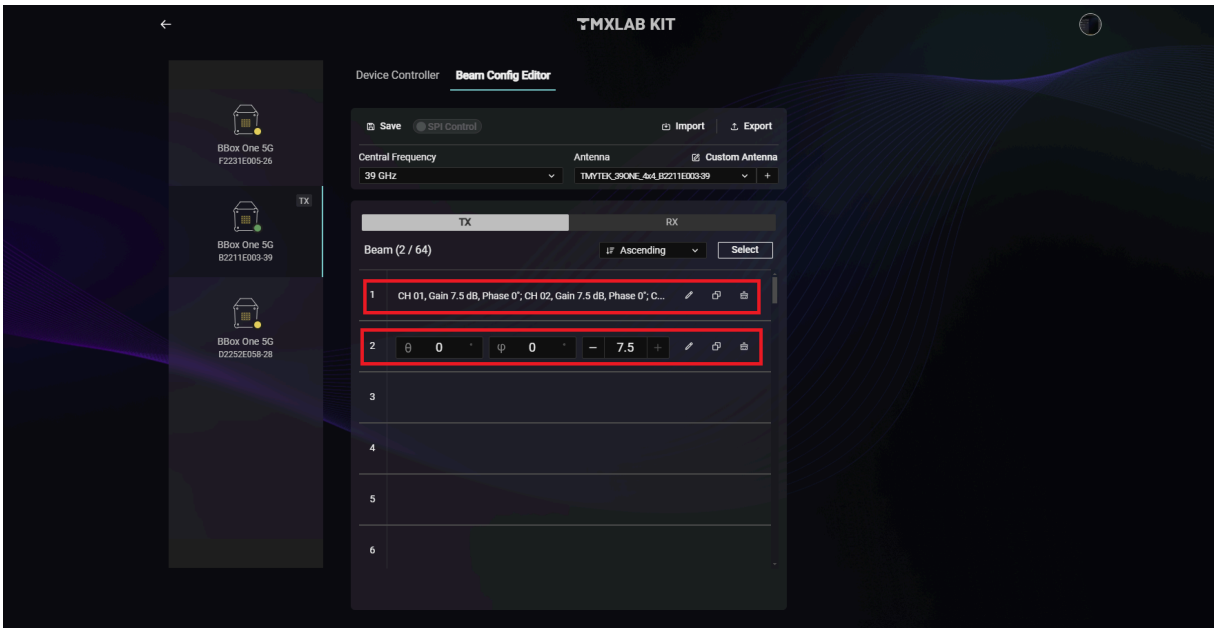
(2). Select antenna, import antenna and custom antenna (detail please refer to Device controller (4).).

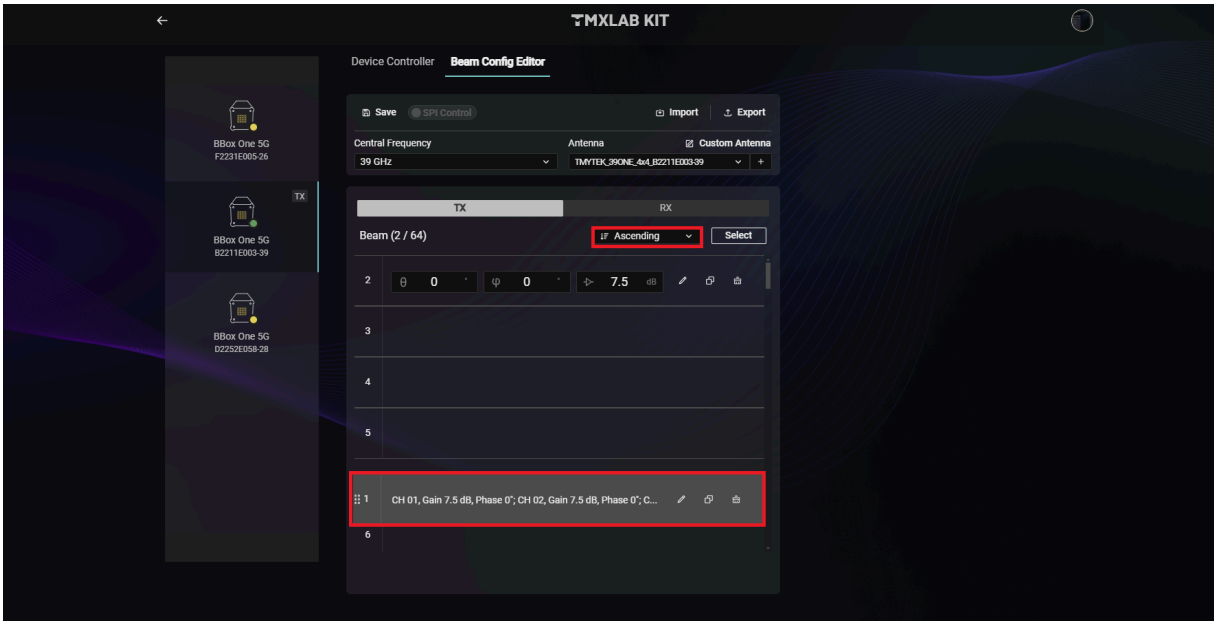
(3). Modify **Beam configuration**, then can **Edit**, **Duplicate**, and **Remove** beam IDs. Additionally, the user can **Select** specific beam IDs for removal.





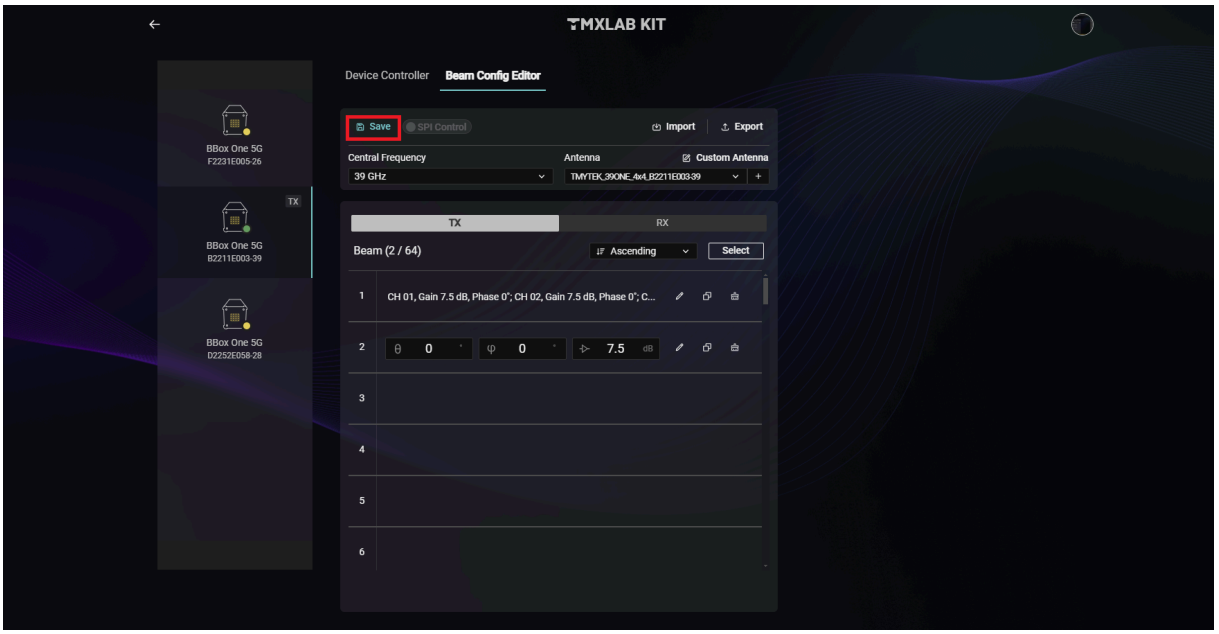
Up to 64 sets of beams can be stored in both Tx and Rx modes. Edit them on the panel or click the edit icon to access detailed configuration. Beam IDs can be sorted in both **Ascending** and **Descending** order and can be rearranged. **Click and drag** the Beam ID to the desired position, then release the mouse to drop it.





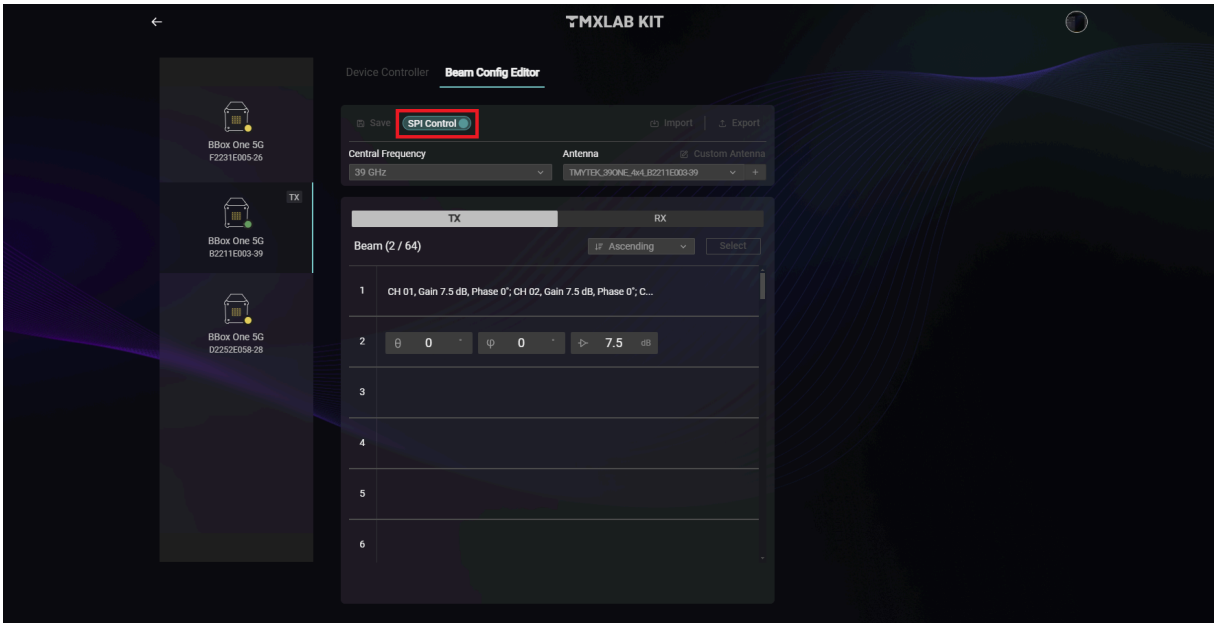
(4). After editing, click "**Save**" to save the configuration file.

Note: The file is saved on the PC only and has not been written to the BBox yet.



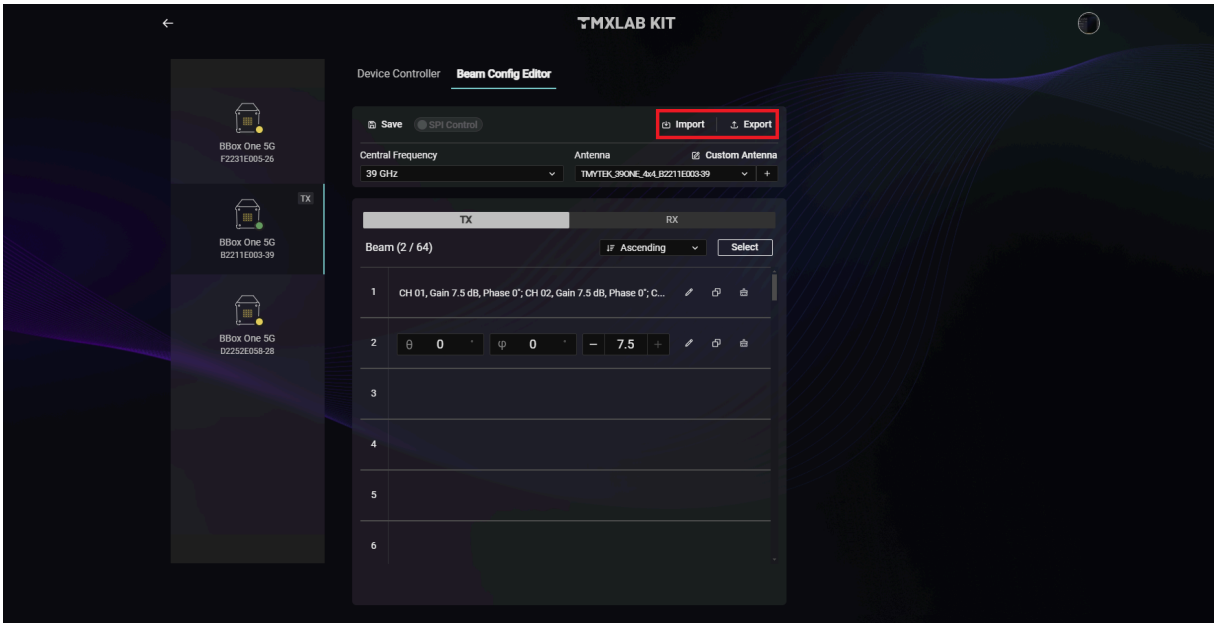
(5). Toggle switch on/off **SPI Control**.

Note: Toggle switch on SPI Control, Beam Config is written to BBox. All functions are locked.



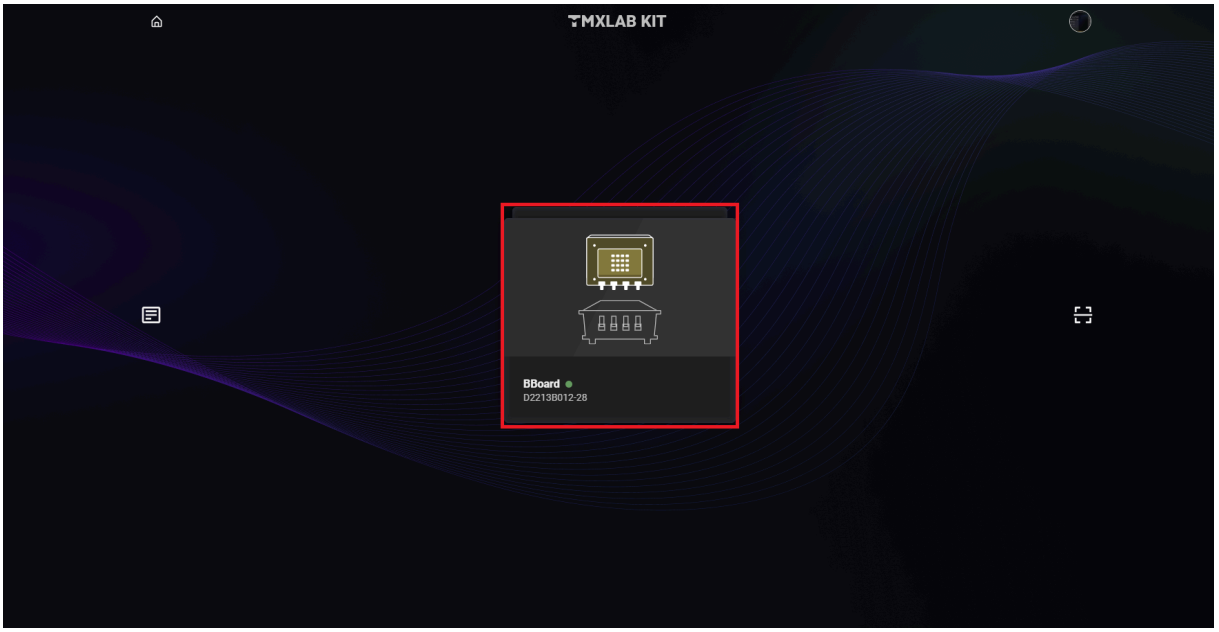
(6). **Import/ Export** Beam Configuration. The user can save and export the beam configuration and import for next time.

Note: Data format of the export file: the configuration of Beam steering and Channel control.

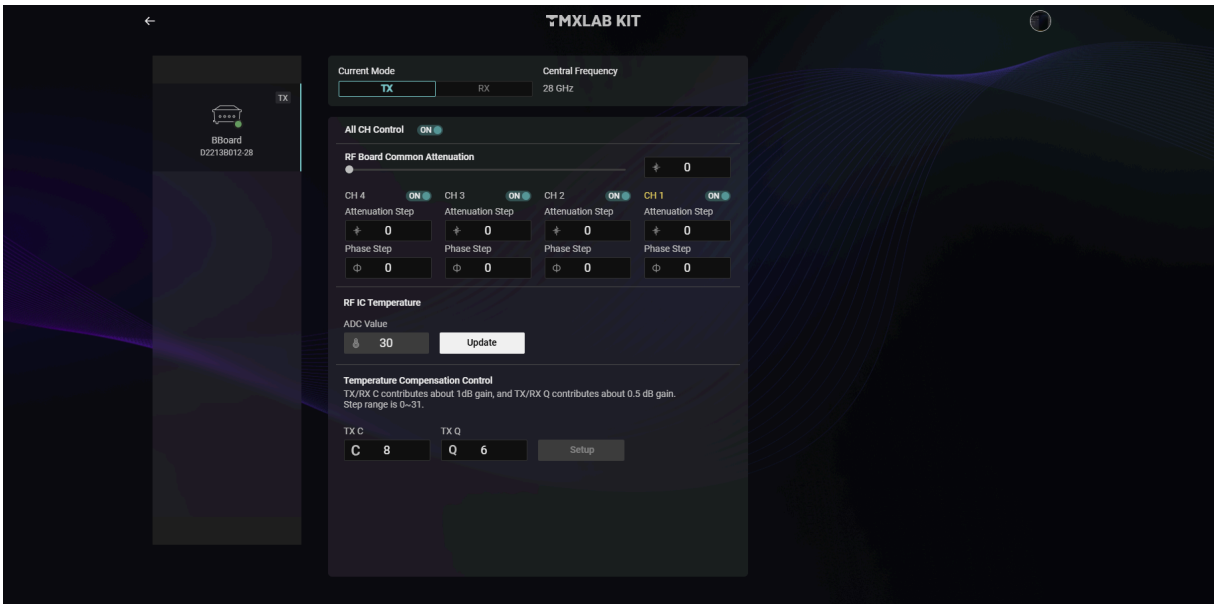


2.3. BBoard

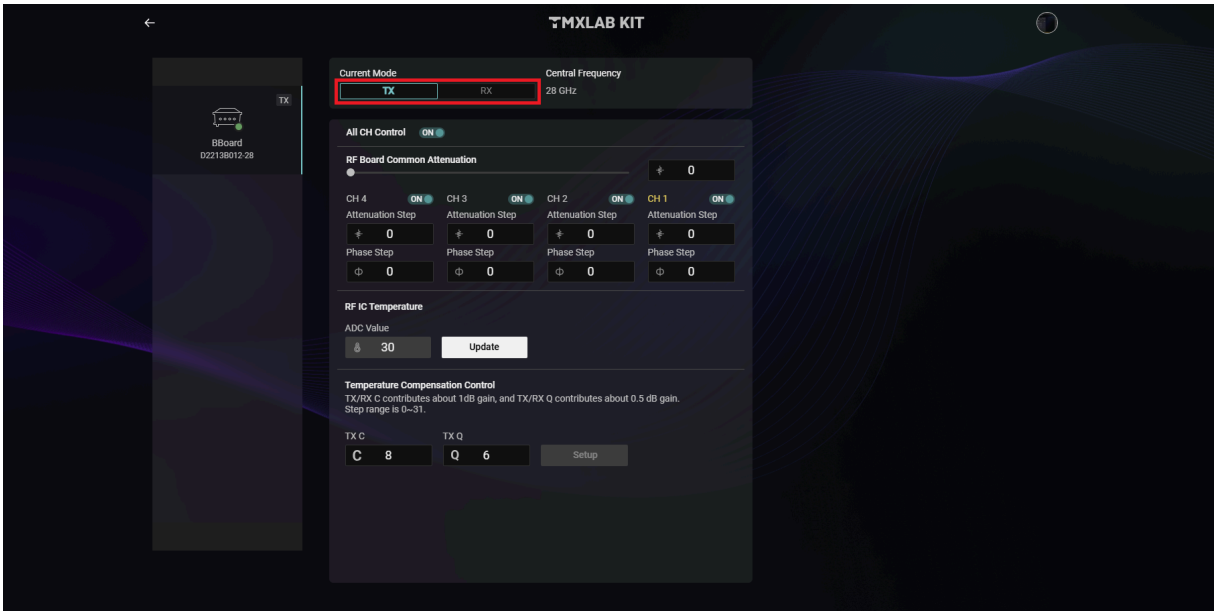
(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.



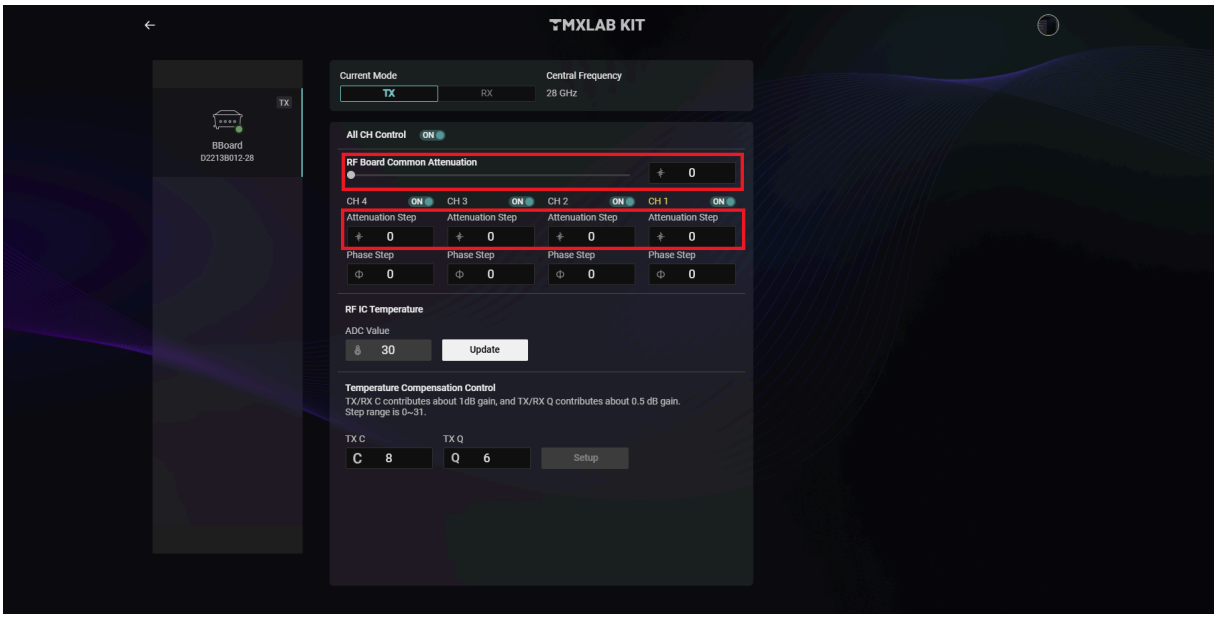
(1). Start initialization. Once completed, the user can proceed.



