# Software User Manual TMXLAB Kit

v 3.9.4

## **Table of Contents**

Table of Contents	1
0. Network Environment Setup	2
0.1 Windows 0.2 Ubuntu 0.3 Device IP Setting <b>1. BBox One</b>	2 5 7 <b>8</b>
2. BBox One 5G	21
2.1 Device Controller 2.2 Beam Config Editor <b>3. BBox Lite</b>	23 36 <b>40</b>
3.1 Device Controller 3.2 Beam Config Editor <b>4. BBoard</b>	42 55 <b>59</b>
5. UD Box 5G	64
6. Power Detector	68

MYTEK

## **0. Network Environment Setup**

#### 0.1 Windows

Network environment settings: If the IP address of the device and PC is assigned by DHCP, • this step can be skipped. If the IP address cannot be obtained through DHCP, the domain must be set to 192.168.100.xxx.

(1). Go to Windows Settings/Network & Internet/Ethernet/Change adapter options.

Setungs			١٨	/indows Settings		
			v v	findows settings		
			Find a setting	9	Q	
	口	<b>System</b> Display, sound, notifications, power		<b>Devices</b> Bluetooth, printers, mouse		Phone Link your Android, iPhone
		Network & Internet Wi-Fi, airplane mode, VPN	Ą	Personalization Background, lock screen, colors	١ <u>=</u>	Apps Uninstall, defaults, optional features
	8	Accounts Your accounts, email, sync, work, other people	。 A字	Time & Language Speech, region, date	⊘	Gaming Game bar, DVR, broadcasting, Game Mode
	Ģ	Ease of Access Narrator, magnifier, high contrast	0	Cortana Cortana language, permissions, notifications	ß	Privacy Location, camera
	$\mathbb{C}$	Update & Security Windows Update, recovery, backup				

OB Home	Ethernet
Find a setting $\rho$	Ethernet
Network & Internet	Ethernet Not connected
🗇 Status	
<i>⊯</i> Wi-Fi	Related settings
<i></i>	Change adapter options
문 Ethernet	Change advanced sharing op
📅 Dial-up	Network and Sharing Center
∞ VPN	HomeGroup

sharing options



## (2). Right click on "Ethernet"/Properties.

🛬 Network Conn	ections					-		Х
$\leftarrow \rightarrow \vee \uparrow$	🛬 « Network and Internet >	Network Connect	tions	~ Ū	Search	Network Cor	nnection	is 🔎
Organize 🔻	Disable this network device	Diagnose this co	nnection	»		<b>■</b> <b>■</b>		?
<b>*</b> **	Bluetooth Network Connection Not connected Wi-Fi Not connected Killer Wireless-n/a/ac 1535	N N	eal 🔮	able unpluge Disable Status Diagnose Bridge Conr Create Shor Delete Rename <b>Properties</b>	nections			
7 items 1 iten	n selected						Į	<b>-</b>

(3). Click "Internet Protocol Version 4 (TCP/IPv4)", and then click "Properties".

Ethernet 2 Properties	<
Networking Sharing	
Connect using:	
ASIX AX88179 USB 3.0 to Gigabit Ethemet Adapter	
Configure	
This connection uses the following items:	
<ul> <li>Client for Microsoft Networks</li> <li>File and Printer Sharing for Microsoft Networks</li> <li>OoS Packet Scheduler</li> <li>Internet Protocol Version 4 (TCP/IPv4)</li> <li>Microsoft Network Adapter Multiplexor Protocol</li> <li>Microsoft LLDP Protocol Driver</li> <li>Internet Protocol Version 6 (TCP/IPv6)</li> </ul>	
Install Uninstall Properties	
Description	1
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.	
OK Cancel	



### (4). Enter the IP address 192.168.100.xxx (please avoid 192.168.100.100 ~ 192.168.100.120)

Internet Protocol Version 4 (TCP/IPv4)	Properties	×
General		
You can get IP settings assigned auton this capability. Otherwise, you need to for the appropriate IP settings.		
Obtain an IP address automatical	У	
• Use the following IP address:		
IP address:	192 . 168 . 100 . 150	
Subnet mask:	255.255.255.0	
Default gateway:		
Obtain DNS server address autom	natically	
• Use the following DNS server add	resses:	
Preferred DNS server:		
Alternate DNS server:		
Validate settings upon exit	Advanced	
	OK Cancel	

### 0.2 Ubuntu

• Network environment settings: If the IP address of the device and PC is assigned by DHCP, this step can be skipped. If the IP address cannot be obtained through DHCP, the domain must be set to 192.168.100.xxx.

(1). Go to Settings/Network page, and click the setting icon under the Ethernet section.

Q	Settings	Network		•	×
•	Network				
*	Bluetooth	Ethernet	+		
Ģ	Background	Connected - 1000 Mb/s			
9	Appearance	VPN			
Û	Notifications	Not set up			
Q	Search				
	Applications	Network Proxy	Off 🔯		
⋳	Privacy				
	Online Accounts				
≪°	Sharing				
IJ	Sound				
•	Power				
Ş	Displays				
Ö	Mouse & Touchpad				
	Keyboard Shortcuts				
Ĵ	Printers				
Ö	Removable Media				



(2). Switch to the "IPv4" tab first, and select "Manual" for IPv4 Method, then enter 192.168.100.xxx in the Addresses field, finally, press Apply. (please avoid 192.168.100.100 ~ 192.168.100.120)

Cancel			Wired			Apply
Details	Identity	IPv4	IPv6	Securi	ty	
IPv4 Meth	• M	utomatic ( anual nared to o		nputers	<ul> <li>Link-Local C</li> <li>Disable</li> </ul>	Dnly
Addresses						
Ad 192.168.1	dress 00.165	255.255	letmask .255.0		Gateway	Ē
						Ē
<b>DNS</b> Separate IP ac	ldresses with co	nmas			Automatio	

MYTEK

### 0.3 Device IP Setting

- If the IP address of the device and PC is assigned by DHCP, this step can be skipped. If the IP address cannot be obtained through DHCP, meanwhile, connected to multiple devices of the same type (such as connecting more than 2 BBoxes or UD Boxes) at the same time, TMXLAB Kit will try to automatically change the static IP of the device, so that all IPs won't be duplicated. However, if changing the IP fails, you need to set it up manually
- (1). Connect only one device whose IP is to be modified, then open TMXLAB Kit, and click the setting icon on the upper right side after scanning is completed.

тмутек	• – • ×
Scan Local Device < Bite One 021446206-28	> 0
Select device	

(2). Enter the IP, which is going to be modified, and click Apply. After the modification is completed, you will see that the IP Address has been changed to the newly modified one. Also, this IP cannot be the same as other devices. After the static IPs of all devices are non-repetitive, they will all be connected to the PC and the TMXLAB Kit will be ready to use.