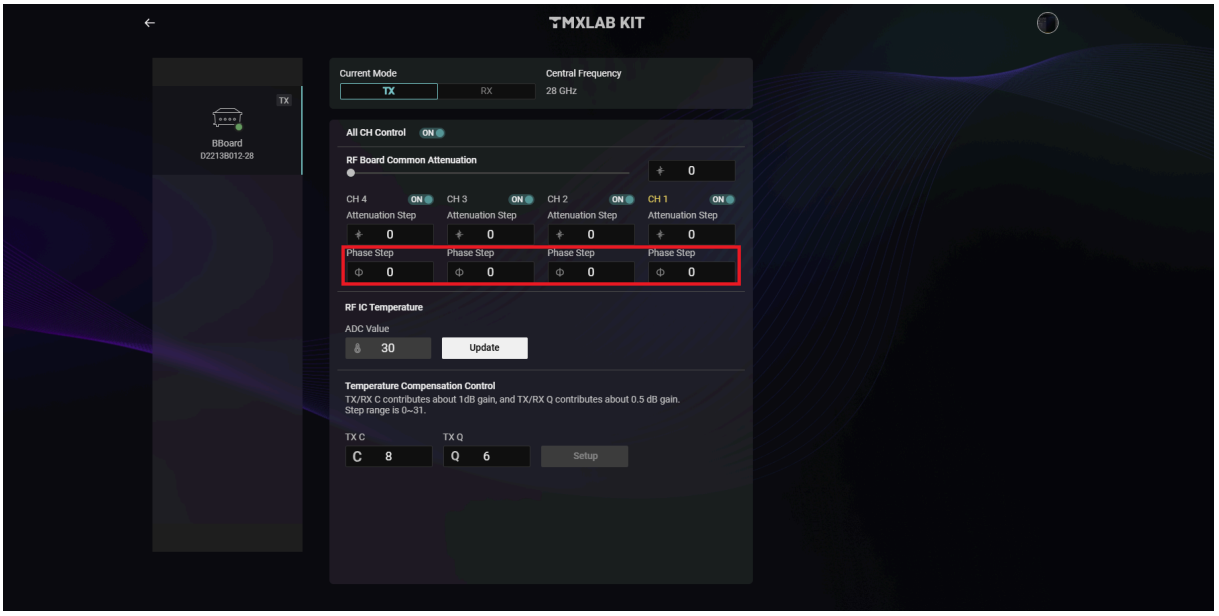
(2). The **Current Mode** allows the user to select either **TX** or **RX** mode.



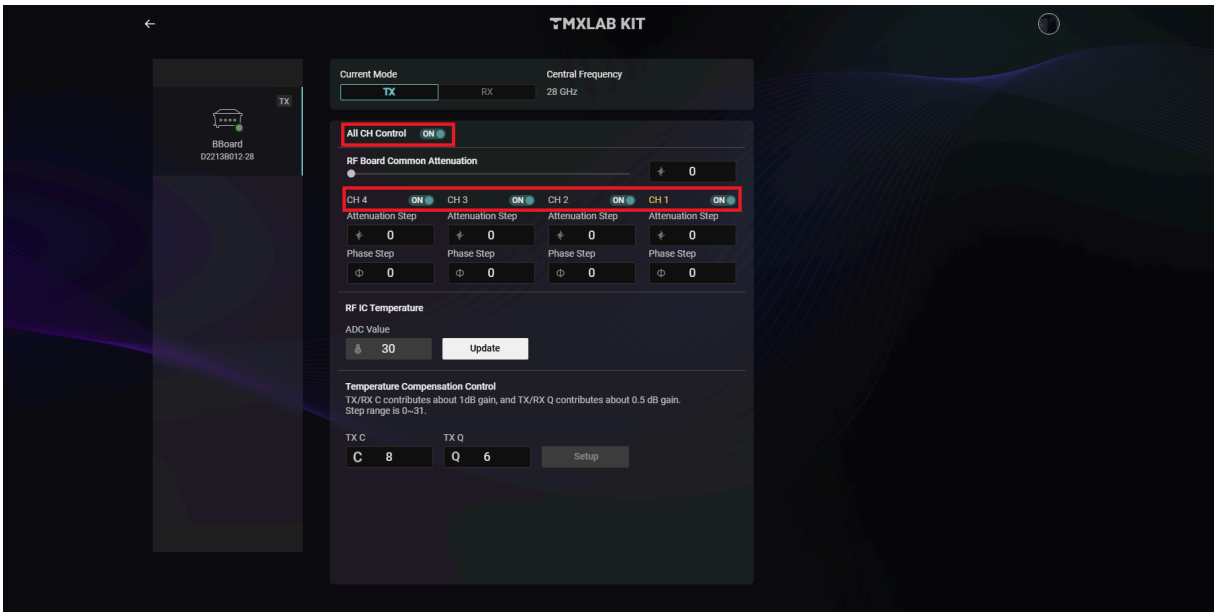
(3). Adjust the Attenuation step to set PA/LNA gain. Step range is 0-15.



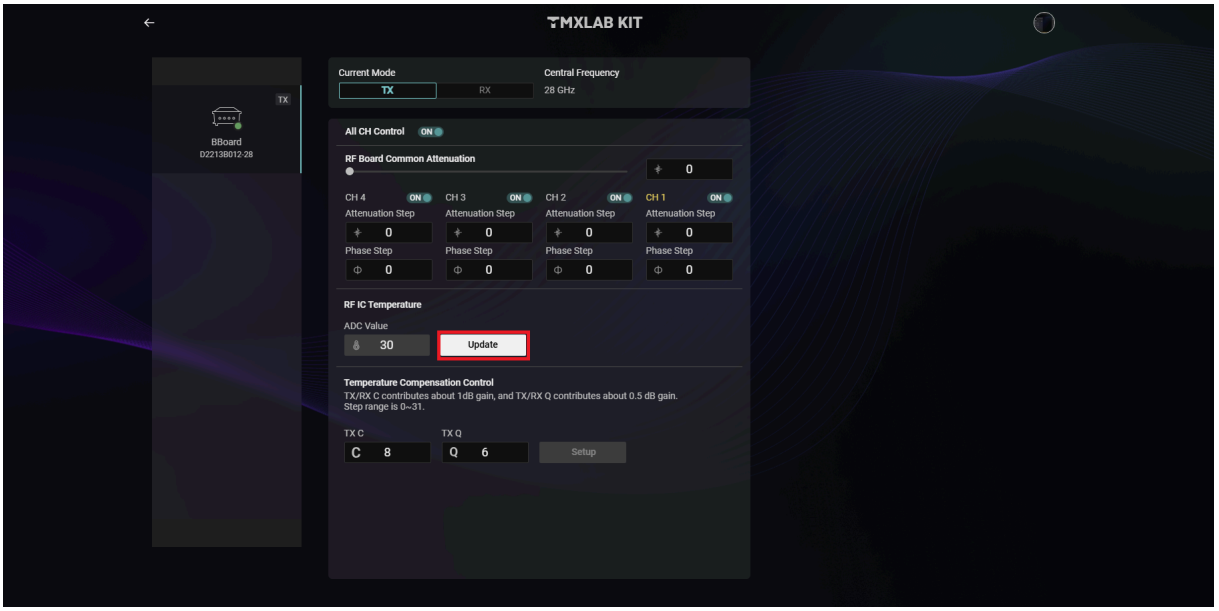
(4). Adjust the **Phase** step to set the phase of each channel. Step range is 0-63.



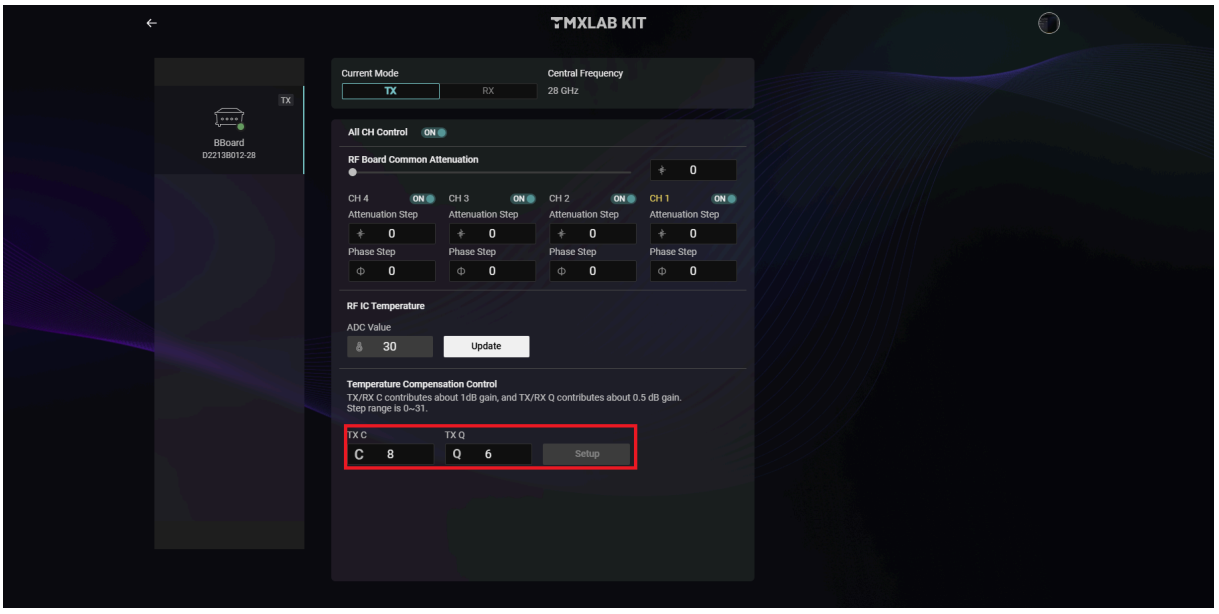
(5). Toggle switch icon of **All CH Control** and **CH1~4** to turn the adjustment mode on or off.



(6). Click “**Update**” to update the real-time ADC Value.



(7). TX C/TX Q (Tx mode) and RX C/RX Q (Rx mode) are temperature compensation coefficients. **TX C and RX C** contribute about 1dB gain, and **TX Q and RX Q** contribute about 0.5 dB gain. Step range is 0-15. Change and click “**Setup**”.



2.4. UD BOX 5G (Single/ Dual)

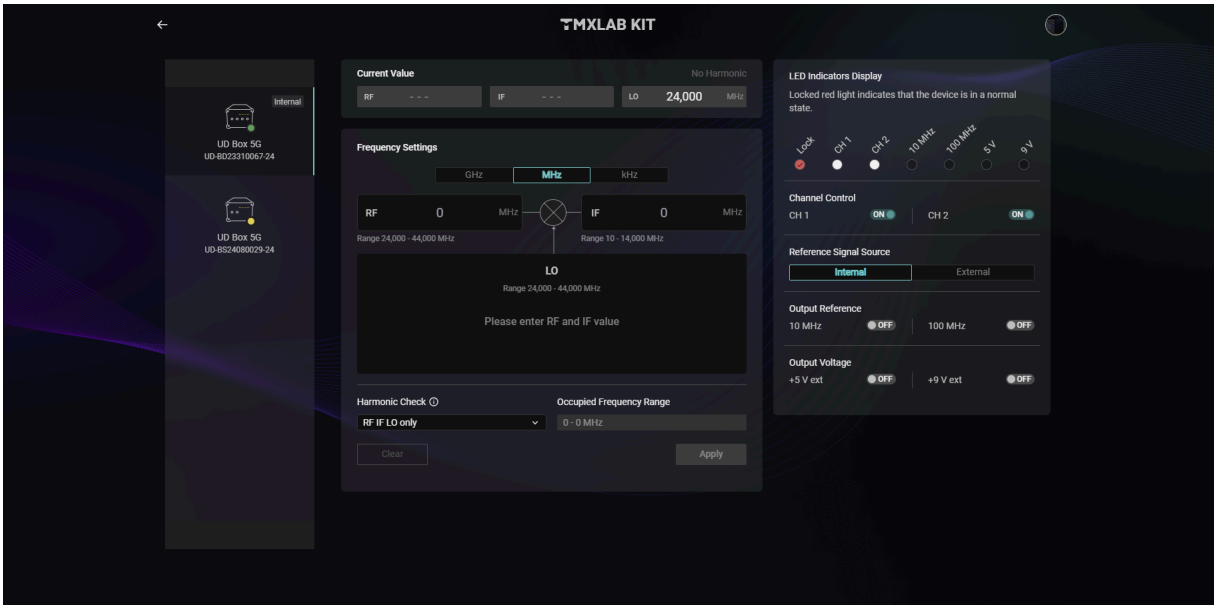
The LED Indicators of UD BOX 5G display description:
UD BOX 5G (Dual) will be used as an example.

Lock		CH1		CH2	
LED Display	Description	LED Display	Description	LED Display	Description
🔴	Lock	○	ON	○	ON
X	Unlock	X	OFF	X	OFF

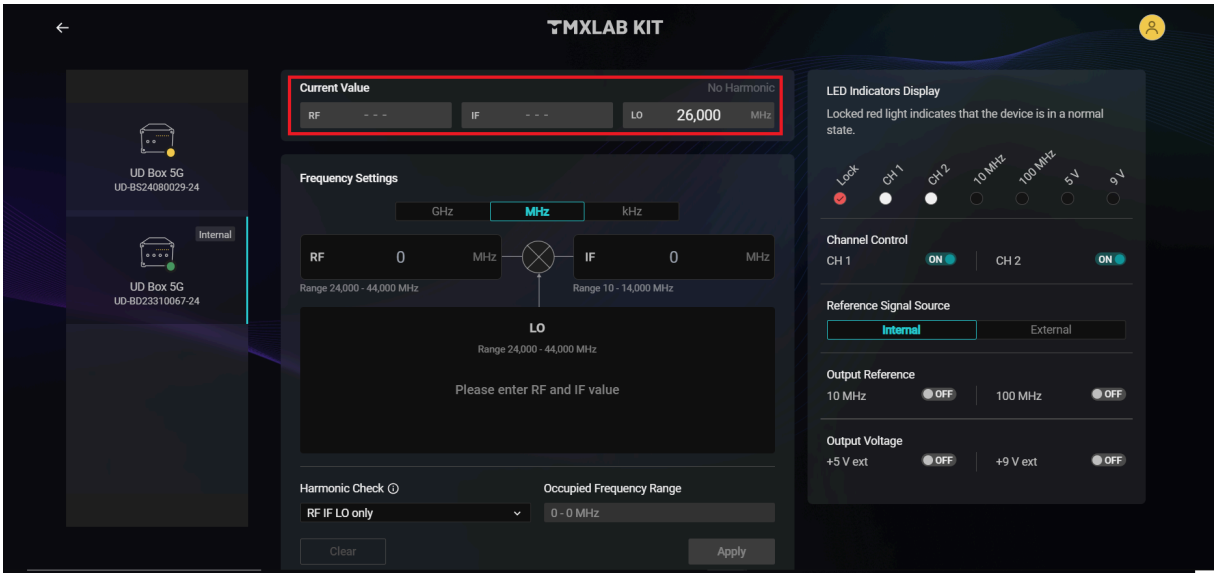
10M		100M		5V		9V	
LED Display	Description	LED Display	Description	LED Display	Description	LED Display	Description
○	Internal	○	Internal	○	ON	○	ON
X	OFF	🔵	External	X	OFF	X	OFF
		X	OFF				

(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.

(1). Start initialization. Once completed, the user can proceed.

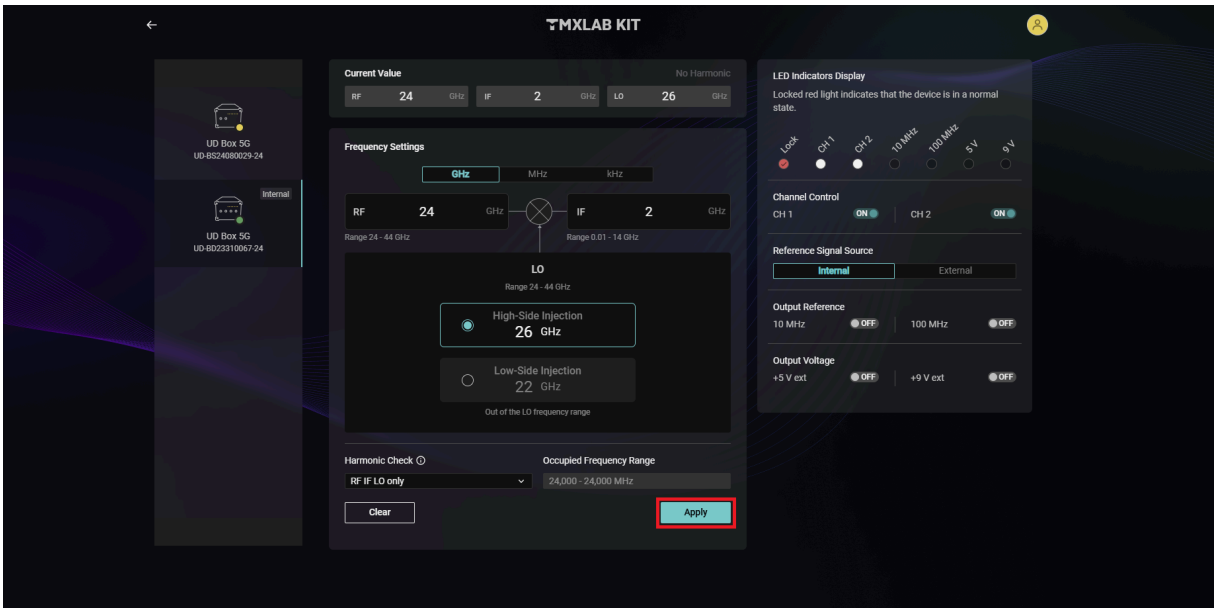


(2). "**Current Value**" displays the current setting of the connected device.



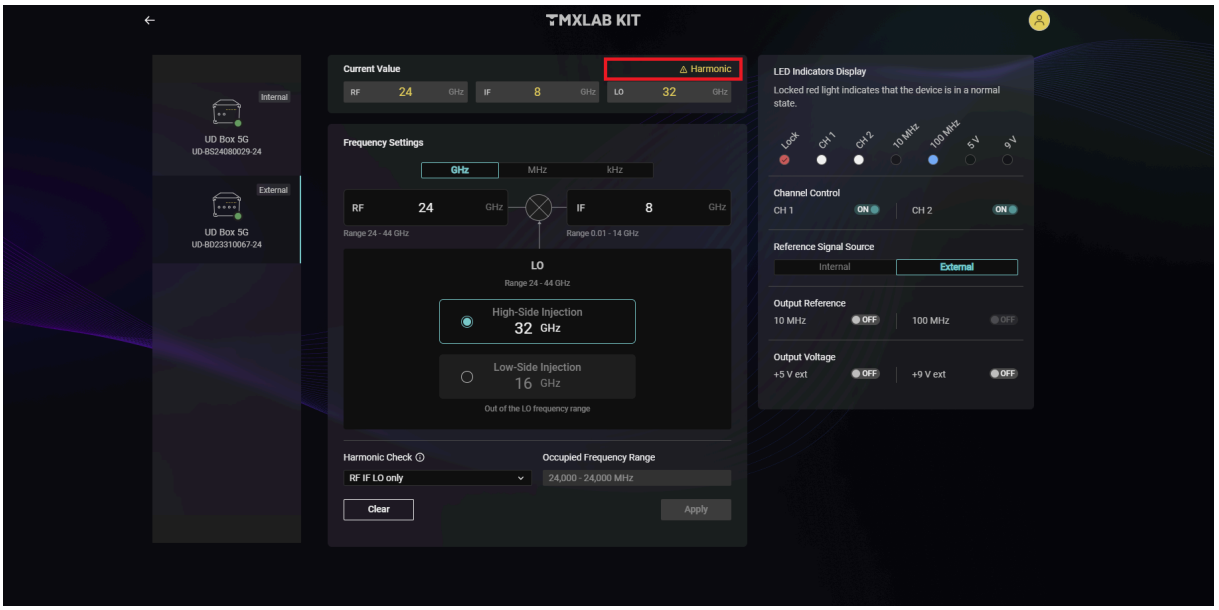
(3). The **LO frequency** can be set in the Frequency Setting.

Enter **RF and IF** input box, after that automatically compute LO, and the value of Harmonic Check will be used to calculate the reference value of frequency range. Choose **High-Side Injection/ Low-Side Injection**. Click "**Apply**" to set the UD Box.

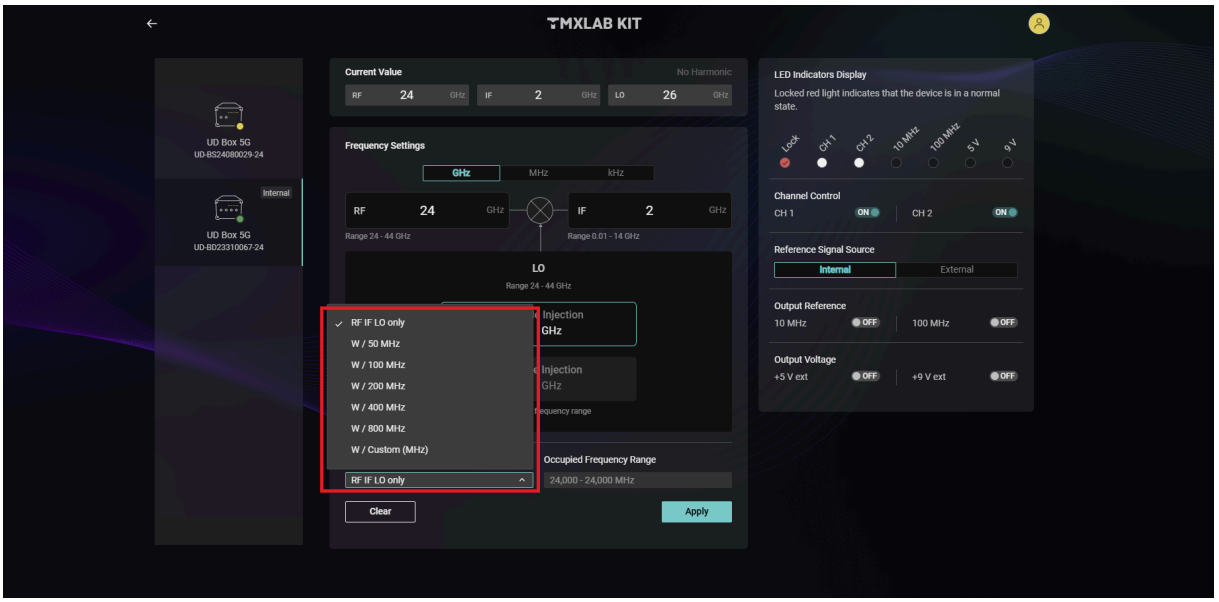


(4). If the input frequency is the same as the in-band harmonics, the Current Value will turn yellow and the **Harmonic** icon in the upper right corner will also turn yellow to signal warning.

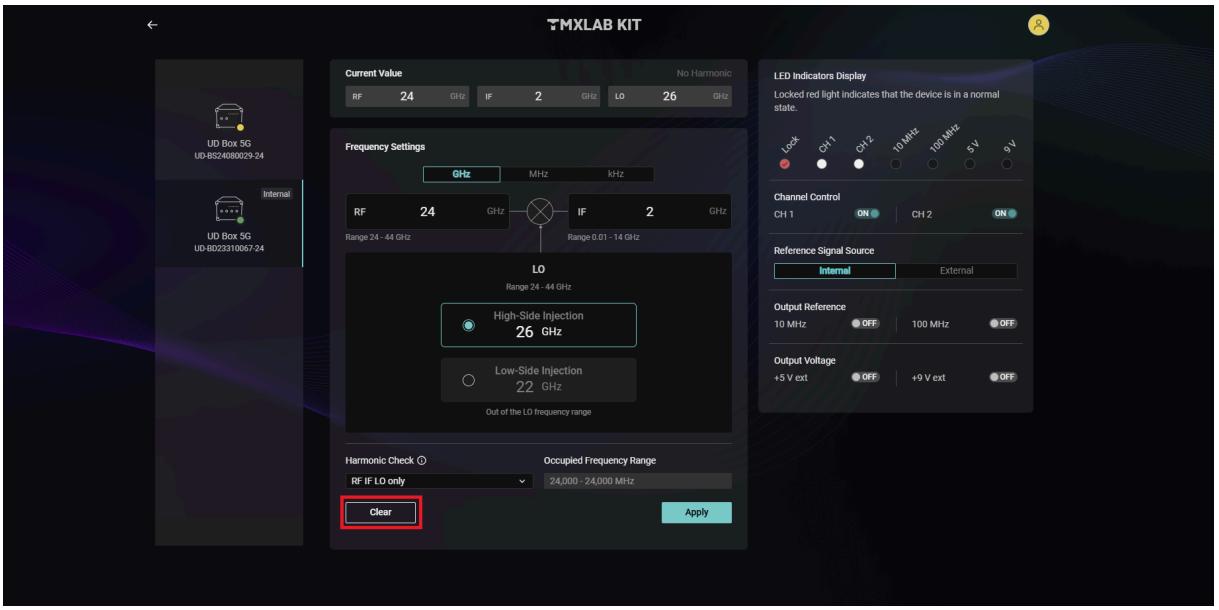
Note: When the yellow warning is shown, UD Box will still execute this setting.



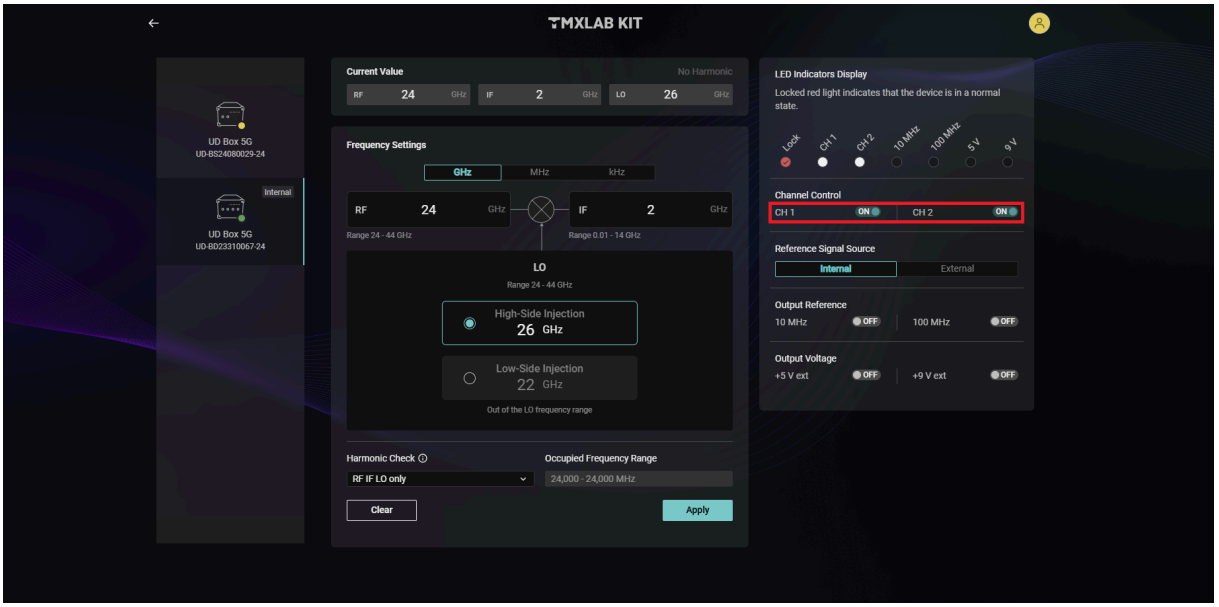
(5). Changing the value in the **Harmonic Check** drop-down list would modify the value in the calculation of harmonic.



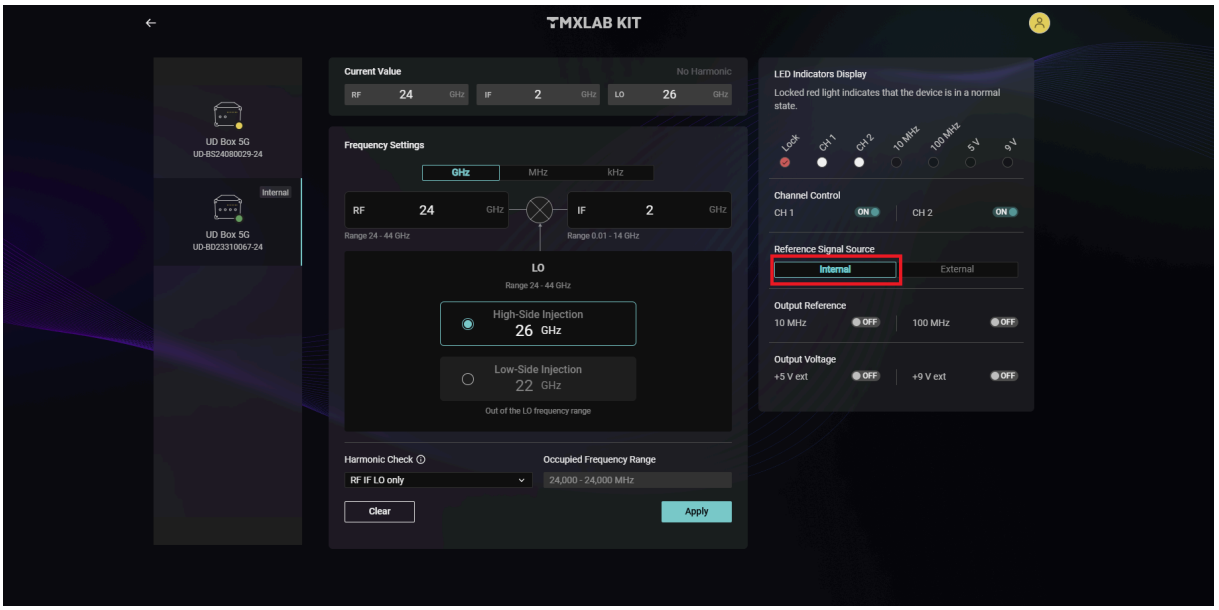
(6). Click “**Clear**” to clear all input values.

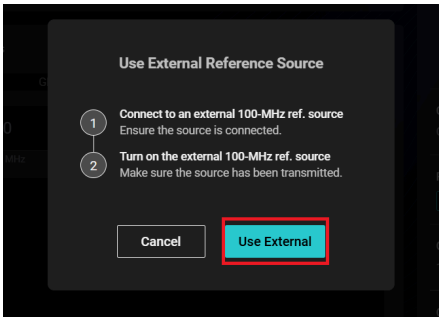


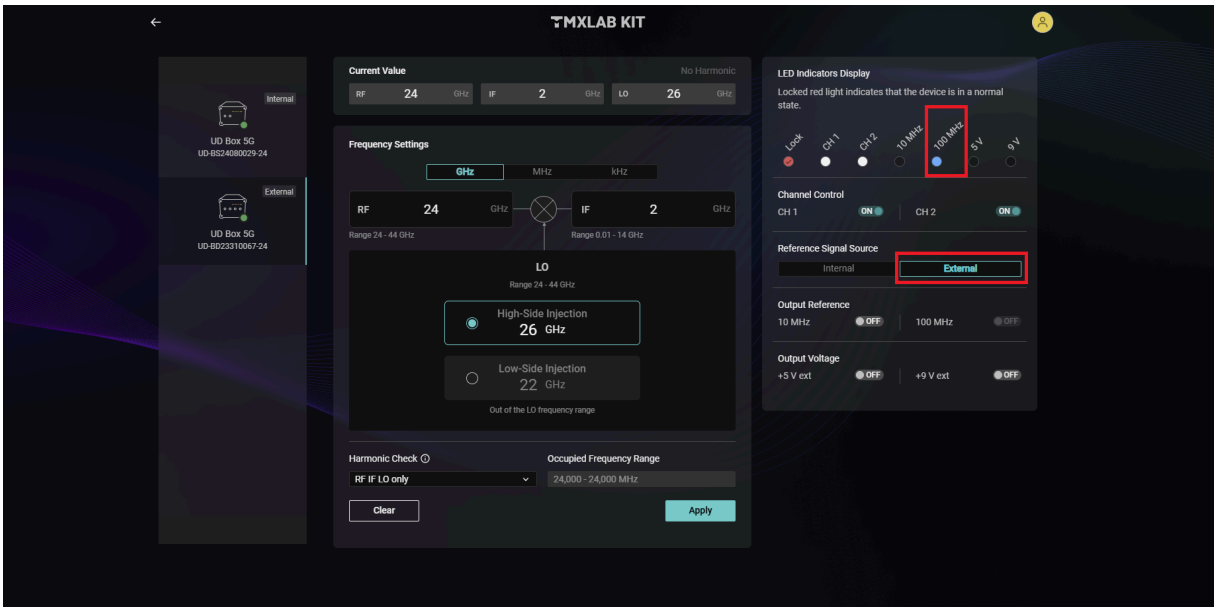
(7). The user can click the toggle switch **CH1and CH2** on and off (Single: Only CH1).



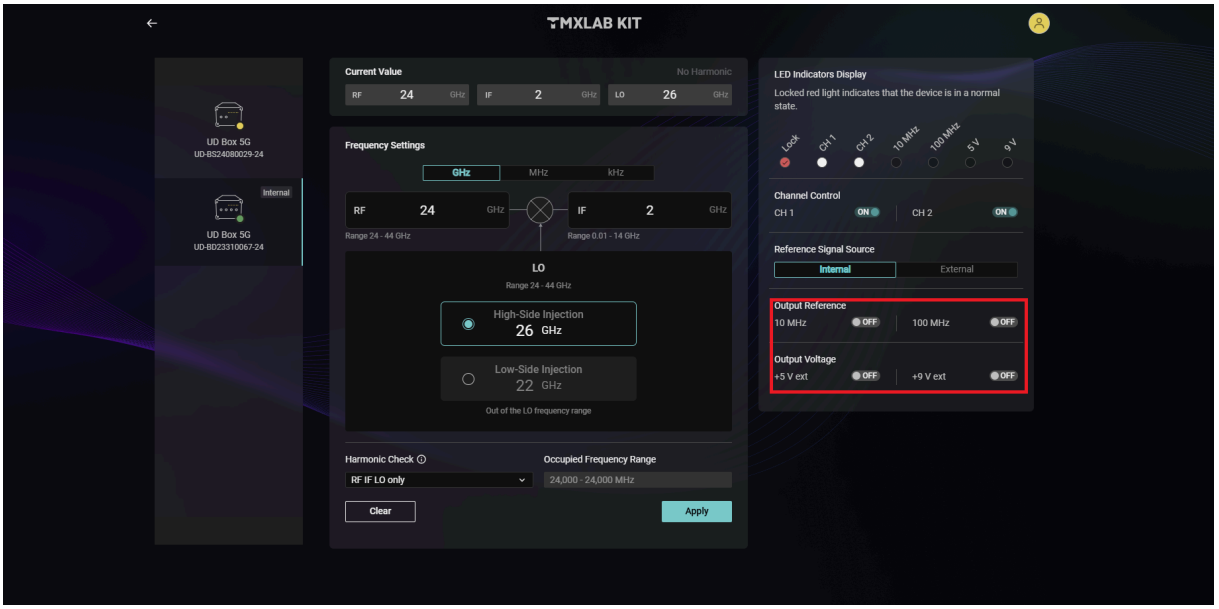
(8). The user can choose either **Internal or External** in the Reference Signal Source. External Source can get **100MHz** only.







(9). The user can click the toggle switch **10MHz, 100MHz, +5V and +9V** on and off.



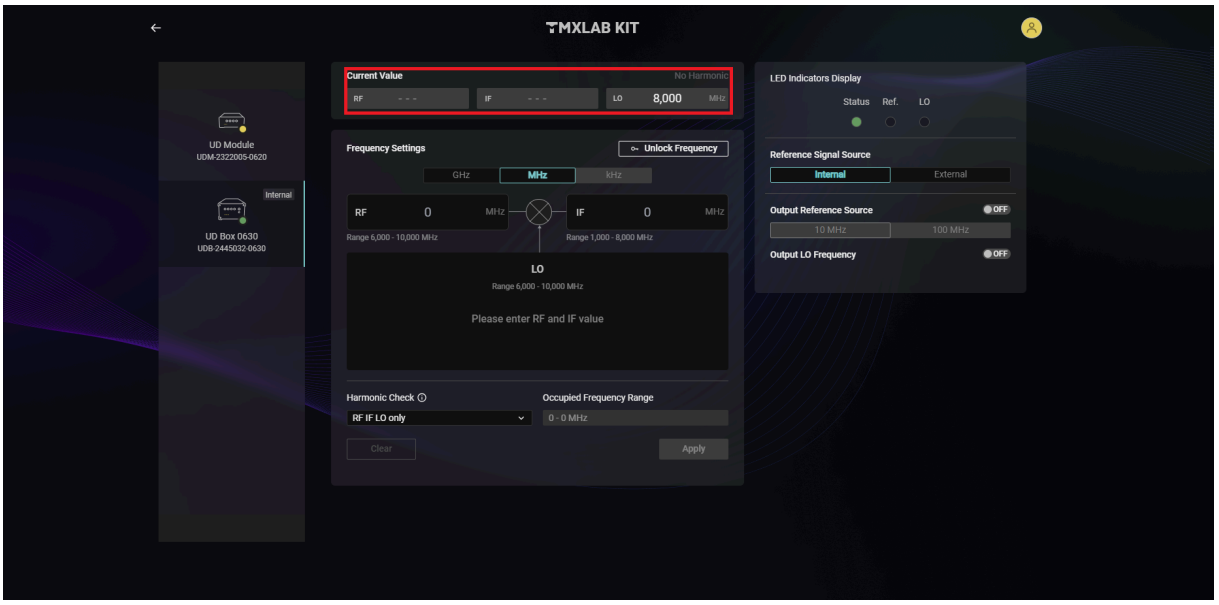
2.5. UD BOX 0630

The LED Indicators of UD BOX 0630 display description:

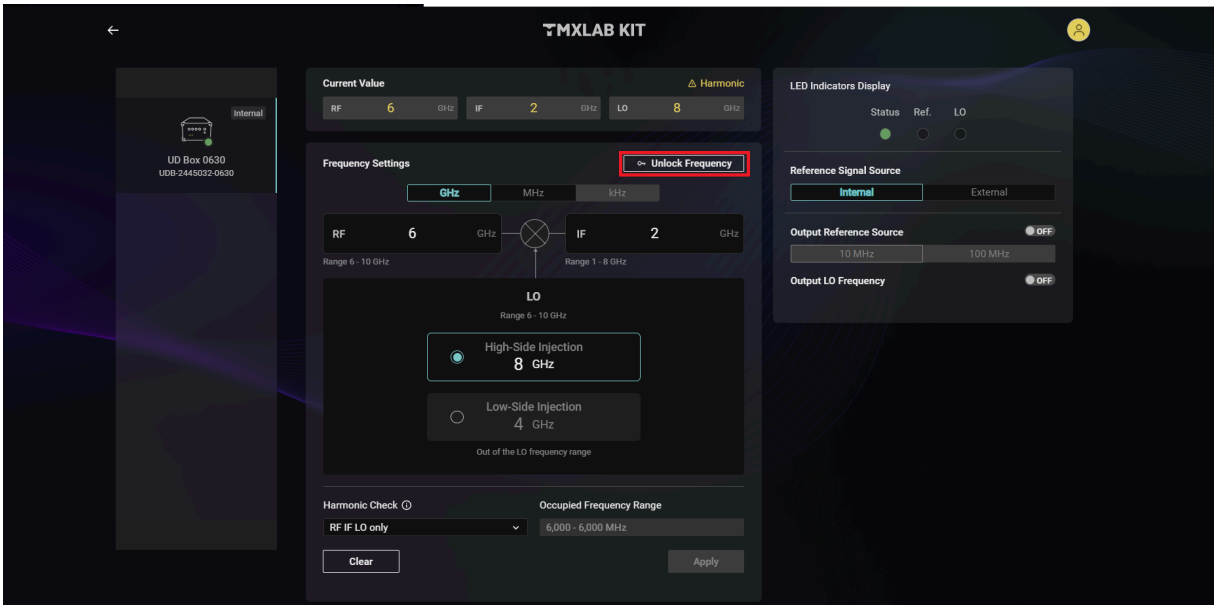
Status		Ref.		LO	
LED Display	Description	LED Display	Description	LED Display	Description
	Normal	X	default	X	default
	Processing		Internal		Internal
	Error		External		External
			Error		Error

(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.

(1). Start initialization. Once completed, the user can proceed. “**Current Value**” displays the current setting of the connected device.

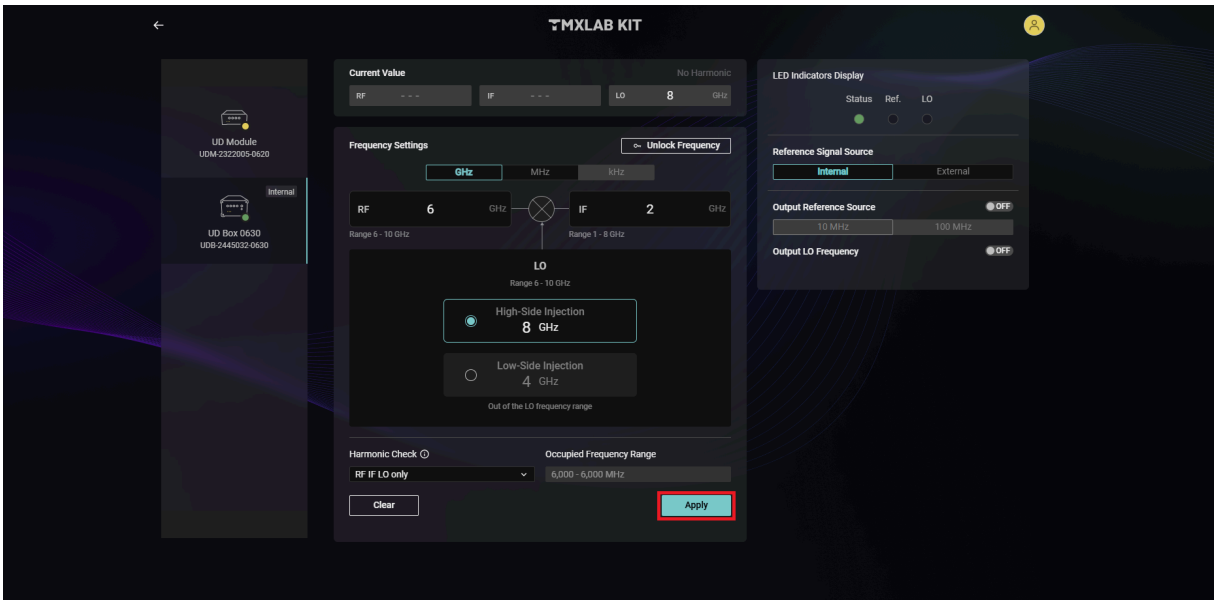


(2). Unlock Frequency, RF default is 10GHz, Unlock according to the purchased license, e.g., RF max is 30GHz.