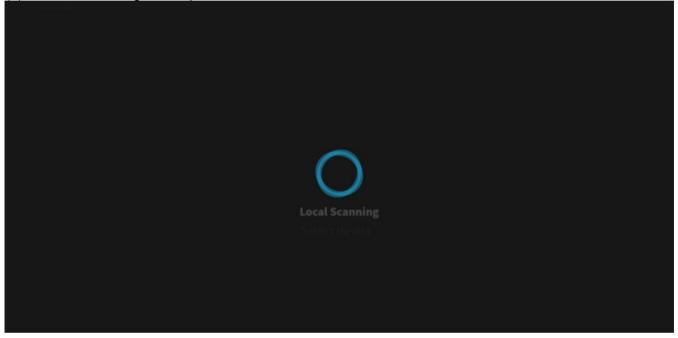
o ×

ð

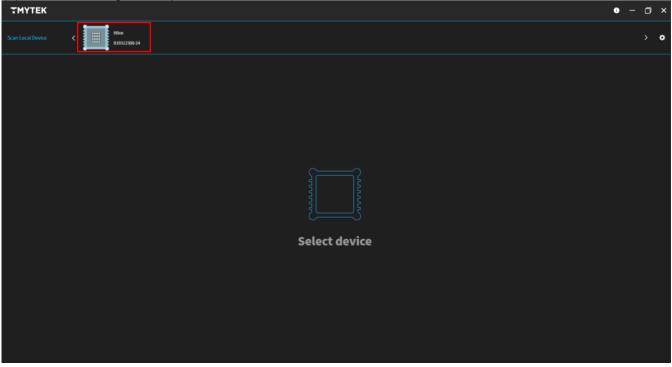


## 1. BBox One

- (1). Connect BBox One and PC with Ethernet, and then turn on the power of BBox One.
- (2). Open TMXLAB Kit.
- (3). Wait till scanning is completed.



(4). After scanning is completed, click the device icon above.



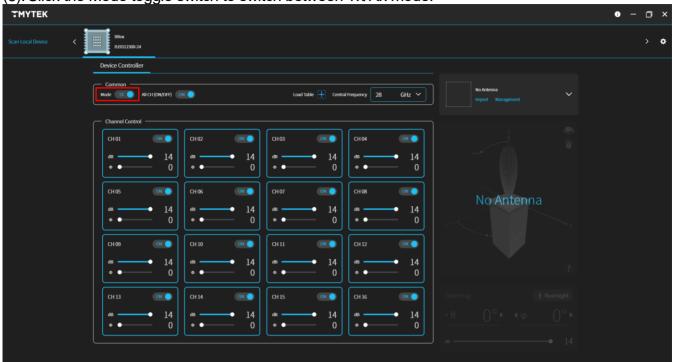


(5). If the table of the clicked device has not been imported, the screen will show "No Calibration Table." Click anywhere to open the file selection window, choose the file(s) to be imported, and then click "Open" to import the table and expand the control panel.

тмутек		• - 🗆 ×
Scan Local Device C BBox B19312200 24		> 0
	No Calibration Table Click here and import the table file to open BBox UI	
тмутек		• - • ×
Scan Local Device K BI9312300-24		> •
	「 単記 ×   ◆ → → ↑ <mark> </mark> → 非常→ OS(C) → Res → ひ 武帝 Res ル	
	総合管理 - 新雄変形式 EI - 町 2	
	第五名第(M): ○ ○ All Files (*) ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	

## MYTEK

(6). Click the Mode toggle switch to switch between Tx/Rx mode.

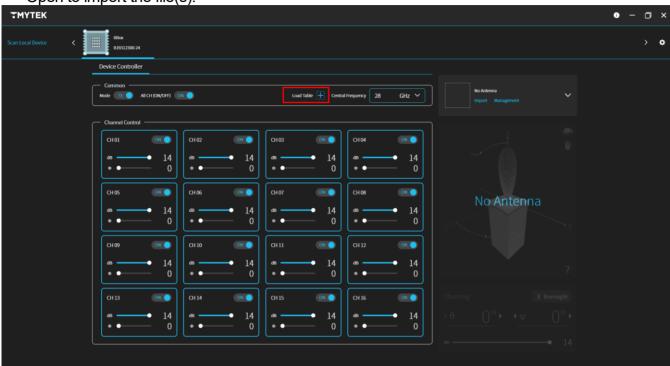


(7). Toggle All CH (ON/OFF) can switch all channels on/off.





(8). Click "Load Table" to import the calibration table. After selecting the file(s) to be imported, click Open to import the file(s).

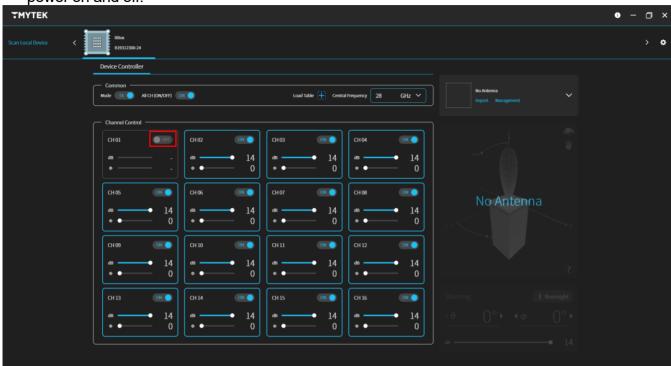


(9). All available frequency points are listed in the Central Frequency drop-down menu. You can choose the desired one.

NOTE: The Dynamic Range of each frequency point may be different.

тмутек									• - • >
Scan Local Device	BBcsc B19312300-24								> ¢
	Device Controller								
	Common Mode TX O All CH (0N/OFF) (	on 🔵	Load1	Table 🔃 Central Fr	requency 28	GHz 🗸	No Antenna Import Management	~	
	Channel Control					GHz			
	СН01 ОМ	СН 02 ОМ 🌖	CH 03		28 CH 04	GHz 오			
	ds 14	dB 14	dB Φ ●	- 14 - 0	dВ Ф •	• 14 - 0			
	CH 05 ON O	CH 06 ON O	СН07		CH 08		No Antenna		
	dB <u>→ 14</u> • • 0	dB <u>14</u> Φ ● 0	dв Ф •	- 14 - 0	dв	$\begin{bmatrix} \bullet & 14 \\ - & 0 \end{bmatrix}$			
	CH 09 ON ()	CH 10 ON 🔵	CH 11		CH 12				
	dB <u>→ 14</u> ⊕ <b>→</b> 0	dB 14 ⊕ ● 0	dB	- 14 - 0	dВ	• 14 • 0			
	CH 13 ON ()	CH 14 ON 🔵	CH 15	ON 🌒	СН 16				
	ds <u> </u>	dB <u>→ 14</u> • • 0	dB Φ ●	- 14 - 0	dВ Ф •	• 14 - 0			

(10). Click the toggle switch in the upper right corner of the channel card(s) to switch the channel power on and off.



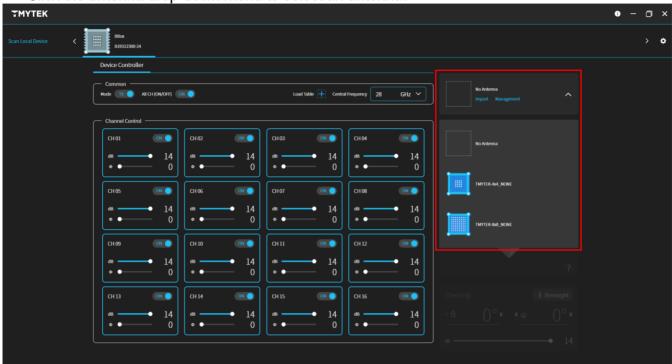
(11). Adjust the sliders of dB and  $\Phi$  in the channel card(s) to control the channel gain and phase.



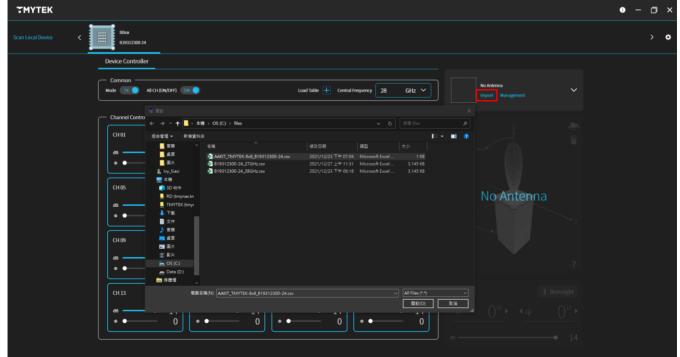


(12). If no antenna is selected, only the channel control mode is functional. The beam steering function is only available after an antenna is selected.

Click the antenna drop-down menu to select an antenna.

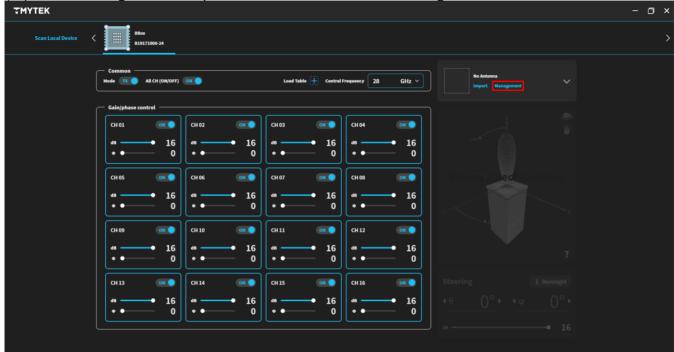


(13). Click "Import" to open the file selection window. Select the file(s) to be imported and click "Open" to use the imported antenna data in the antenna menu.





(14). Click "Management" to open the customized antenna management interface.



#### (15). Click "Add" to enter the add mode.

Enter following in order: antenna name (for identification, the name cannot be repeated), SpacingX (the pitch-to-pitch spacing between two adjacent antenna elements on the Xcoordinate, Unit: mm), SpacingY (the pitch-to-pitch spacing between two adjacent antenna elements on the Y-coordinate, Unit: mm), theta max angle, and phase offset of each channel. Click the arrow on the right to expand/collapse the offset input box.

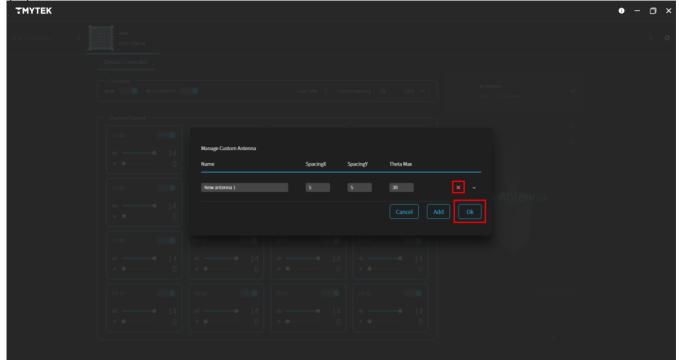
After completing the above action, click "Ok" to save the input data and return to the main control interface. You will see that the antenna option has been added to the antenna menu.

тмутек		• – 🗆 ×
Scan Local Device C		
Device Controller		
Common — All CH (ON/OFF)		
- Channel Control	Manage Custom Antenna	
CHOL	Name SpacingX SpacingY Theta Max	
dis 14	New antenna 1 5 5 30 × ^	
• •0	RX Offset TX Offset	
CH 05		
CH 09		
as <u>14</u> • • 0		
• • • 0		

тмутек					0 – 🗇 ×
Scan Local Device C Bibox B19312300-24					> 0
Device Controller					
Common	ж 🔵	Load Table 🕂 Central Fre	equency 28 GHz 💙	No Anterna Import Management	~
Channel Control					
CH 01 ON O	Сног Сно		сно4 оч 🌔	No Antenna	
dB <u>→ 14</u> • • <u>0</u>	dB <u>−−−</u> 14 dB · • •		dB <u>14</u>		
Сноз ОП	Сное Сно	л ом 🔵	СН 08 СМ 🔵	New antenna 1	
			<sup>d8</sup> <u> </u>		
			dB 14		
CH 13 ON •	CH 14 ON O	5 ON O	CH 16 ON 🔵		
	dB <u>14</u> dB		dB <u>14</u>		

## MYTEK

(16). Click the red "X" and then "OK" to delete the antenna data.

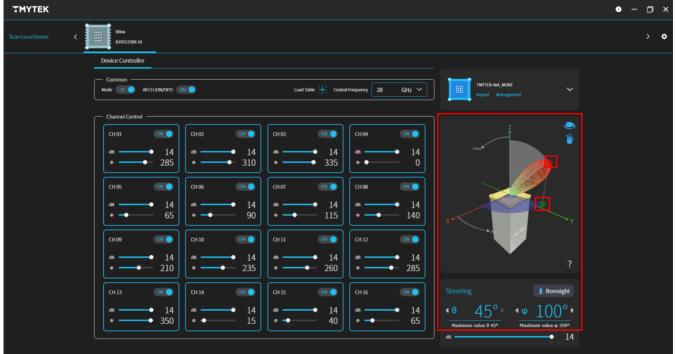




- (17). Press and hold the red dot on the tip of the Beam to rotate the Beam and adjust  $\theta$  and  $\phi$ . Press and hold the green dot on the xy-plane to adjust  $\phi$ .
- NOTE:  $\theta$  is the angle between the positive Z-axis and the vector in question ( $0 \le \theta \le$  Theta max angle).