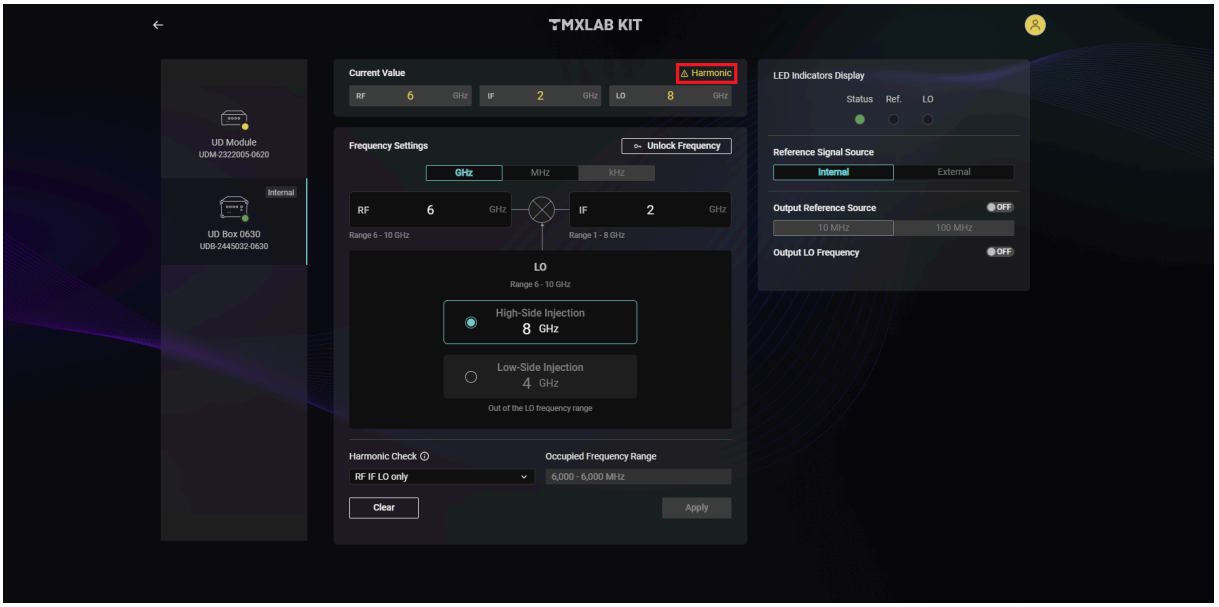
(3). The LO frequency can be set in the Frequency Setting.

Enter **RF and IF** input box, after that automatically compute LO, and the value of Harmonic Check will be used to calculate the reference value of frequency range. Choose **High-Side Injection/ Low-Side Injection**. Click "**Apply**" to set the UD Box.

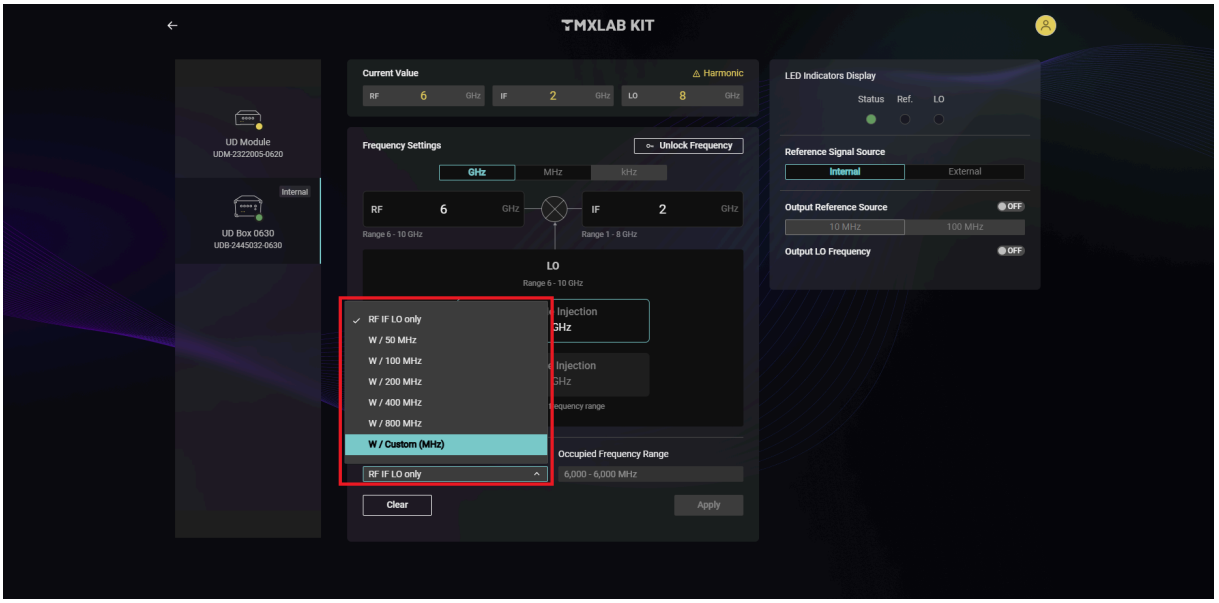


(4). If the input frequency is the same as the in-band harmonics, the Current Value will turn yellow and the Harmonic icon in the upper right corner will also turn yellow to signal warning.

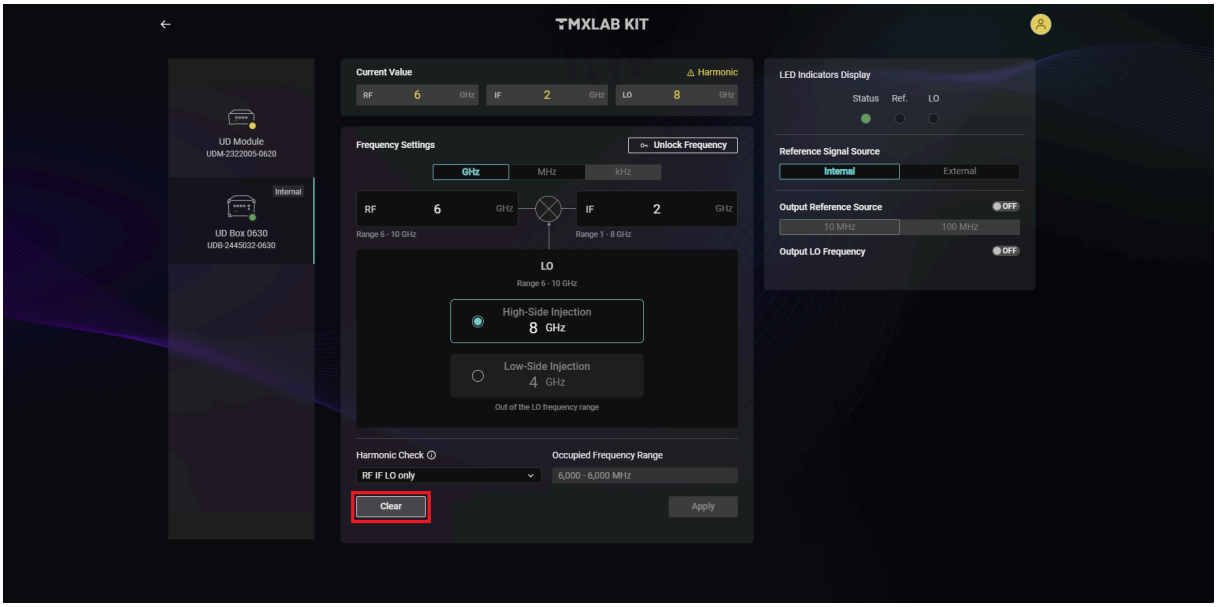
Note: When the yellow warning is shown, UD Box will still execute this setting.



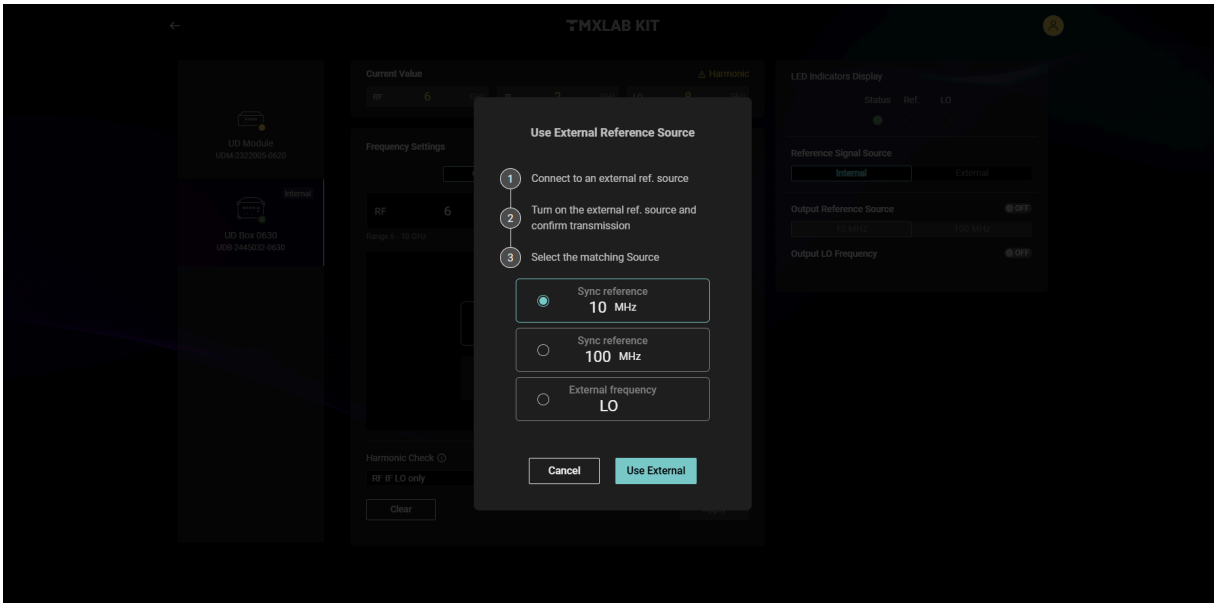
(5). Changing the value in the **Harmonic Check** drop-down list will affect the harmonic calculation by modifying the **Occupied Frequency Range**.



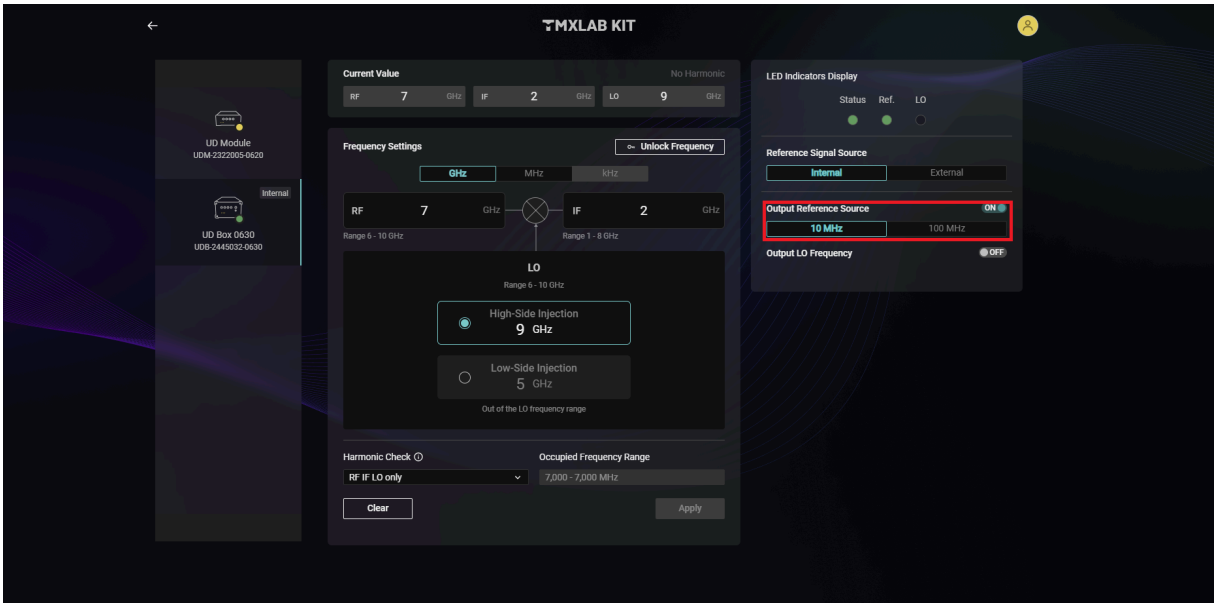
(6). Click “**Clear**” to clear all input values.



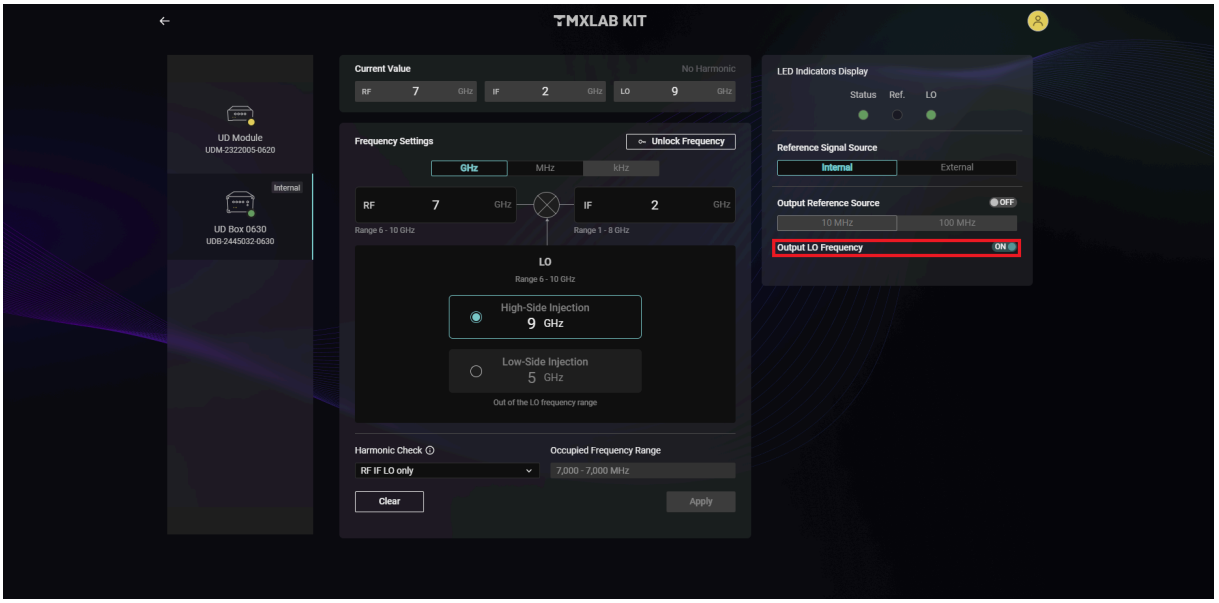
(7). The user can choose either **Internal or External** in the Reference Signal Source. External Source can choose **10MHz, 100MHz or LO.**



(8). The user can toggle switch on **Output Reference Source** and choose **10MHz** or **100MHz.**



(9). The user can toggle switch on/off **Output LO Frequency**.



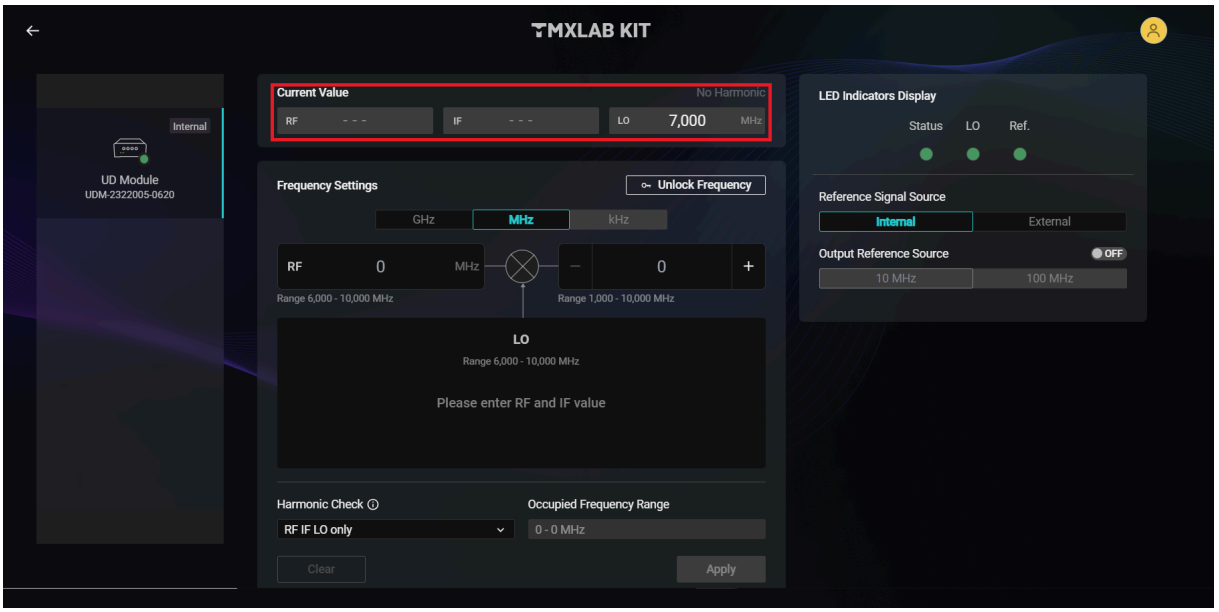
2.6. UD Module

The LED Indicators of UD Module display description:

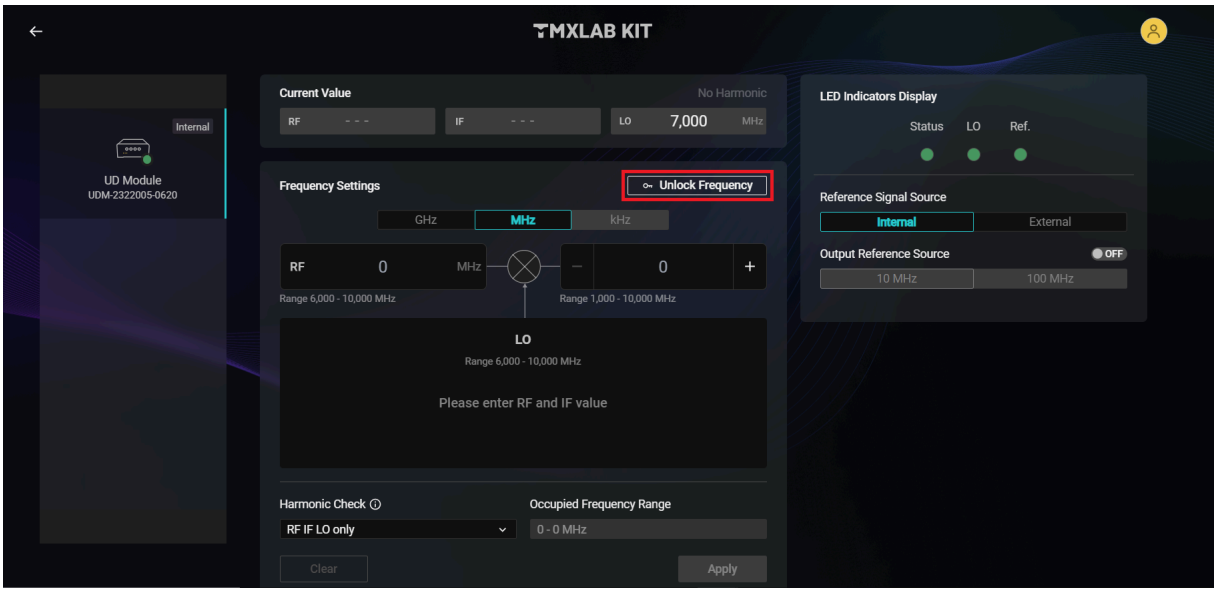
Status		LO		Ref.	
LED Display	Description	LED Display	Description	LED Display	Description
🟢	Normal	🟢	Lock	🟢	Internal
🟠	Processing	🔴	Unlock	🟠	External
🔴	Error			🔴	Error

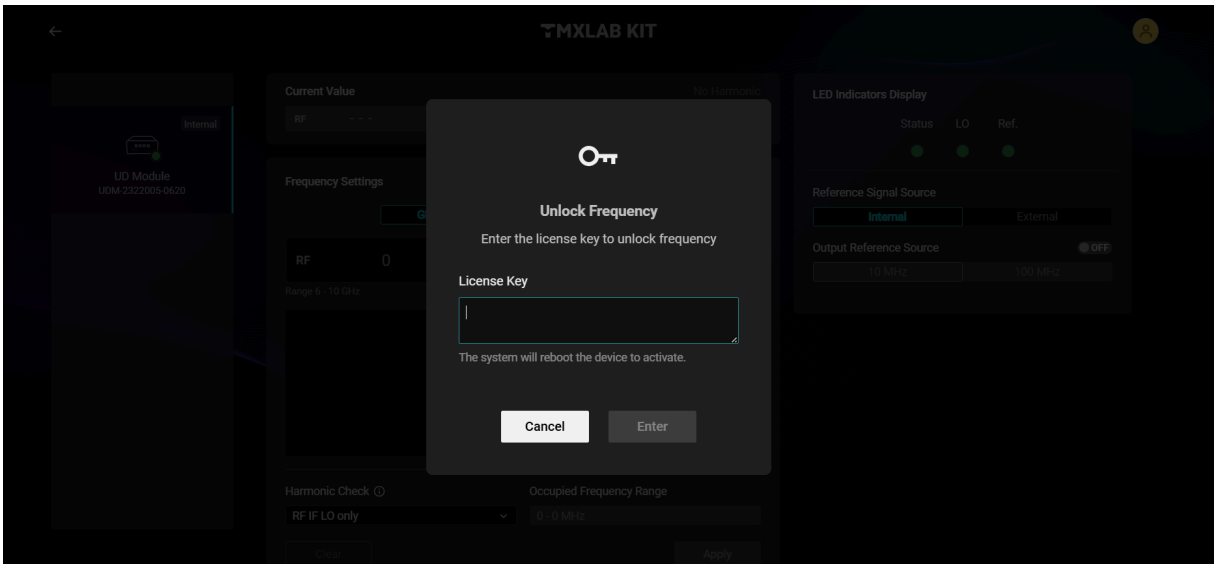
(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.