 $\varphi$  is the angle between the projection of the vector onto the xy-plane and the positive X-axis (0  $\leq \varphi < 360^{\circ}$ ).

Take this screenshot as an example, the theta max is 45°.



(18). Pressing "Boresight" can set  $\theta$  and  $\phi$  back to 0 degree.

тмутек	• - • ×
Scan Local Device C Bibliox Bibliox 24	> <b>o</b>
Device Controller	
Continuon Mode TX • All CH (ON/OFF) OX • Load Table 🕂 Central Frequency 28 GHz •	TMTTEX-64_NONE
$ \begin{array}{c c}         Channel Control \\ \hline         CHOI \\         ds \\                         $	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	x
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Steering $\theta$ $0^{\circ}$ $\phi$ $0^{\circ}$ Maximum value $\theta$ 45° $\theta$ Haximum value $\varphi$ 359° $\theta$ $14$



ON 🔵

14350

ON 🔵

14 125

ON 🔵

dB

• ---•

dB

Φ -

dв — Ф —

Φ -

dB Φ -

ON 🔵

14 35

ON 🔵

ON 🔵

dВ ——

(19). When the device is rotated to an arbitrary angle, pressing the "Reset Angle" button can set the device to its original angle.



ON 🔵

ON 🔵

14 220

ON 🔵

• 355

φ -

•

۰ 🗕

ON 🔵

ON 🔵

14 270

ON 🔵

14 45 💧 Boresight

•• 110° •

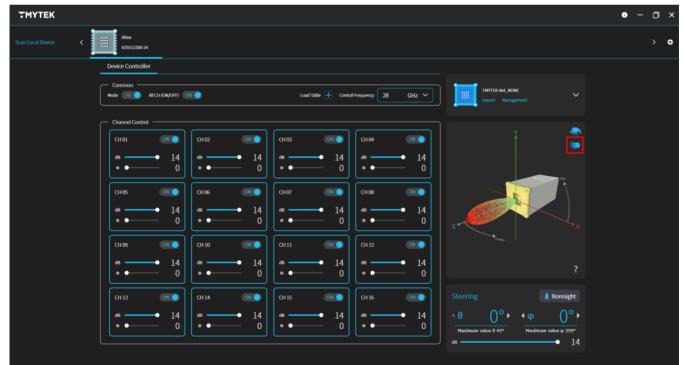
45°



(20). This button can quickly adjust the device to the upright or horizontal position.

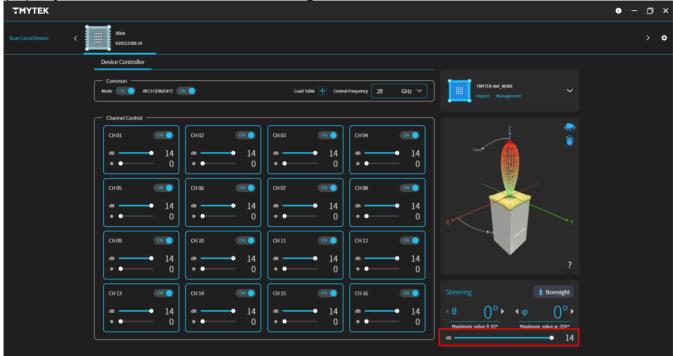
NOTE: Users can manually rotate the angle of the device instead of using this function.







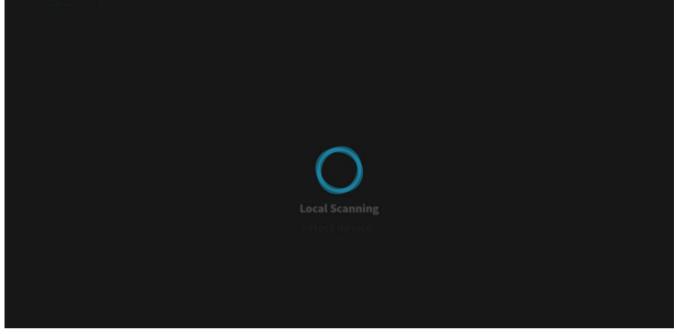
(21). Adjust the dB value to control the Beam gain.



MYTEK

## 2. BBox One 5G

- (1). Connect BBox One and PC with Ethernet, and then turn on the power of BBox One.
- (2). Open TMXLAB Kit.
- (3). Wait till scanning is completed.



(4). After scanning is completed, click the device icon above.

тмутек							• - 🗇 ×
Scan Local Device < BBcx One D2144E030-28			<u> </u>				> ¢
Device Controller	r Beam Config Editor						
Common — Made III •	All CH (ON/OFF) ON 🔵	to	ad Table 🕂 Central Frequency 📿	28 GHz 🗸	No Antenna Import Management	~	
Channel Control Common Gain							
da	CN ○ CH03 → 12 dB	СN СН 02 12 dв —	CH01 → 12 dB —	• 12			
CH08	0 • • • • • • • • • • • • • • • • • • •	О СНО6	0 ● ● ●	0	No Antenna		
d8	→ 12 → 0  dB  → →	● 12 ● 0 dB —	→ 12 → 0 dB →	12 0			
CH 12	CH 11 CH 11	ON CH 10					
d3 • • • • • • • • • • • • • • • • • • •	0 [ • •	• 12.5 - 0 Ф •	● 12.5 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	• 12.5 0			
CH 16	□N  □ CH 15 □ 14 dB  □ 0	ом о Сн 14 • 14 ав —	СН 13 14 ав	• 14			
• •	0 • •	0	0 • •	0			



(5). If the table of the clicked device has not been imported, the screen will show "No Calibration Table." Click anywhere to open the file selection window, choose the file(s) to be imported, and then click "Open" to import the table and expand the control panel.

тмутек	• -	- (	Ð	×
Scan Local Device < Distances 2014 COD 28		;	>	۰
No Calibration Table				
Click here and import the table file to open BBox UI				

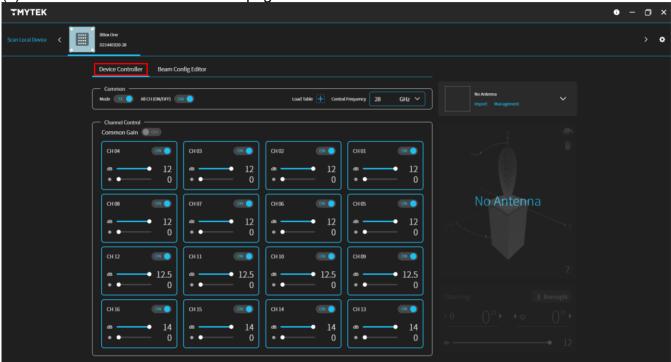
тмутек								• –	٥	×
	← → • ↑ 📑 ≭	輟 → OS (C) → files				Ļ	2			
	组合管理 · 新增资料					II * 🔳 (	2			
	🖈 快速存取	名編 ^	修改日期	調整						
	E 48	AAKIT_TMYTEK_28ONE_4x4_C2104L020-28 D2144E020-28_27GHz.csv	2022/5/10 下午 03:19 2022/2/10 下午 03:27		1 KB 53,241 KB					
		D2144E020-28_28GHz.csv	2022/5/10 下学 03:22							
	福志:	呂稿(N): 22144E020-28_27GHz.csv* *D2144E020-28	1_28GHz.csv*		All Files (*.*)		1			
					(O)		-2			

MYTEK

#### 2.1 Device Controller

• The device controller is designed to switch between Tx/Rx mode, change central frequency, control the power/gain/phase of each channel and set beam angle.



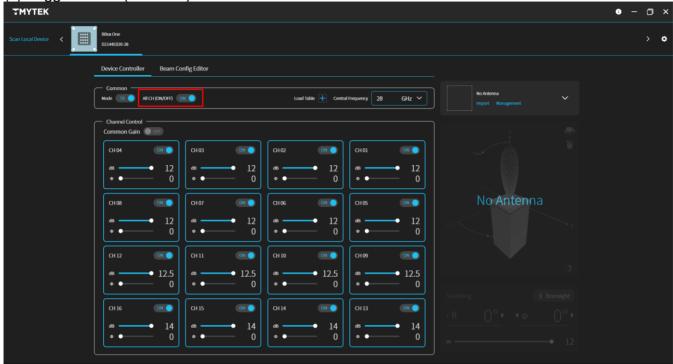


(2). Click the Mode toggle switch to switch between Tx/Rx mode.

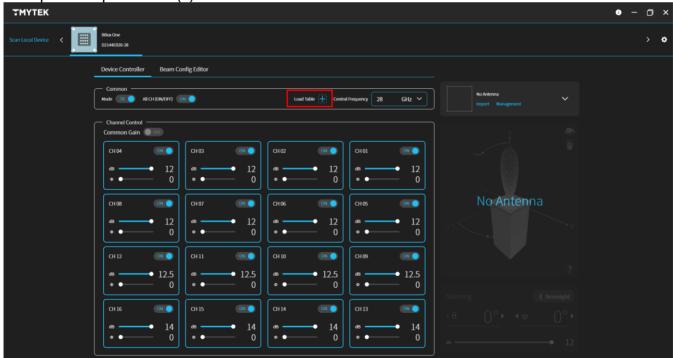
тмутек							• - • ×
Scan Local Device <	BBcx One D2144E020-28						> 0
_	Device Controller Beam Con	fig Editor					
	Common All CH (ON/OFF) ON	•	Load Table 🔃 Centra	al Frequency 28 GHz V	No Antenna Import Management	~	
ſ	Channel Control						
	сноч оч о ав — 12	сноз ол о db — 12	сн 02 ом о db	сноі оч )			
	• • 0	Ф О	Ф Ф О Сноб ОN О	• • 0 CH 05	No Antenna		
	dB 12 ◆ ● 0	dB 12	dB● 12	dB <u>12</u> ⊕ 0			
	CH 12 ON O	CH11 ON O	CH 10 ON O	СН 09 СМ 🔵			
	dB 12.5 ♥ ● 0	dB 12.5 ♥ ● 0	<sup>dв</sup> — 12.5 Ф О	dB 12.5 ♥ ● 0			
	Сн 16 ОМ О db — 14	CH 15 ON O	Сн 14 ОМ О db — 14	сн 13 ом о ав — 14			
	* • 0	• • 0	• • 0	• • 0			



(3). Toggle All CH (ON/OFF) can switch all channels on/off.



(4). Click "Load Table" to import the calibration table. After selecting the file(s) to be imported, click Open to import the file(s).





(5). All available frequency points are listed in the Central Frequency drop-down menu. You can choose the desired one.



NOTE: The Dynamic Range of each frequency point may be different.

(6). Click the toggle switch in the upper right corner of the channel card(s) to switch the channel power on and off.

тмутек		0 – 🗆 ×
Scan Local Device < Biox One D2144E009-28		> ¢
Device Controller Beam Config Editor		
Common Mode IX All CH (ON/OFF) ON CH Load Table 拱 Contral Frequency 28 GHz 🗡	No Anterna Import Management	
Channel Control		
	No Antenna	
$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$		

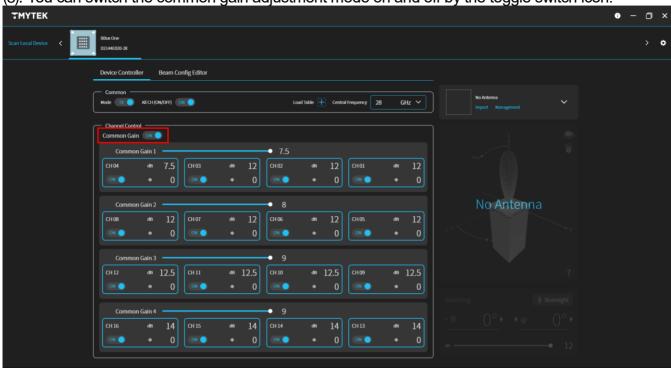
(7). Adjust the sliders of dB and Φ in the channel card(s) to control the channel gain and phase. When the element gain is minimal/maximal, the screen will show "Please adjust common gain." You need to adjust the common gain before you can continue to lower/higher the channel gain. Click "OK" to switch to the common gain adjustment mode.

тмутек	• - • ×
Scan Local Device < Bibox One 02144(209-38	> 0
Device Controller Beam Config Editor	
Common Mode TR All CH (CN/OFF) OR Call Load Table 🔆 Central Frequency 28	GHz V No Anterna V
Channel Control	
	■ 12
	• No Antenna
$\begin{bmatrix} a_{13} & & & 12 \\ \bullet & \bullet & & 0 \end{bmatrix} \begin{bmatrix} a_{23} & & & & 12 \\ \bullet & \bullet & & 0 \end{bmatrix} \begin{bmatrix} a_{23} & & & & & 12 \\ \bullet & \bullet & & & 0 \end{bmatrix} \begin{bmatrix} a_{23} & & & & & & 12 \\ \bullet & \bullet & & & 0 \end{bmatrix} \begin{bmatrix} a_{23} & & & & & & & & 12 \\ \bullet & \bullet & & & & & 0 \end{bmatrix}$	0 12 0
	· 12.5
	O     Steering     A Boresight
	• <b>0</b> dm• 12

тмутек						• – • ×
Scan Local Device <	3Bax One 32144E020-28					> •
	Device Controller Beam Conf	fig Editor				
	Common Mode TX All CH (ON/OFF) ON	•	Load Table 拱 Centr	al Frequency 28 GHz 🗸	No Anterna import Management	
	Channel Control Common Gain CH 04 CH 08 CH 02 CH 12 CH 12 CH 12 CH 16 CH 16 CH 16 CH 16 CH 16 CH 16 CH 16 CH 14 CH 14 C	CH03 CH03 CH07 CH07 CH07 CH07 CH07 CH07 CH11 CH0 CH11 CH0 CH15 CH15 CH14 CH14 CH15 CH07 CH14 CH15 CH14 CH14 CH14 CH14 CH15 CH14 CH14 CH14 CH14 CH15 CH14 CH14 CH14 CH14 CH15 CH14 CH14 CH14 CH15 CH14 CH14 CH14 CH15 CH14 CH15	CH02 ON as 12 o 0 CH06 ON as 12 o 0 CH06 ON as 12 o 0 CH10 ON as 12 o 0 CH10 ON cH10 ON cH10 ON cH14 ON	CH01 (CH01) (CH05) (CH05) (CH13) (CH	No Antenna No Antenna Steering $\theta$ $0^{\circ}$ $\phi$ $0^{\circ}$ m 12	



(8). You can switch the common gain adjustment mode on and off by the toggle switch icon.