(1). Start initialization. Once completed, the user can proceed. “**Current Value**” displays the current setting of the connected device.



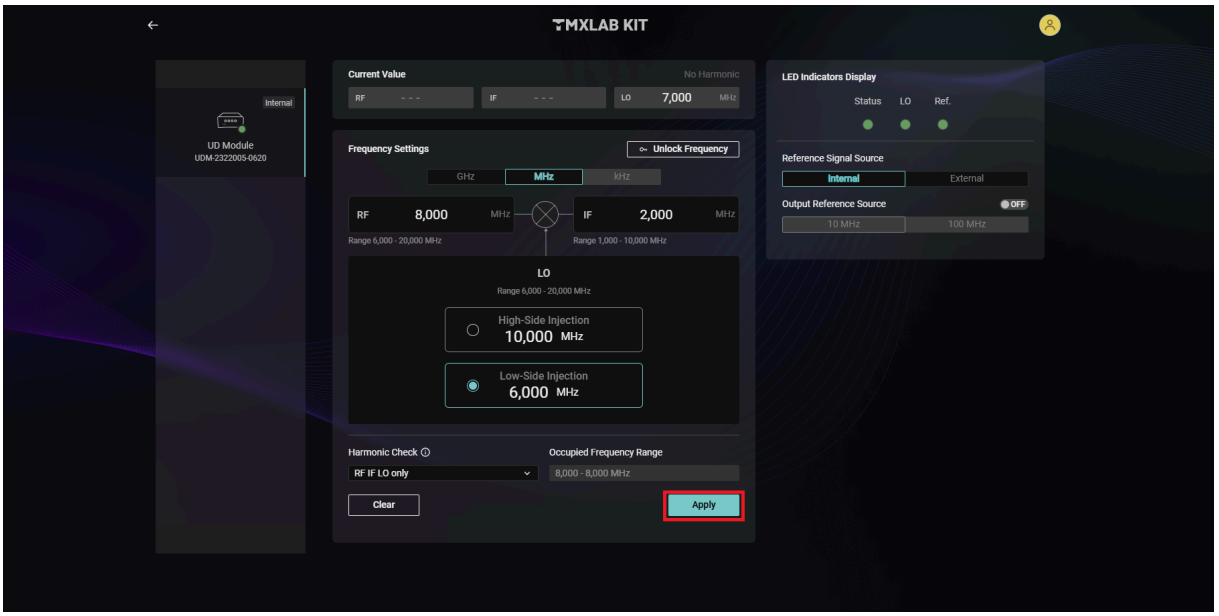
(2). Unlock Frequency, RF default is 10GHz, Unlock according to the purchased license, e.g., RF max is 20GHz.





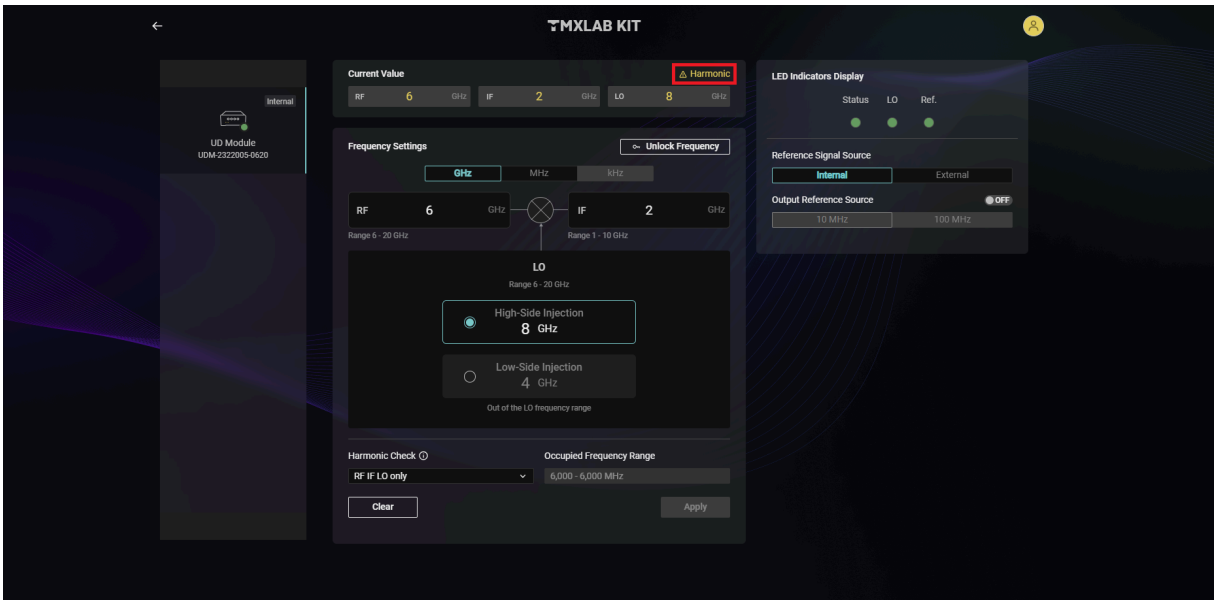
(3). The LO frequency can be set in the Frequency Setting.

Enter **RF and IF** input box, after that automatically compute LO, and the value of Harmonic Check will be used to calculate the reference value of frequency range. Choose **High-Side Injection/ Low-Side Injection**. Click "**Apply**" to set the UD Box.

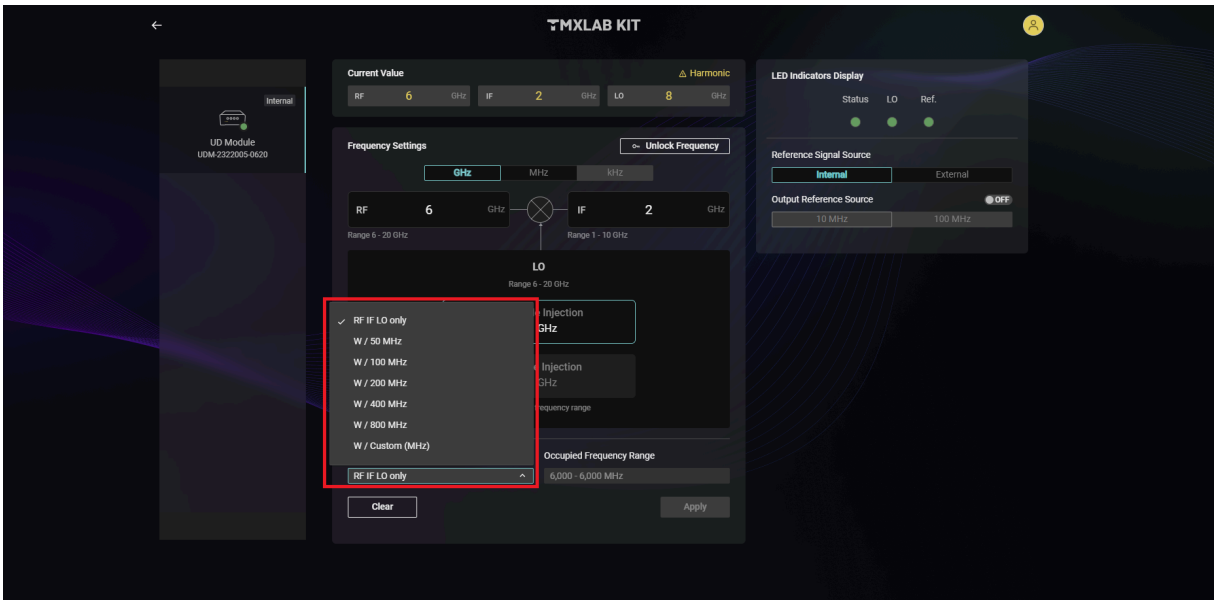


(4). If the input frequency is the same as the in-band harmonics, the Current Value will turn yellow and the **Harmonic** icon in the upper right corner will also turn yellow to signal warning.

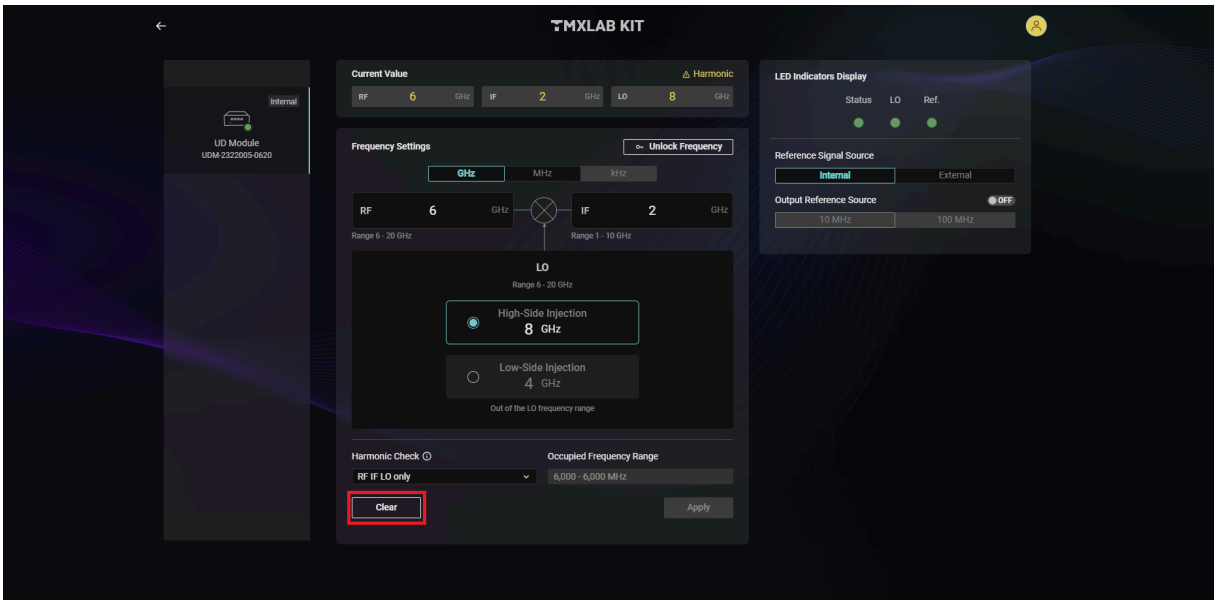
Note: When the yellow warning is shown, UD Box will still execute this setting.



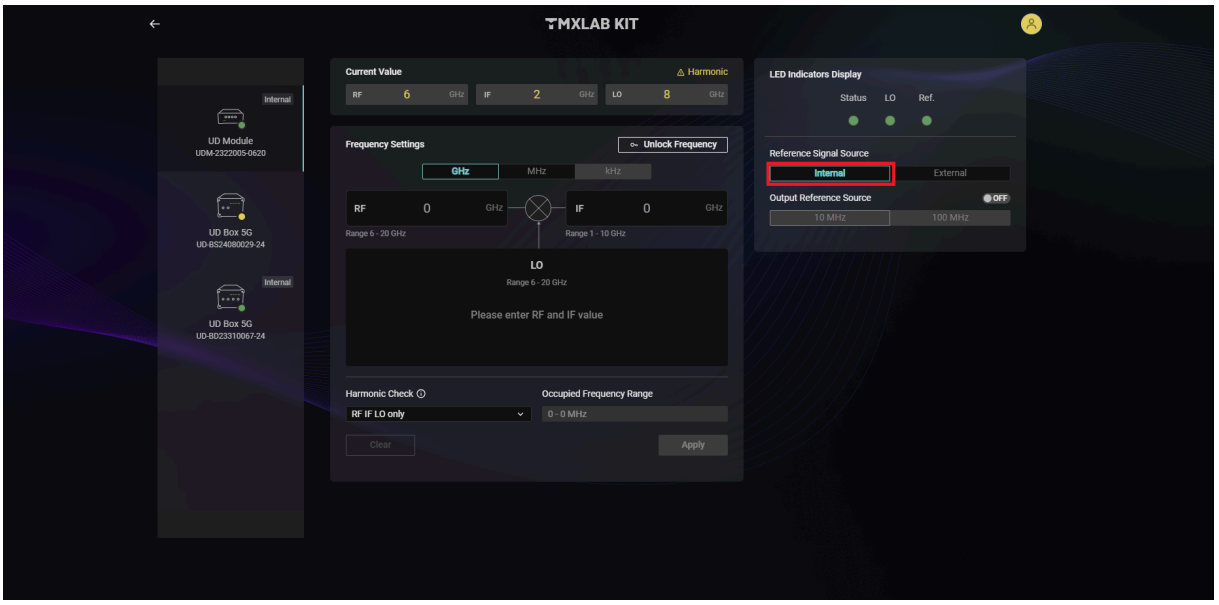
(5). Changing the value in the **Harmonic Check** drop-down list would modify the value in the calculation of harmonic.

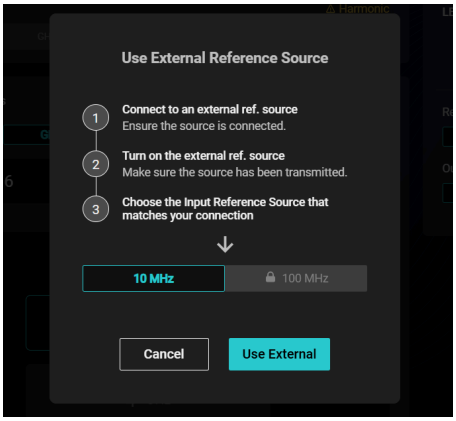


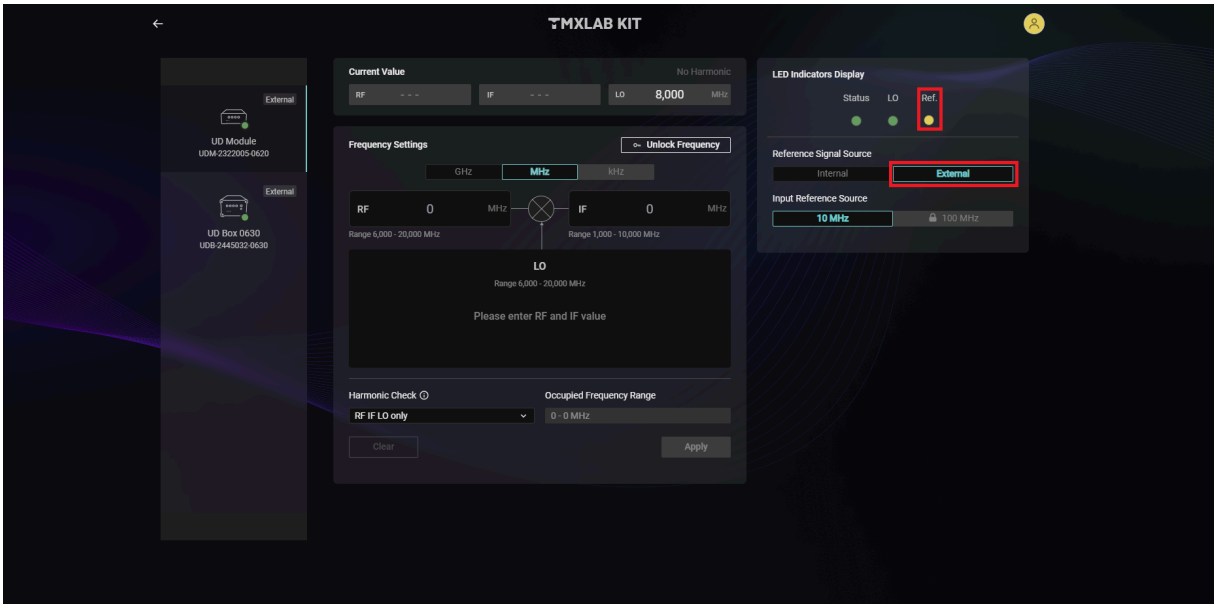
(6). Click "**Clear**" to clear all input values.



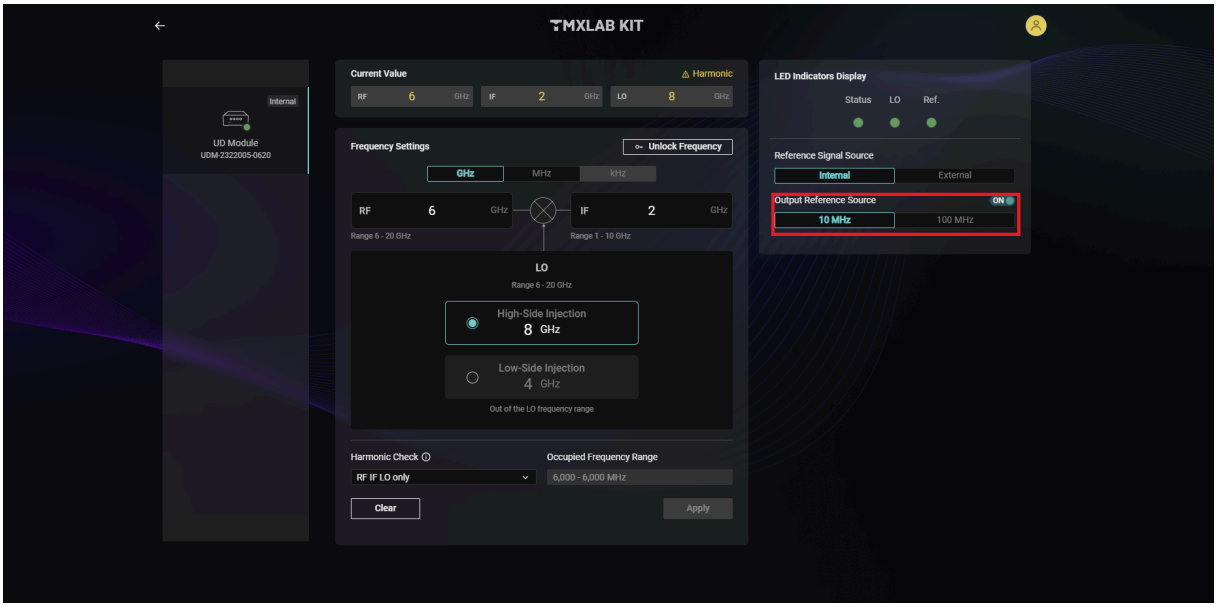
(7). The user can choose either **Internal or External** in the Reference Signal Source. External Source can get **10MHz** only.