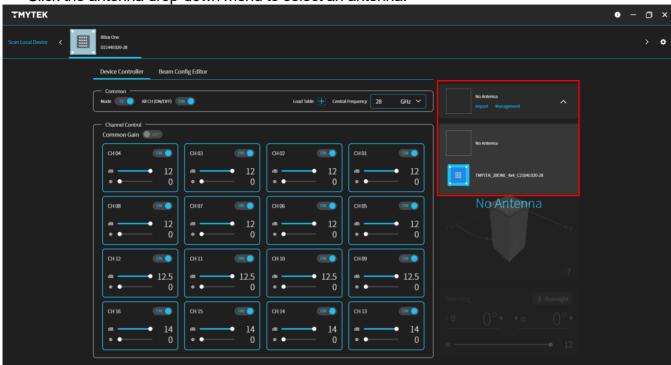
(9). Adjusting the common gain will simultaneously affect the gain of the 4 channels on the board. Take this screenshot as an example, if the common gain is changed to 0, the Channel01 is 4.5 dB, Channel04 is 0 dB. Then, the common gain and channel gain can be adjusted separately.

тмутек	• - • ×
Scan Local Device < Bibox One 02144600-38	> •
Device Controller Beam Config Editor	
Common Mode TR NI CH (DN/DIF) OK National Trequency 28 GHz V Management	
Channel Control	
Common Gain 1 7.5 CH04 de 7.5 CH03 de 12 CH02 de 12 CH01 de 12	
Common Gain 2       8       No Antenna	
CH08       ds       12         CH08       ds       12         CH06       ds       12         CH07       ds       0         CH06       ds       12         CH07       ds       0         CH06       ds       12         CH07       ds       0         CH08       ds       12         CH07       ds       0         CH07       ds       0         CH07       ds       0         CH08       ds       12         CH07       ds       0         CH08       ds       12         CH08       ds       12         CH09       ds       12         <	
Common Gain 3 9	
cH12       dw       12.5       cH11       dw       12.5       cH09       dw       12.5       dw       12.5       dw <td></td>	
Common Gain 4 9 CH15 ds 14 CH15 ds 14 CH14 ds 14 CH13 ds 14 CH13 ds 14	



(10). If no antenna is selected, only the channel control mode is functional. The beam steering function is only available after an antenna is selected.

Click the antenna drop-down menu to select an antenna.

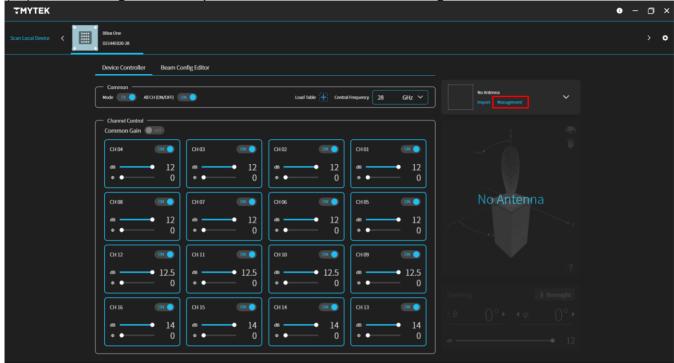


(11). Click "Import" to open the file selection window. Select the file(s) to be imported and click "Open" to use the imported antenna data in the antenna menu.

TMYTEK	) – 🗆 ×
Scan Local Device < Biox One D214HE270-38	> 0
Device Controller Beam Config Editor	
Node 📧 🌑 All CH (DA/CIFF) 🗰 Load Table 🔆 Central Frequency 28 GHz 🔶	
Channel Control         ≤ git         ×           Common Gain         ● → → ↑ ■ , ★■ , O5 (C) ; Bes         ×         ↓	
CH04     (日本)     1     1     1     1     1     1       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)       (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)     (日本)	
CHORE CHORE INTERNA	
dB → 12.5 SEE (10): AANT_IN/TEX_280NE_4ud_C2104L020-28.cov · All Files (1*) · · ? • • • 0 EBE(0): RN/TEX_280NE_4ud_C2104L020-28.cov · All Files (1*) · ?	
CH16     CH15     CH14     CH13     CH13     CH13     CH14     CH13     CH14     CH15     CH15     CH15     CH16     CH16	
$ \begin{array}{c} ds & \longrightarrow & 14 \\ \bullet & \bullet & & 0 \end{array} \begin{array}{c} ds & \longrightarrow & 14 \\ \bullet & \bullet & & 0 \end{array} \begin{array}{c} ds & \longrightarrow & 14 \\ \bullet & \bullet & & 0 \end{array} \begin{array}{c} ds & \longrightarrow & 14 \\ \bullet & \bullet & & 0 \end{array} \begin{array}{c} ds & \longrightarrow & 14 \\ \bullet & \bullet & & 0 \end{array} \end{array} $	



(12). Click "Management" to open the customized antenna management interface.



#### (13). Click "Add" to enter the add mode.

Enter following in order: antenna name (for identification, the name cannot be repeated), SpacingX (the pitch-to-pitch spacing between two adjacent antenna elements on the Xcoordinate, Unit: mm), SpacingY (the pitch-to-pitch spacing between two adjacent antenna elements on the Y-coordinate, Unit: mm), theta max angle, and phase offset of each channel. Click the arrow on the right to expand/collapse the offset input box.

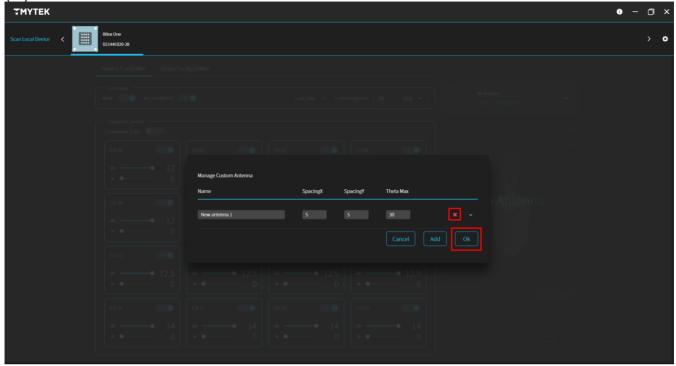
After completing the above action, click "Ok" to save the input data and return to the main control interface. You will see that the antenna option has been added to the antenna menu.

тмутек			• - 🗆 ×
Scan Local Device <	BBax One D2144E020-28		> 0
		Manage Custom Antenna	
		Name SpacingX SpacingY Theta Max	
		New antenna 1 5 5 30 × ^	
		RX Offset TX Offset 0 0 0 Antenna	

тмутек		• - • ×
Scan Local Device <	BBcx One D2144E030-28	> 0
	Device Controller Beam Config Editor	
	Common Mode IX All CH (GN/OH7) CH CH CH Child Field All CH (GN/OH7) CH CH CH Child Field All CH (GN/OH7) CH Child Field All CH (GN/OH7) CH CH Child Field All CH (	
	Channel Control Common Gain a com CH04 ON C CH03 ON C CH02 ON C CH01 ON C	
	$\left \begin{array}{cccccccccccccccccccccccccccccccccccc$	
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
	$\begin{bmatrix} as & - \bullet & 14 \\ \bullet & \bullet & 0 \end{bmatrix} \begin{bmatrix} as & - \bullet & 14 \\ \bullet & \bullet & 0 \end{bmatrix} \begin{bmatrix} as & - \bullet & 14 \\ \bullet & \bullet & 0 \end{bmatrix} \begin{bmatrix} as & - \bullet & 14 \\ \bullet & \bullet & 0 \end{bmatrix} \begin{bmatrix} as & - \bullet & 14 \\ \bullet & \bullet & 0 \end{bmatrix}$	



(14). Click the red "X" and then "OK" to delete the antenna data.

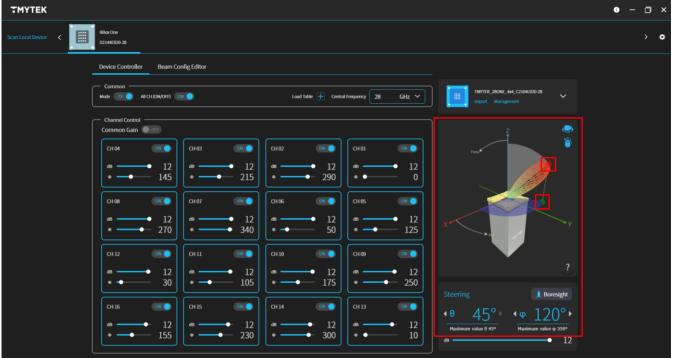




- (15). Press and hold the red dot on the tip of the Beam to rotate the Beam and adjust  $\theta$  and  $\phi$ . Press and hold the green dot on the xy-plane to adjust  $\phi$ .
- NOTE:  $\theta$  is the angle between the positive Z-axis and the vector in question ( $0 \le \theta \le$  Theta max angle).

 $\varphi$  is the angle between the projection of the vector onto the xy-plane and the positive X-axis (0  $\leq \varphi < 360^{\circ}$ ).

Take this screenshot as an example, the theta max is 45°.

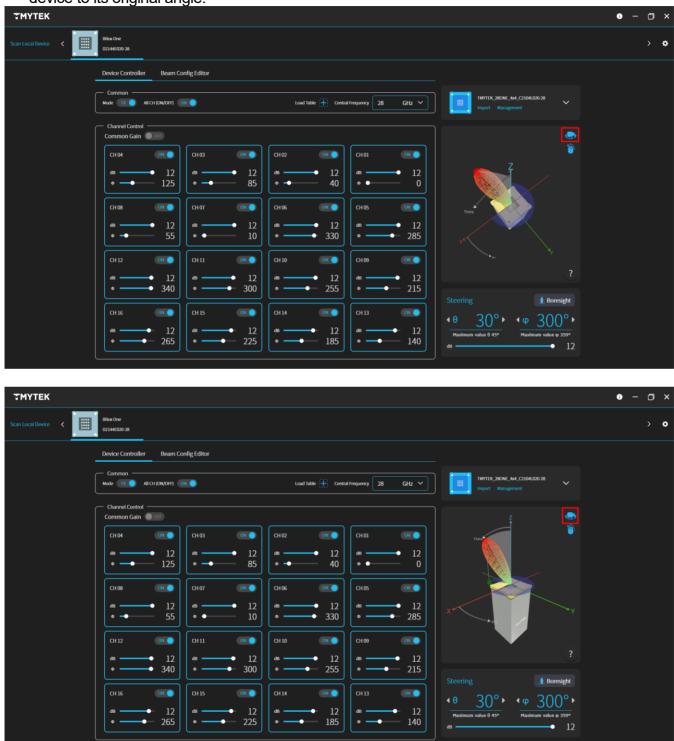


(16). "Pressing "Boresight" can set  $\theta$  and  $\phi$  back to 0 degree.

				• - • ×
BBax One 02144E020-28				> 0
Device Controller Beam Config Editor				
Common Mode TX All CH (ON/OFF) ON	Load Table 拱 Cen	tral Frequency 28 GHz 💙	IMVITEK, 280NE_644_C2104L020-28 v	
Channel Control			z 🔮	
CH 04 ON CH 03	СН 02 СН 02 ОМ • • 12 ив • 12	Снол ОМ О	These *	
da <u>→ 12</u> • • <u>0</u>	$\begin{array}{c c} \bullet & 12 \\ \hline & \bullet & 0 \\ \end{array} \begin{array}{c} d s & \bullet & 12 \\ \bullet & \bullet & 0 \\ \end{array}$	ds 12 ◆ ● 0		
CH 08 ON CH 07	CH 06 ON O	СН 05 ОН О		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c c} \bullet & 12 \\ \bullet & \bullet & 0 \\ \end{array} \qquad \begin{array}{c} \bullet & \bullet & 0 \\ \bullet & \bullet & 0 \\ \end{array}$	dB 12	X *	
CH 12 ON CH 11	ON • CH 10 • ON •	СН 09 ОК 🔵		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\begin{array}{c c} \bullet & 12 \\ \hline & \bullet \\ \end{array} \begin{array}{c} d_{B} & \longrightarrow & 12 \\ \bullet & \bullet \\ \end{array} \begin{array}{c} 0 \\ \end{array} $	dB <u> </u>		
CH 16 ON O	ON   CH 14  ON	CH 13 ON O	Steering $\blacksquare$ Boresight	
dB <u>→ 12</u> dB <u>→</u> 0	→ 12 dB → 12 → 0 • → 0	ds ——● 12 ● ● 0	Maximum value θ 45° Maximum value φ 359°	