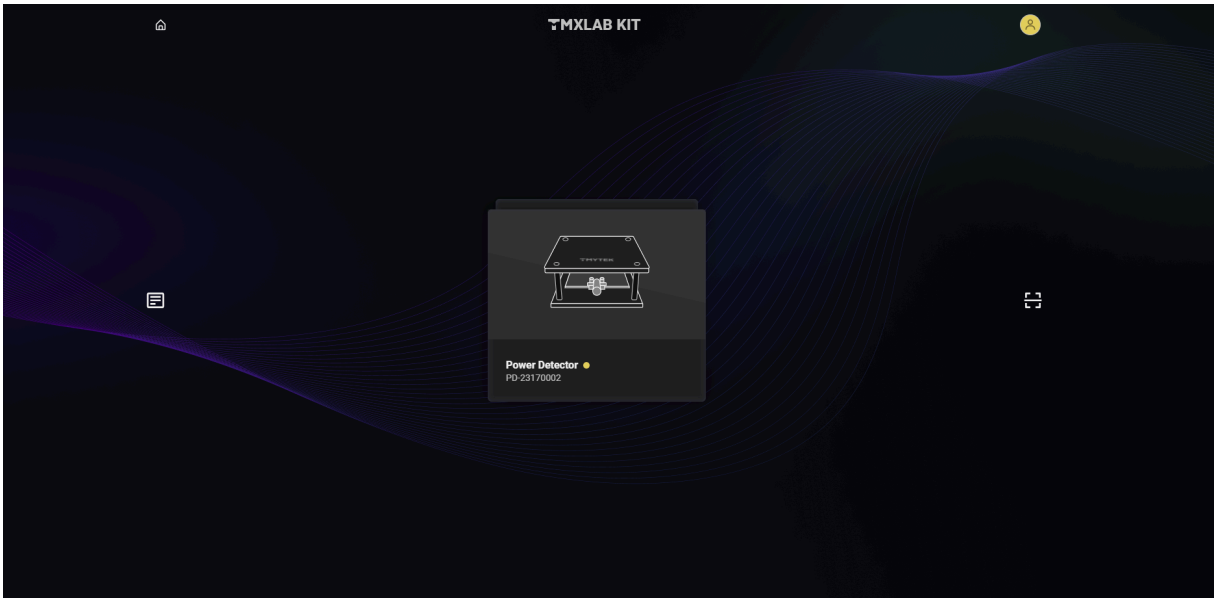


(8). The user can toggle switch on **Output Reference Source** and choose **10MHz** or **100MHz.**

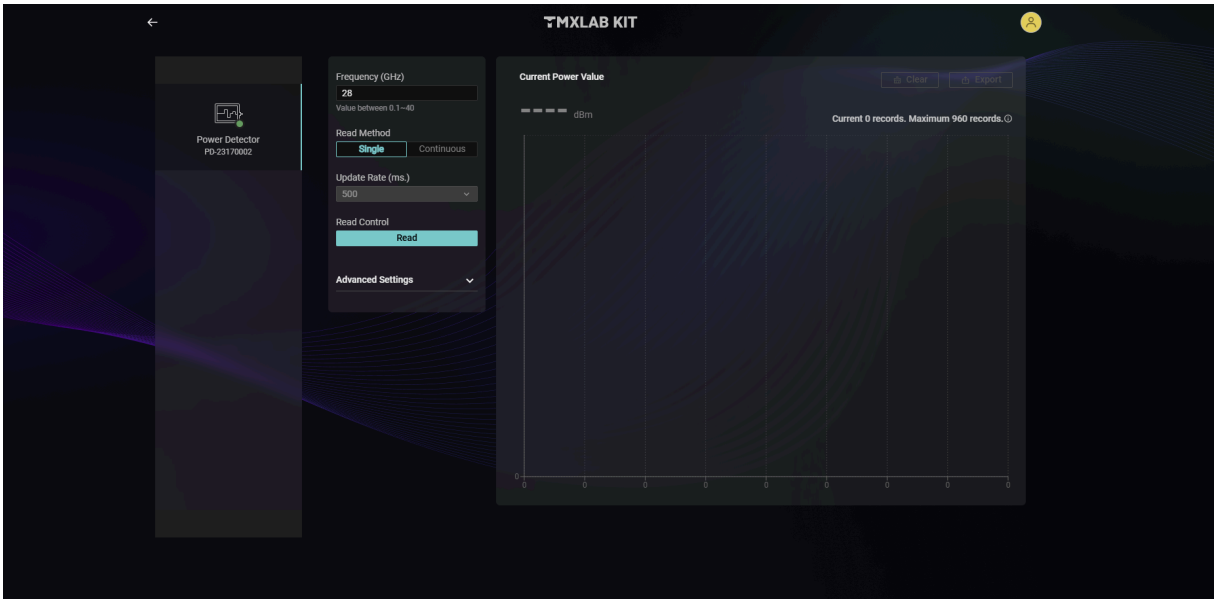


2.7. Power Detector

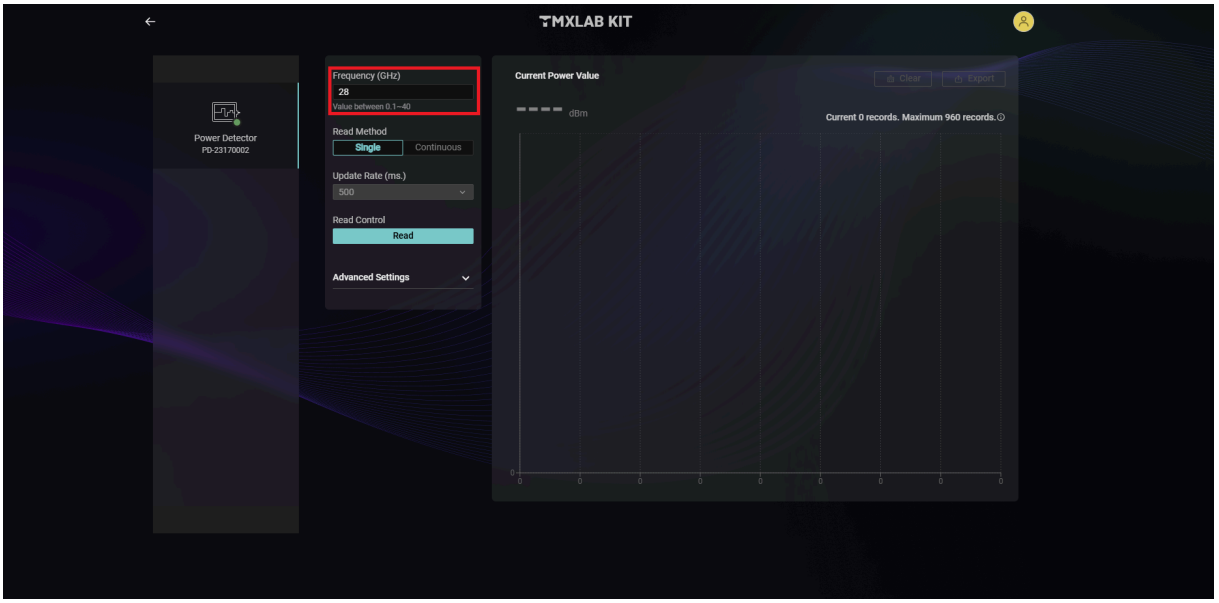
(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.



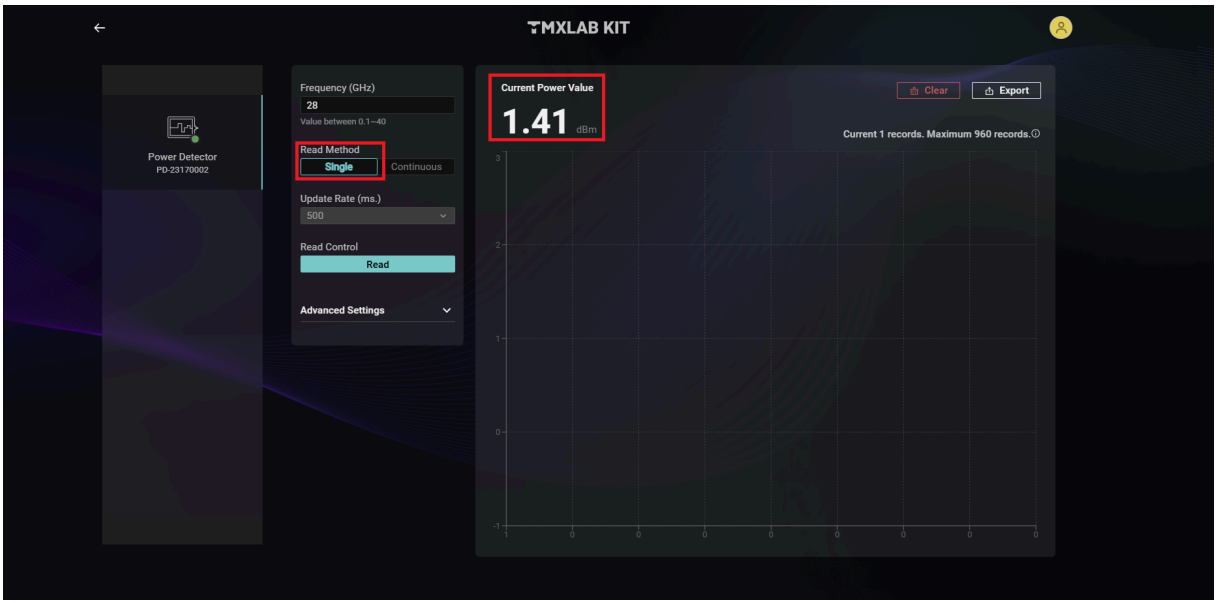
(1). Start initialization. Once completed, the user can proceed.



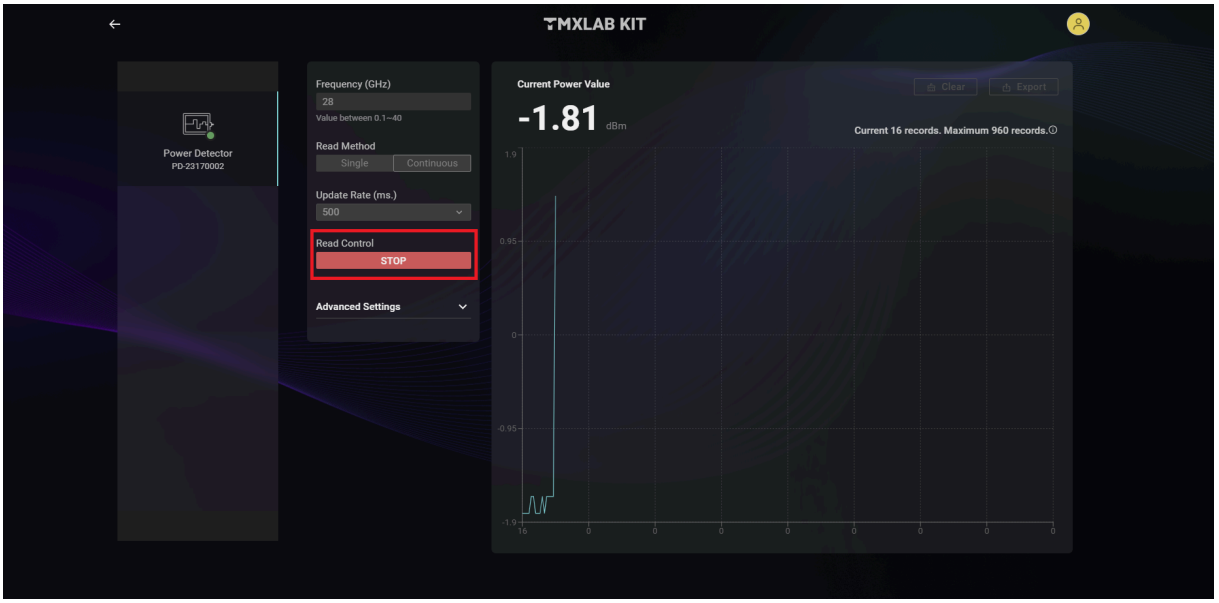
(2). Setup Frequency (GHz) between 0.1-40 GHz.



(3). When the Read Method is **"Single"**, click **Read** to measure once and the value will be shown in the Current Power Value (dBm) and also plotted in the figure.



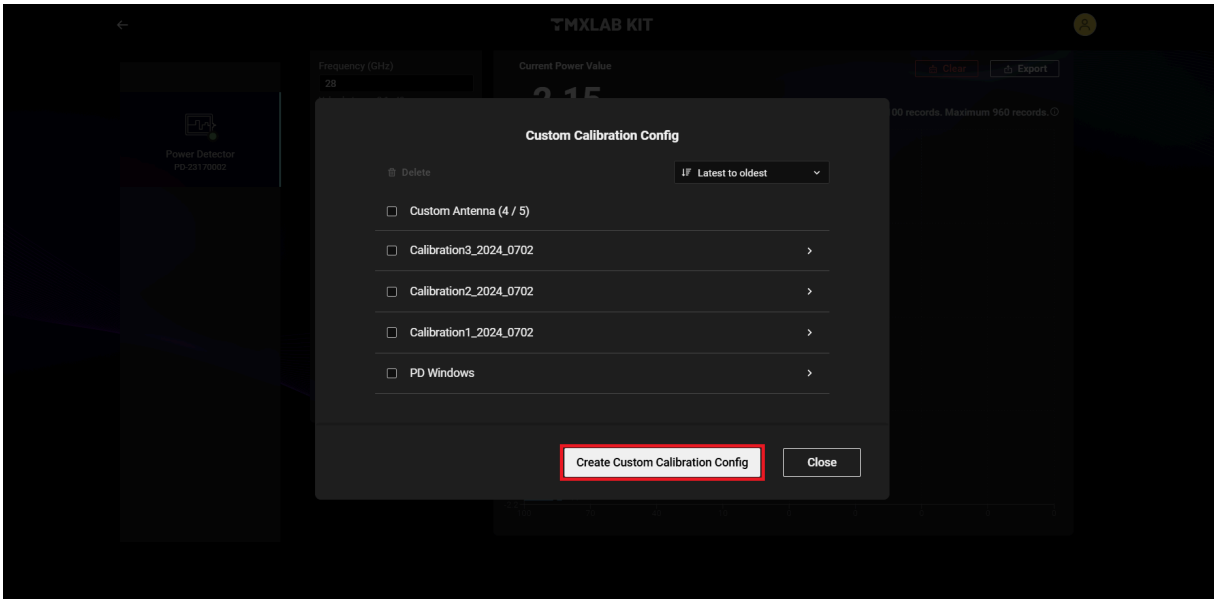
(4). When the Read Method is **"Continuous"**, select and set up the Update Rate (ms.), click Read to continuously measure. The measurement can be stopped when clicking the **STOP**. The measured value is shown in the Current Power Value (dBm) and also plotted in the figure.

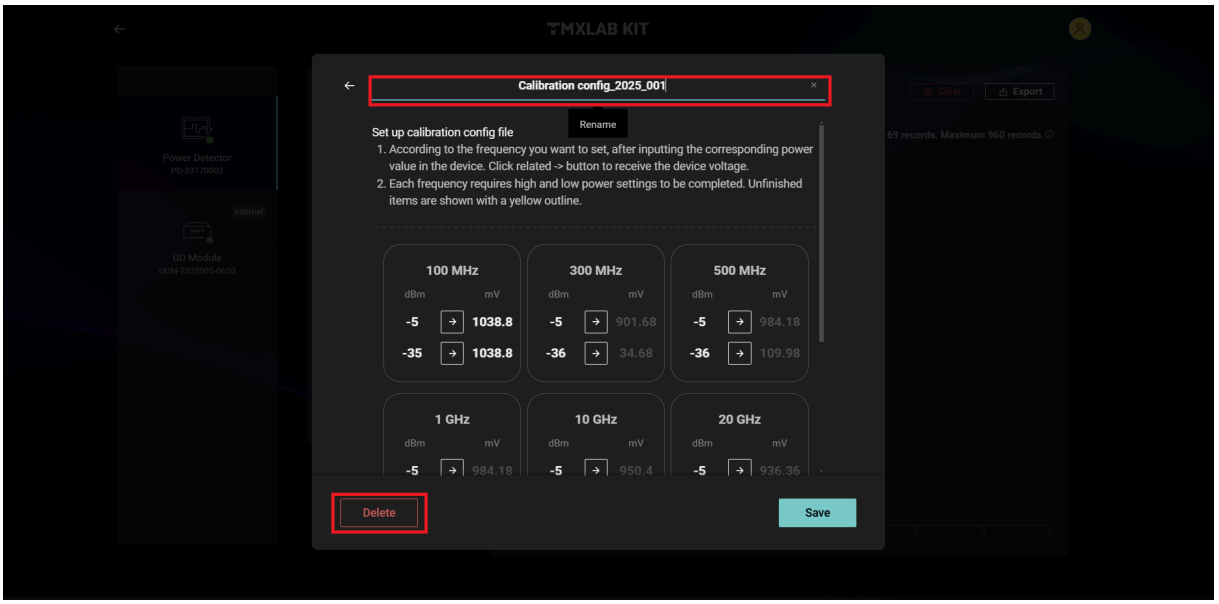


(5). (**Advance Setting**) Set up the **"Average"** option to calculate the average value with times. As shown in the figure, the Update Rate has been set to 500 ms and average is 20. It means Current Power value is updated every 500 ms and the value is the average of 20 times (every data for 25 ms).

(6). (**Advance Setting**) Calibration is the calibrated file. Use the system default calibrated file in normal situations. If there is some measured tolerance, the user can add and use a new calibrated file. Click "**Custom**" to enter the page for calibration file editing.

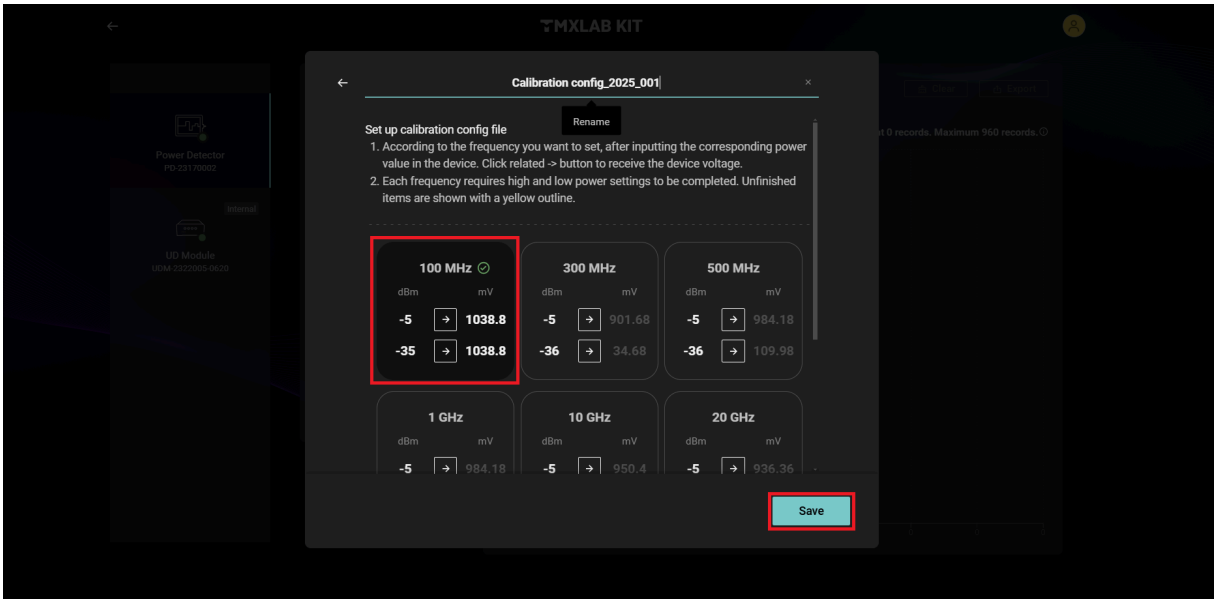
(7). (**Advance Setting**) Click **“Create Custom Calibration Config”** to add a new calibration file. The user can change Config File Name. New file name will be shown in the tab. Click **“Delete”** to remove the calibration file. The User can save up to 5 calibration files.

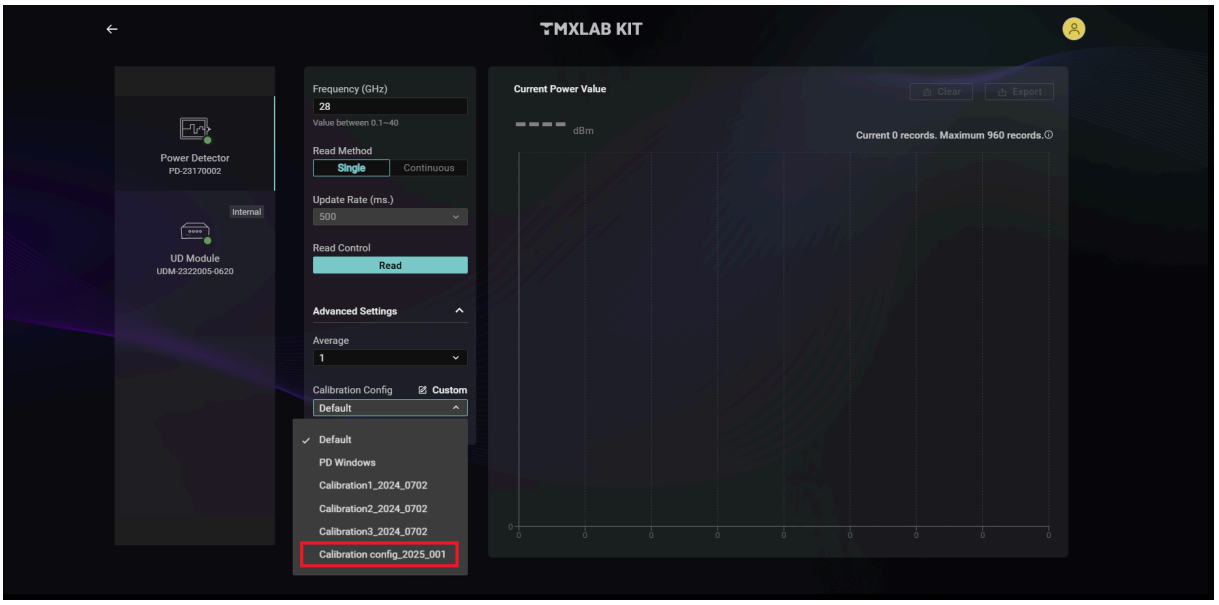




(8). After setting up the external signal source, click " → " at each calibrated frequency and power to record the DC voltage (mV). For each frequency, the user needs to finish the high and low power measurement. After showing the green " ✓ ", the calibration is done. When finishing all the frequencies, click "**Save**" to store the calibration file and back to the control panel. The user can choose the calibration file in the **"Calibration Config"** menu.

Note: The user can only calibrate the frequency point which is needed. No need to finish all frequency points.



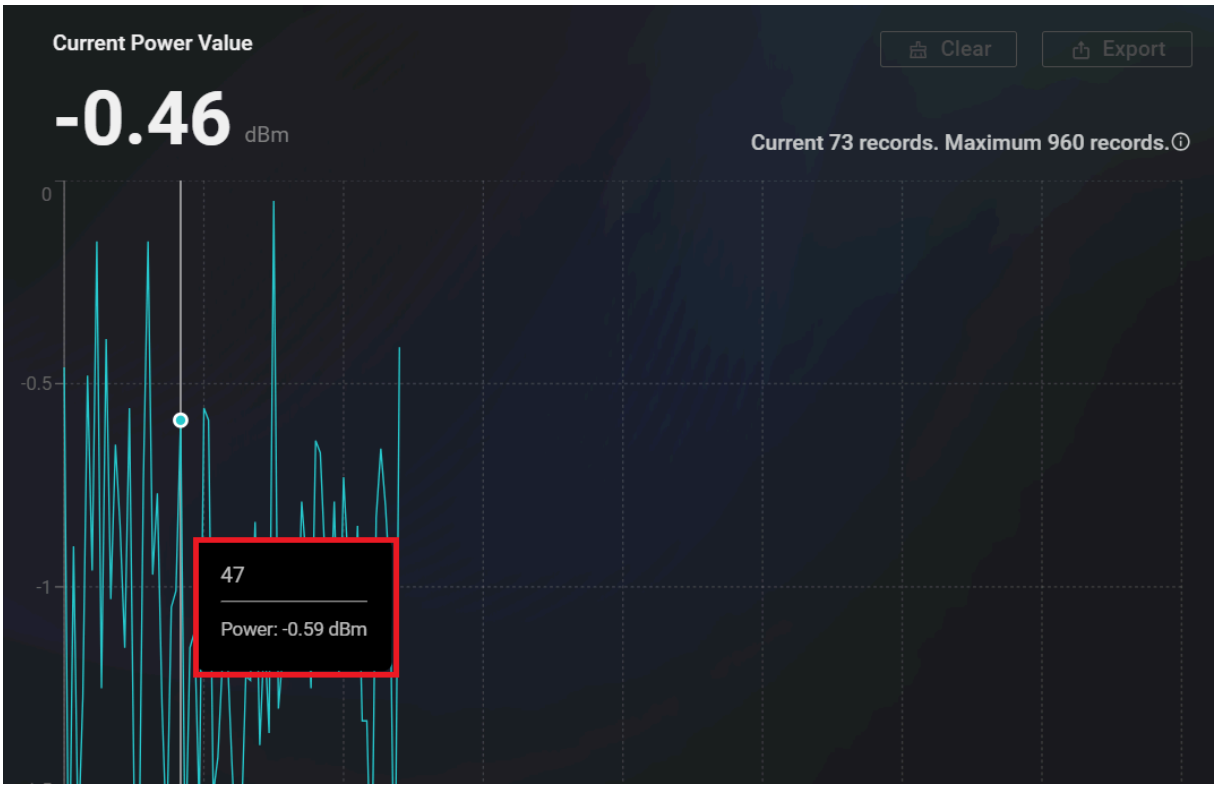


(9). Click **"Clear"** to clean the measured record.

(10). Click "**Export**" to download the measured data with a .csv file. The user can record up to 960 points.

Note: Data format of the export file: measured time, measured frequency, measured value.

(11). Move the mouse on the dynamic chart. It shows record numbers and power. e.g. 47/ Power: -0.59dBm

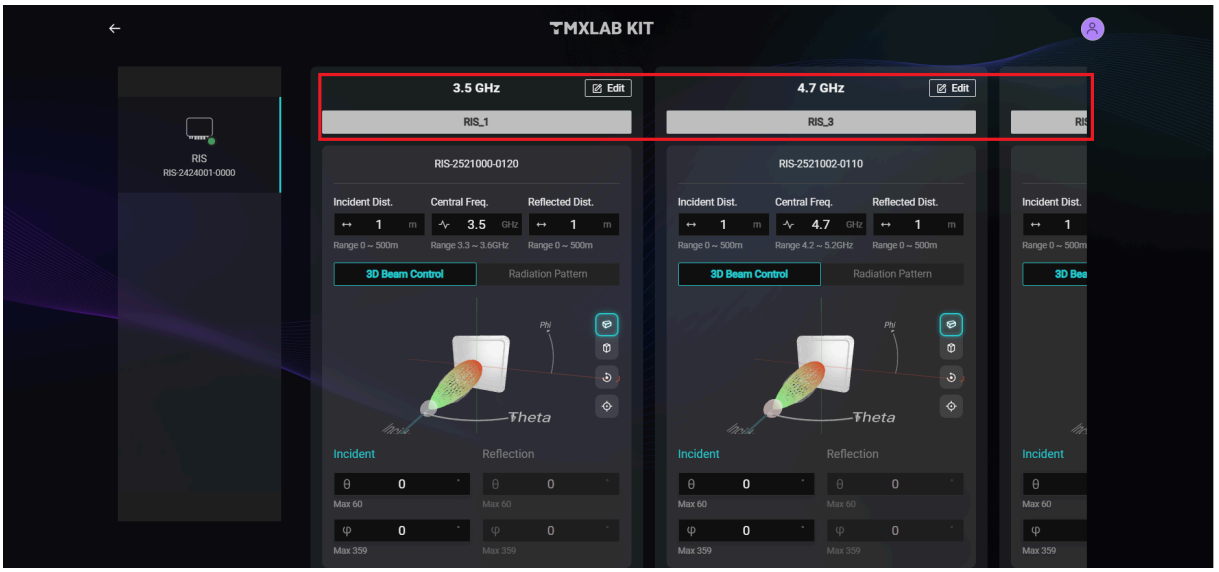


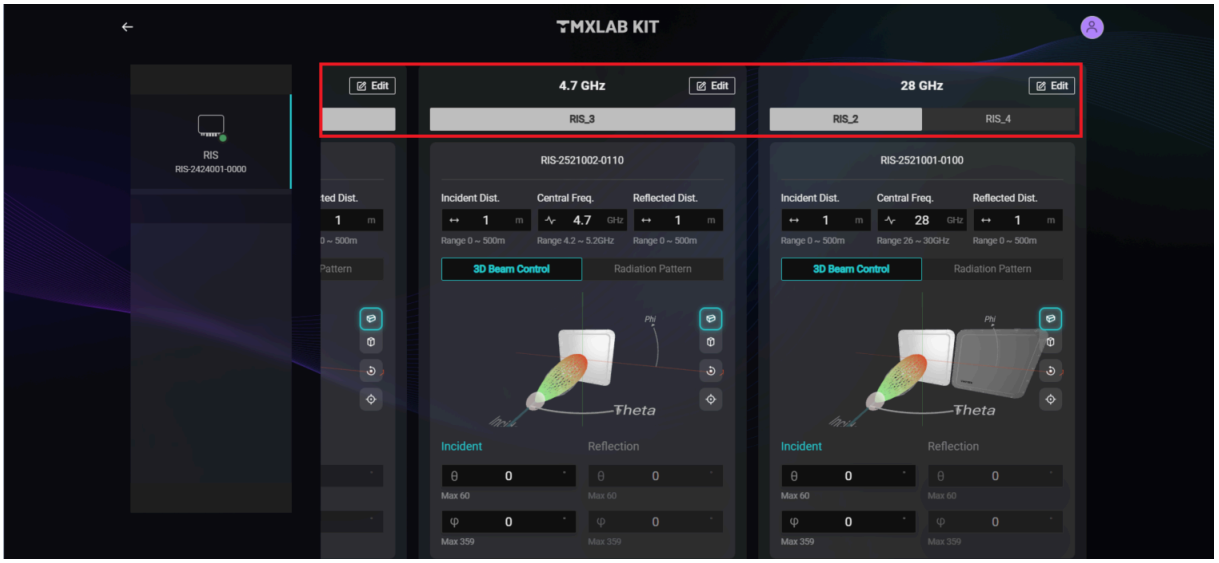
2.8. XRifle Dynamic RIS

(0). Once the user clicks Device Control, the system will scan for available products. Then, click the product card.

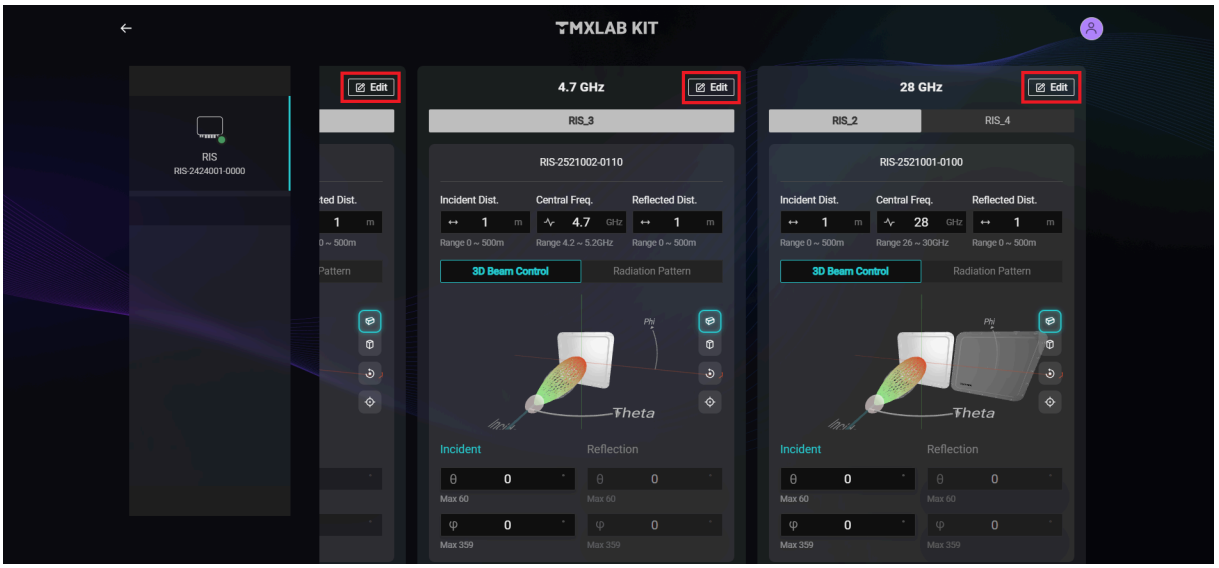
(1). Start initialization. Once completed, the user can check the supported frequency **(3.5GHz or 4.7 GHz or 28 GHz)**. A maximum of four ports can be connected, and TMXLAB Kit will correctly display which ports are in use.

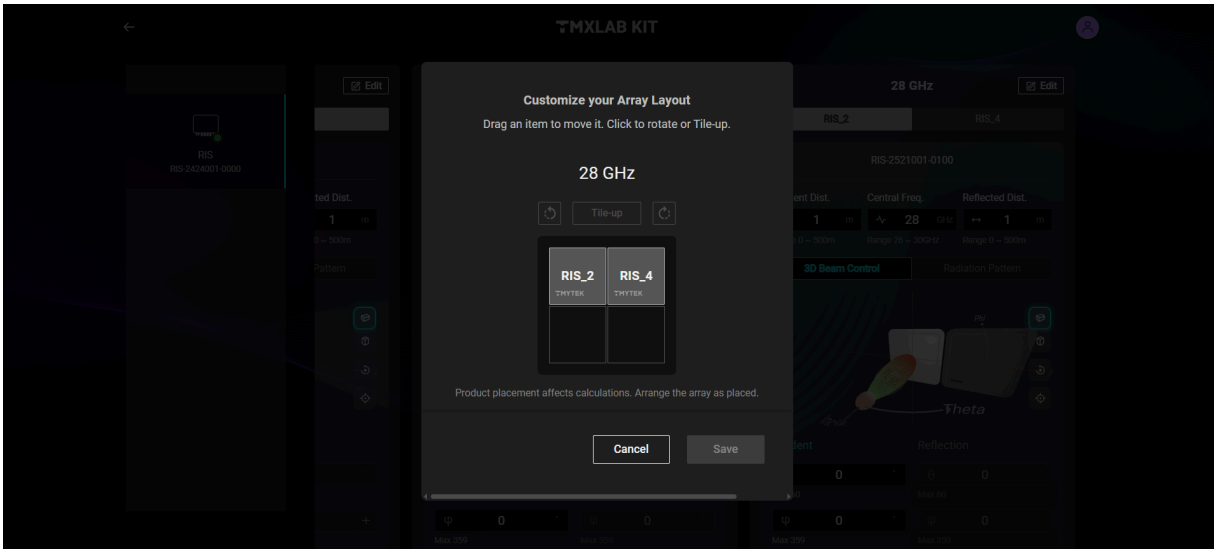
There is an example: RIS_port number. Port 1 is connected to a 3.5GHz RIS Module, Port 2 and Port 4 to a 28GHz RIS Module, and Port 3 to 4.7GHz RIS Module.



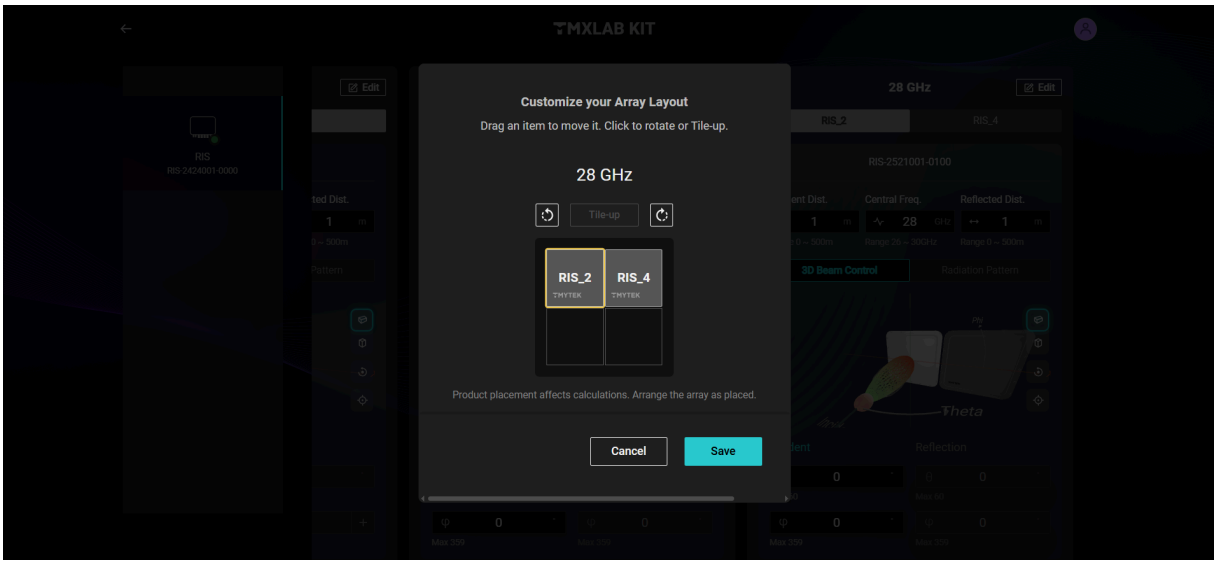


(2). The user can click the **Edit button** before pop modal to modify RIS module location and Tile-up. (This example is provided because there are two 28G connections in this case.)

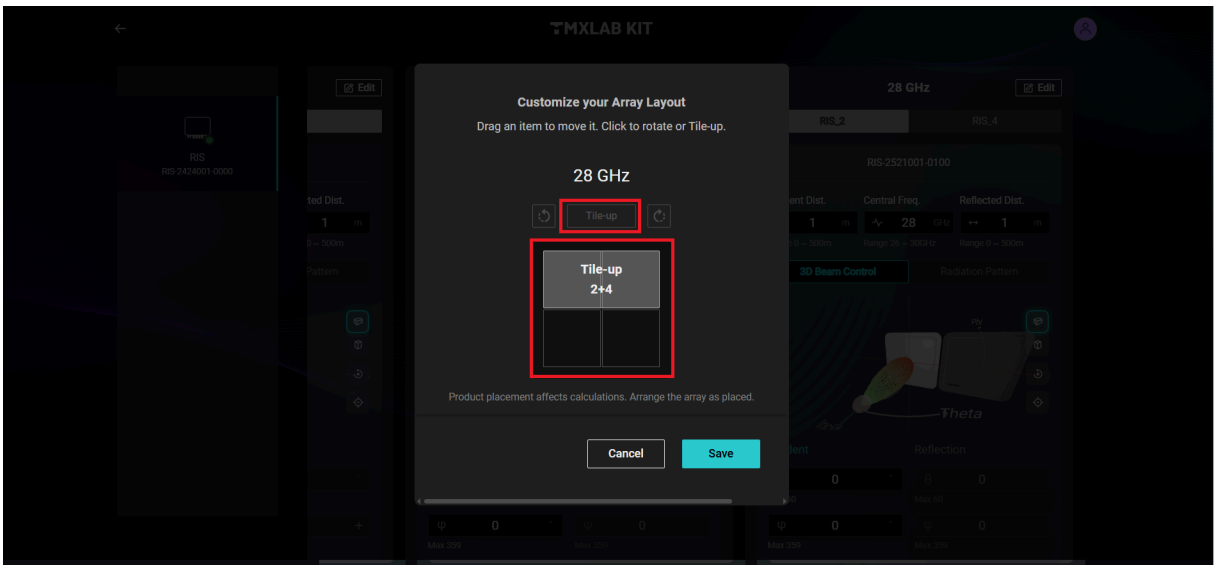




(3) Once the user clicks the first RIS, it will be highlighted with a yellow frame. The item can then be rotated. If more than two items are selected, tile-up is available.
(Here, two RIS modules with the same frequency are shown. If three such RIS modules are connected, a 3×3 grid will be displayed; with four, a 4×4 grid, and so on.)

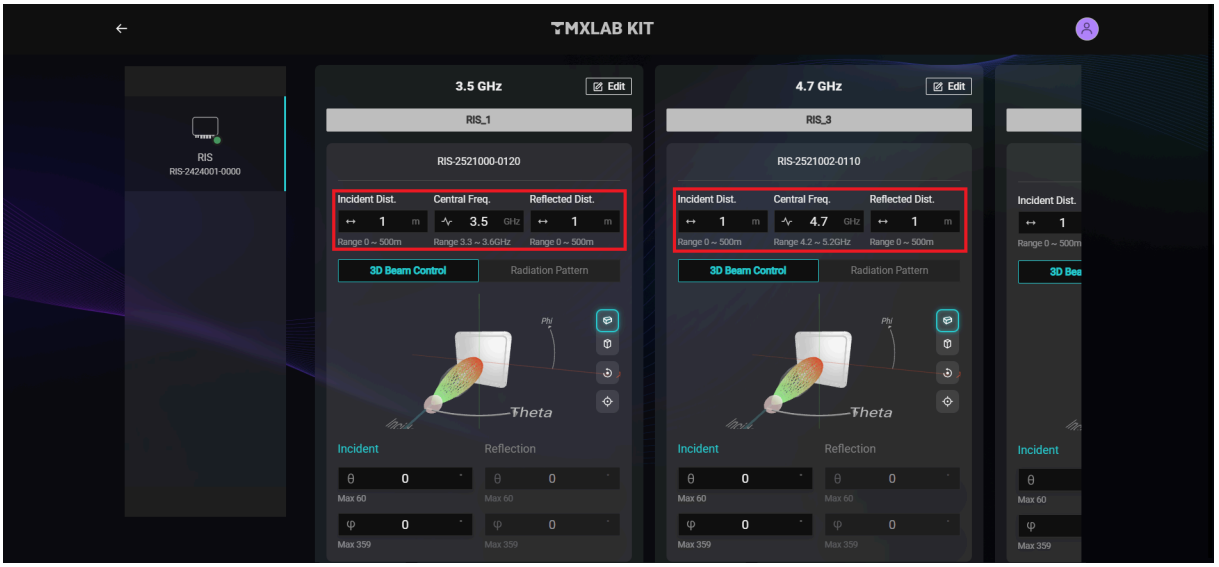


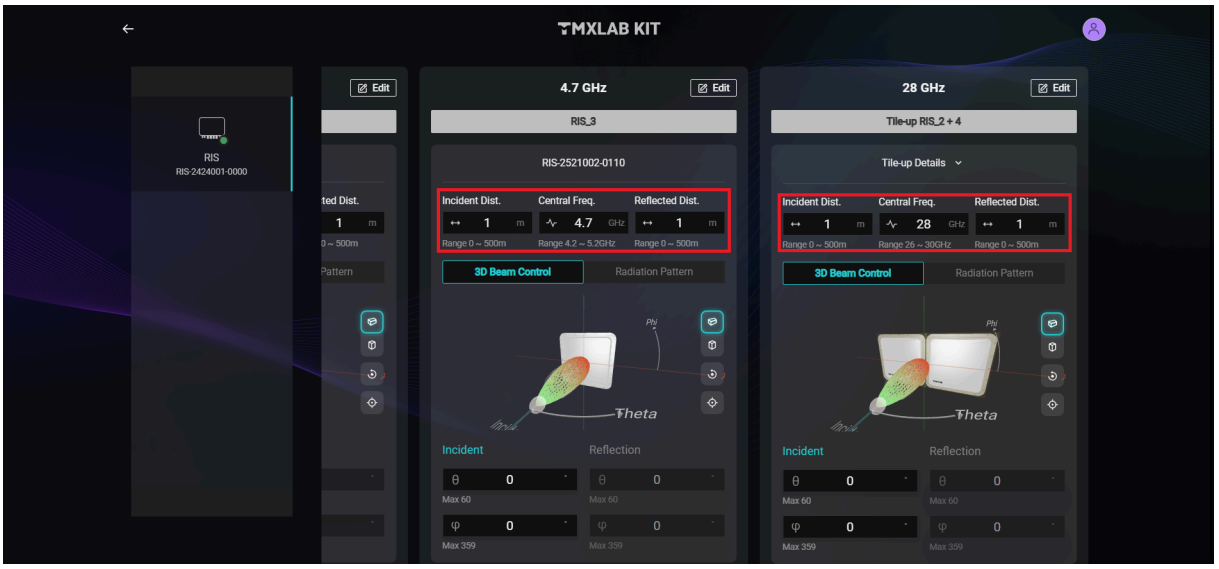
Tile-up method: Make sure to select at least two RIS modules before clicking the Tile-up button.



(4) The range of Incident/ Reflected distance(Incident Dist./ Reflected Dist.) to RIS are **0-500m.**

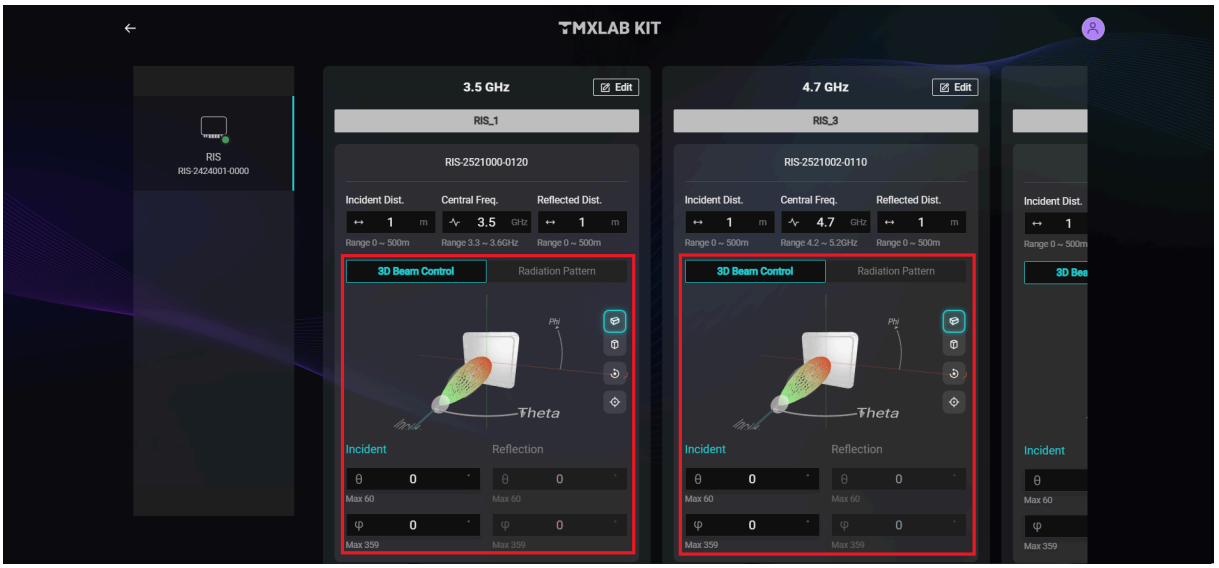
The central frequency(Central Freq.) depends on the frequency of the connected RIS module.

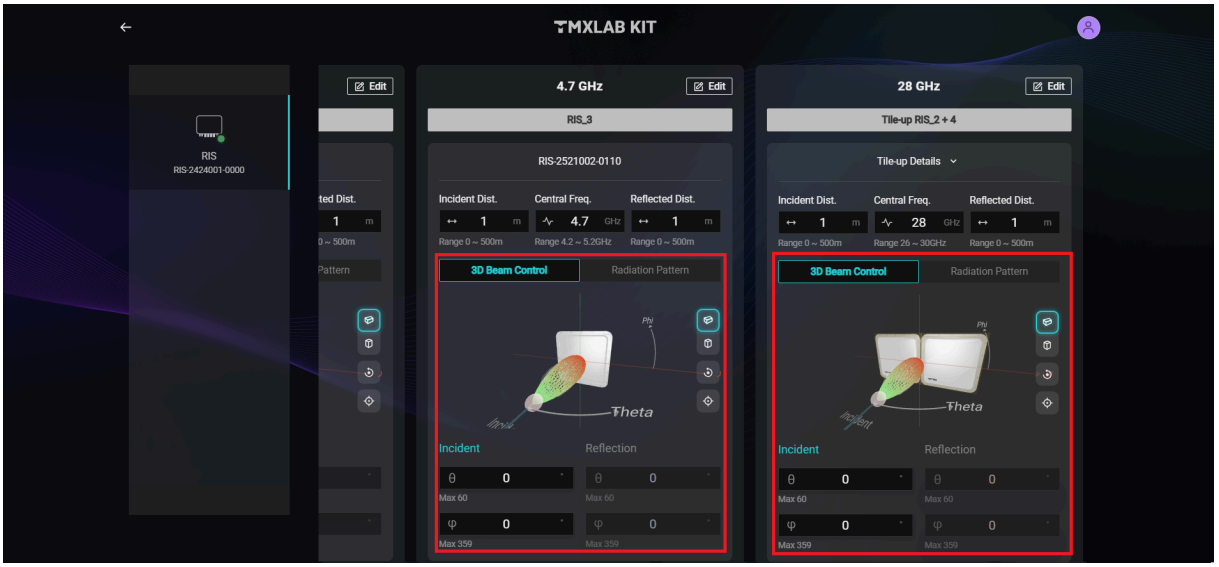




(5)Two different methods are available here for simulating RIS- 3D Beam Control and Radiation Pattern.

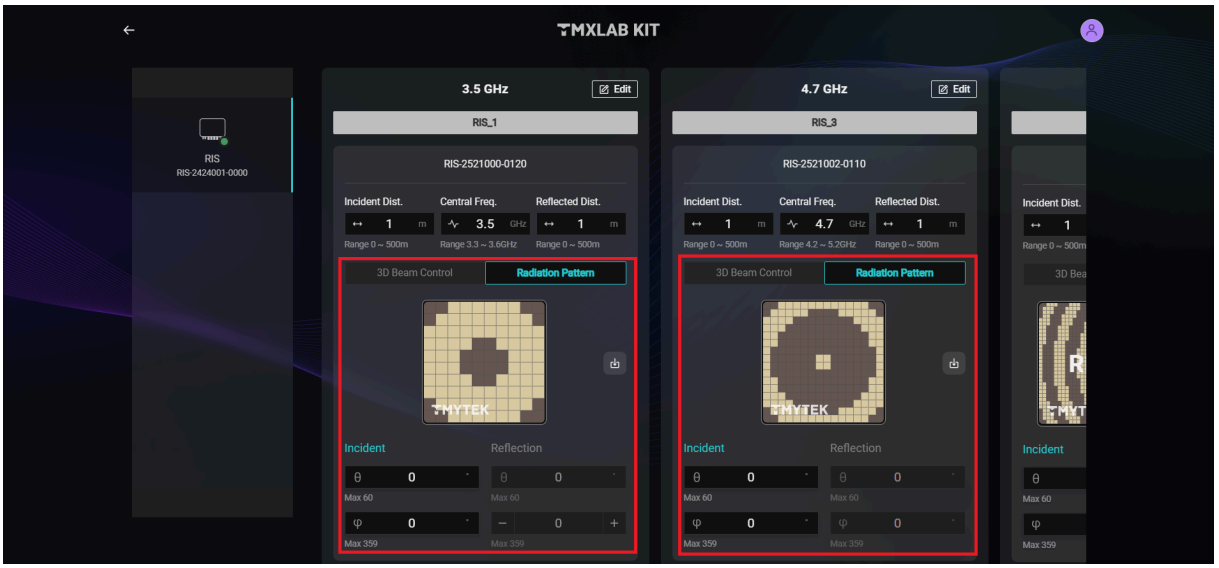
[3D Beam Control] The device can be rotated to any angle (θ and φ) on Incident and Reflection and guild to use, controlling the four icons on the right. (Upright, Horizontal, Reset and Boresight)

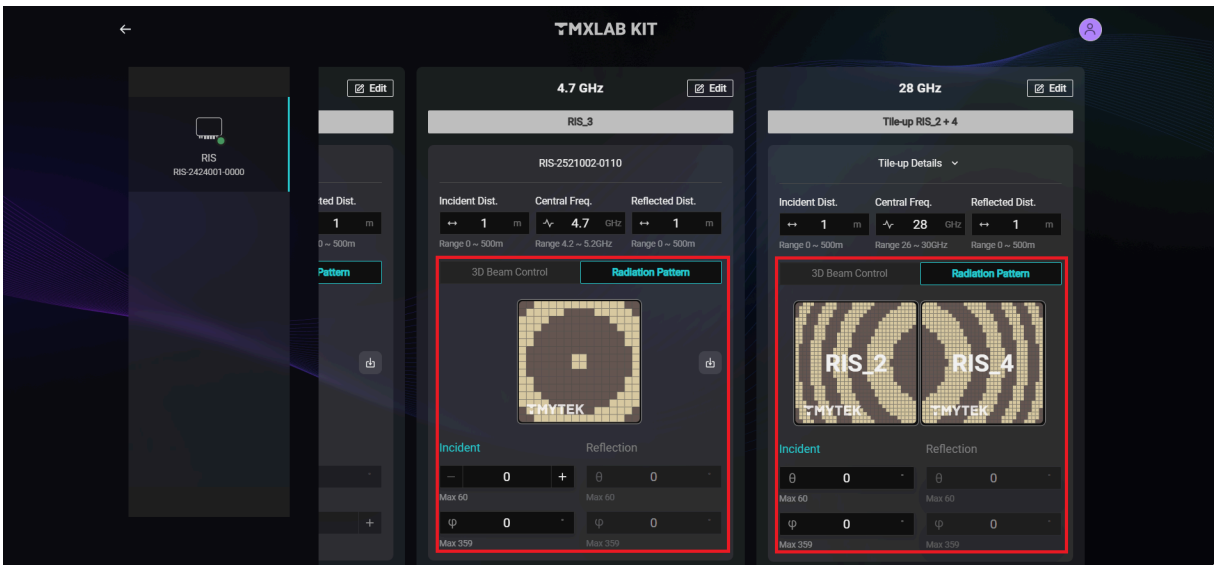




[Radiation Pattern] The device can be rotated to any angle (θ and φ) for both incidence and reflection, and the radiation pattern will change accordingly. The user can select a file by importing a radiation pattern.

Note: should match the data format.





3. Device Firmware Upgrade(DFU)

Support Device: XRifle Dynamic RIS

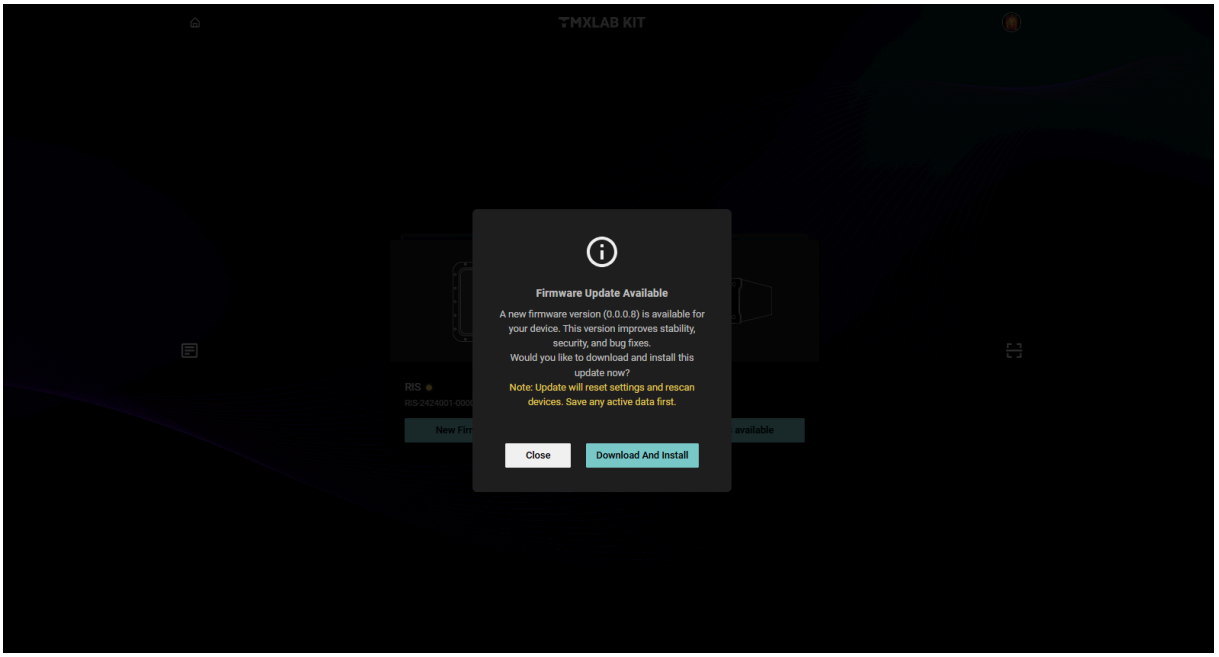
[Online] When a new firmware version is released, the GUI will display a "New version available" button on the web interface, allowing the user to start the update.

[Offline] The GUI will display a "Manual Update Firmware" button on the web interface.

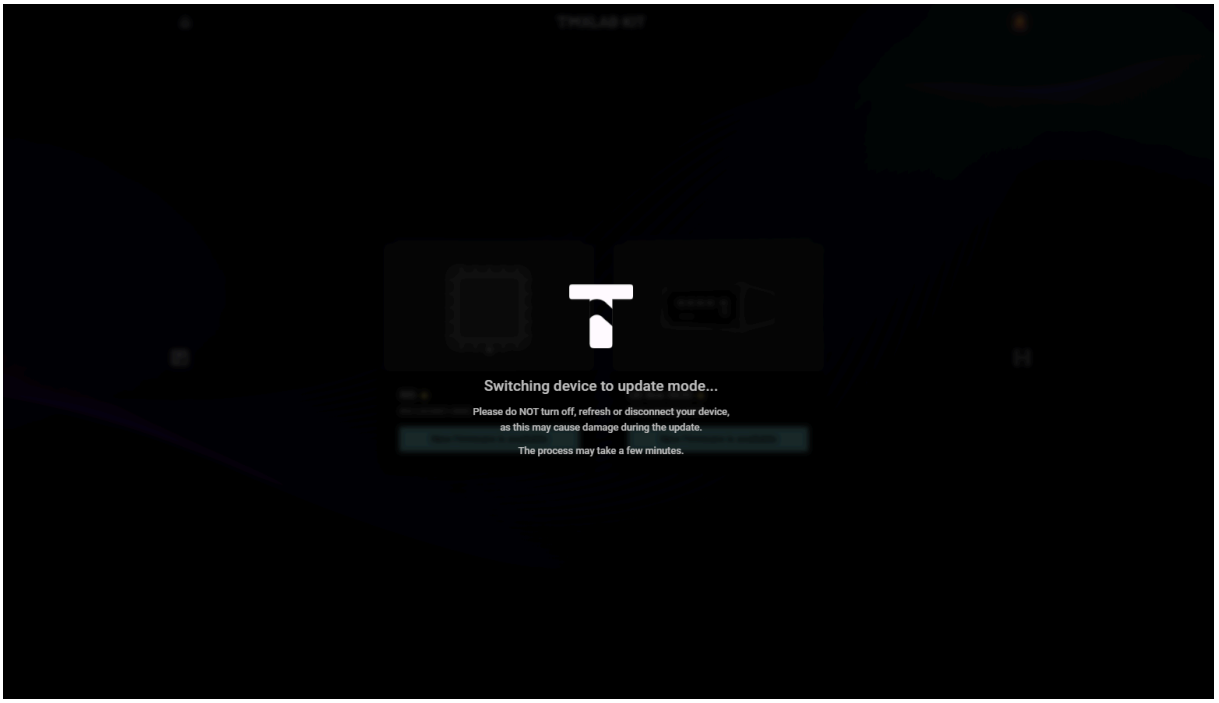
(1).

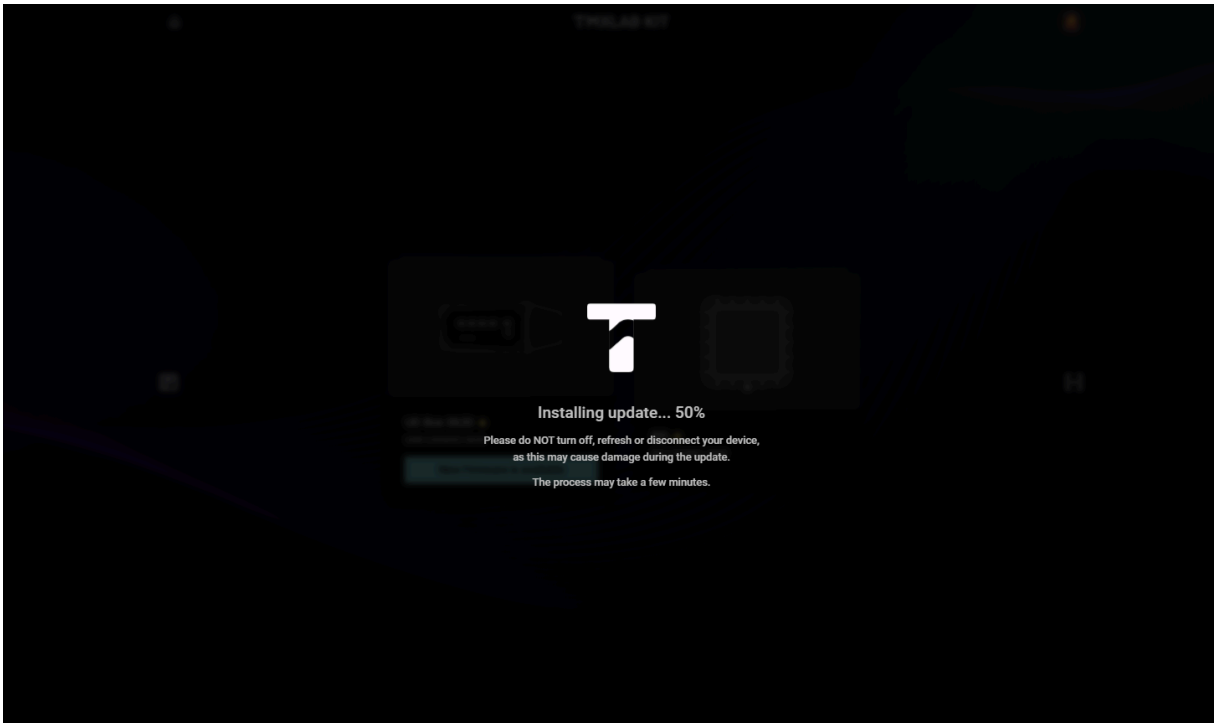
[Online] Click “New Firmware is available” and pop-up modal to remind users to update Firmware.

[Offline] Click “Manual Update Firmware” and pop-up modal to remind users to update Firmware and **select the file (.tbin file) from TMYTEK.**

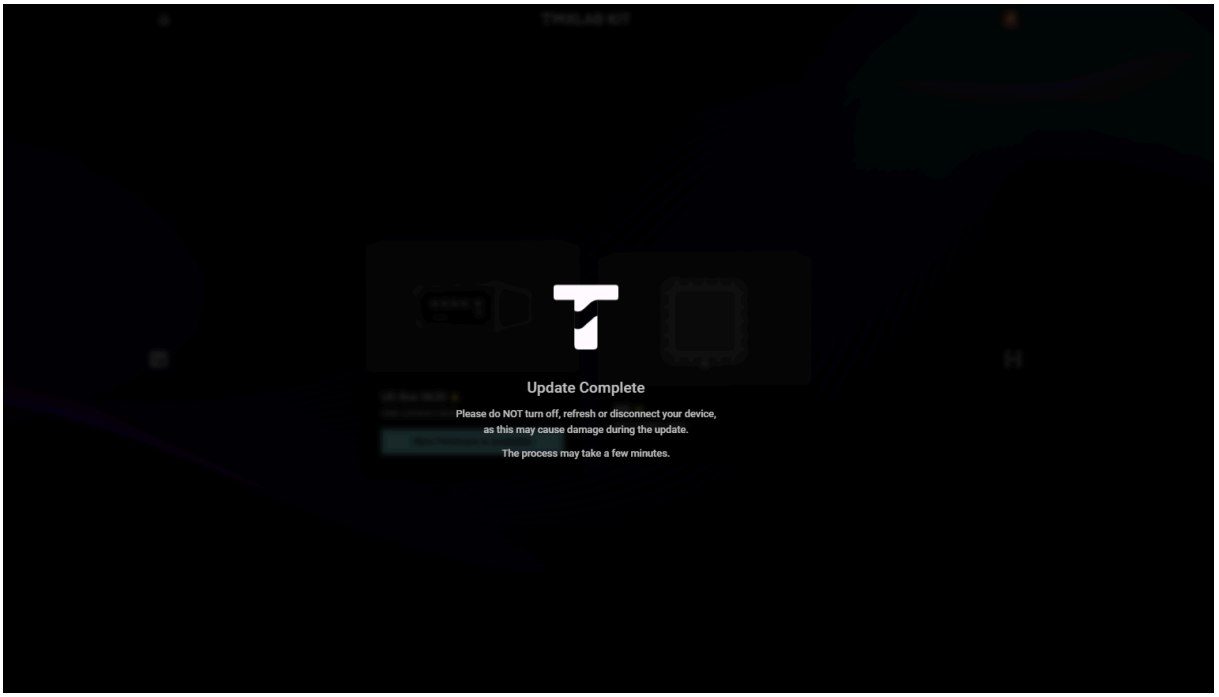


(2).Shows Downloading and Installing update status.





(3). Once completed, TMXLAB Kit will return to the product card page.



[Online] The “New Firmware is available” button will disappear.

[Offline] The Manual Update button will keep it, but users can check Device info (Right icon) to check firmware version whether upgrade successfully.

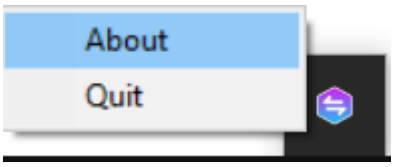
4. FAQ-Troubleshooting

1. **Q: how do I resolve issues caused by outdated or incompatible middleware(applications) on my computer?**

A: The TMXLAB Kit will pop to modal to remind the latest version and follow the steps to install.

2. **Q: How could I check the middleware application version?**

A: Click the middleware icon and select about.



3. **Q: How to search for TMXLAB Kit portal site?**

A: https://web-tlk.tmytek.com/