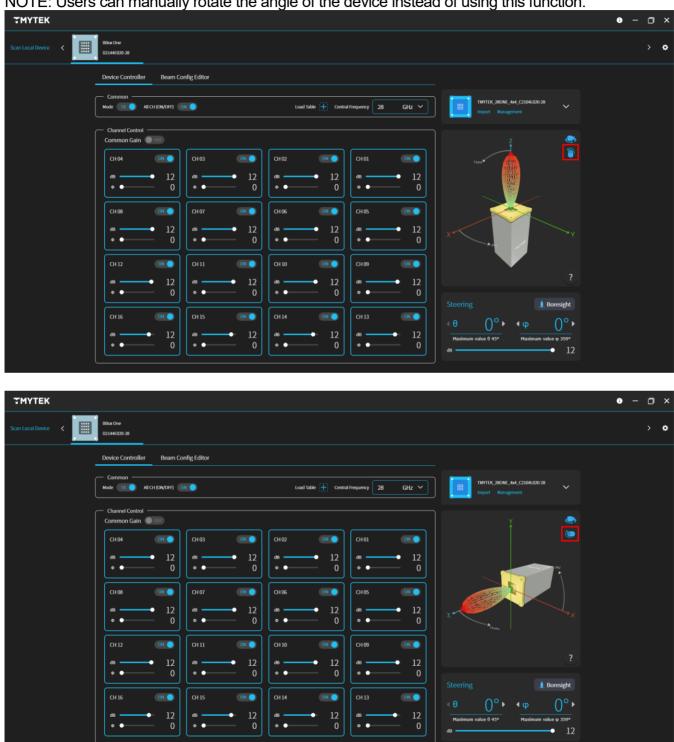
(17). When the device is rotated to an arbitrary angle, pressing the "Reset Angle" button can set the device to its original angle.





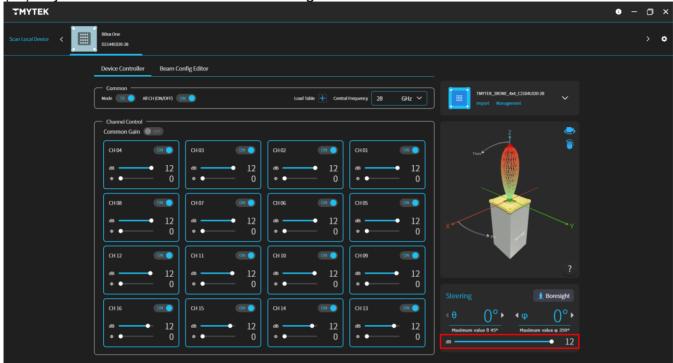
(18). This button can quickly adjust the device to the upright or horizontal position.

NOTE: Users can manually rotate the angle of the device instead of using this function.





(19). Adjust the dB value to control the Beam gain.



### 2.2 Beam Config Editor

 The Beam Config Editor can pre-edit up to 64 sets of beams in Tx/Rx mode each, and can write the beam table into the BBox. In the same power cycle, the user can switch the prewritten beam ID through the SPI interface.

(1). Switch to the "Beam Config Editor" page

IYTEK							• - •
scal Device <	BBax One D2144E020-28						
	Device Controller	Beam Config Editor					
					No Antenna Import Manager	ment	
	— тх ——			— RX ———			
			Please selec	ct antenna			

(2). If no antenna is selected, the beam table cannot be edited, and "Please select antenna" will pop up on the screen.

тмутек							• - • ×
Scan Local Device <	BBax One D2144E020-28						> 0
	Device Controller	Beam Config Editor					
					No Antenna Import Management	~	
	— τ <b>x</b> ————— BeamID 1			BeamID 1			
			Please sele	ct antenna			



(3). After selecting an antenna, you can edit the beam table.

YTEK								• - •
ocal Device <	BBax One D2144E020-28							> •
	Device Controller	Beam Config Editor						
	Z Save Config	Control Method					TMYTEK_280NE_644_c2106L020-28 V	
	хт				RX			
	BeamID 1	θ ο	ф 💽 .	Gain 12 da	BeamID 1	θ .	φ 0 . Gain 2.5 **	
	BeamID 2	θ 0	ф <u>о</u> -	Gain 12 as	BeamID 2	θ ο	ф 0 • Gain 2.5 *	
	BeamID 3	θ	¢ 0	Gain 12 de	BeamID 3	θ ο .	ф 0 Gain 2.5 м	
	BeamID 4	θ	¢ 0.	Gain 12 de	BeamID 4	θ ο .	ф 0 - Gain 2.5 м	
	BeamID 5	θ ο -	<b>∳</b> 0	Gain 12 de	BeamID 5	θ ο .	ф 0 Gain 2.5 м	
	BeamID 6	θ 0	ф 0	Gain 12 m	BeamID 6	θ 0	ф 0 - Gain 2.5 #	
	BeamID 7	<b>9</b> 0 -	ф 0	Gain 12 as	BeamID 7	θ 0	ф 0 • Gain 2.5 и	
	BeamID 8	<b>8</b> 0 -	ф <u>о</u> .	Gain 12 📾	BeamID 8	θ ο	ф 0 • Gain 2.5 и	
	BeamID 9	θ ο	ф <u>о</u> .	Gain 12 as	BeamID 9	θ ο	ф 0 Gain 25 м	
	BeamID 10	0 ·	ф <u>о</u> .	Gain 12 an	BeamID 10	<b>0</b> 0-	φ 0 Gain 2.5 au	

(4).64 sets of beams can be stored in the Tx/Rx mode each, and the range of values that can be entered will be prompted below the input box.

тмутек							• - 🗆 ×
Scan Local Device < BBox One D2144F020-28							> ŏ
Device Controller	Beam Config Editor						
Z Save Config	Control Method				TMYTEK_28ONE_644_C2) Import Management	104L020-28	
x			RX				
BeamID 1	θ (d) 0°-45° Φ (0°-359°	- Gain 12 as	BeamID 1	θ ο	ф <mark>о Ga</mark>	in 2.5 🗰	
BeamID 2	θ ο φ ο	• Gain 12 as	BeamID 2	θ	ф 0	in 2.5 **	
BeamID 3	θ 0 • φ 0	• Gain 12 as	BeamID 3	0.	ф 0 Ga	in 2.5 a	
BeamID 4	θ ο φ ο	- Gain 12 at	BeamID 4	θ	ф <mark>0                                    </mark>	in 2.5 m	
BeamID 5	θ ο φ ο	• Gain 12 #	BeamID 5	θ ο -	ф0 Ga	in 2.5 m	
BeamID 6	θ ο φ ο	• Gain 12 a	BeamID 6	θ 0 .	ф 0 <sup>-</sup> Ga	in 2.5 m	
BeamID 7	θ ο φ ο	- Gain 12 as	BeamID 7	θ 0 -	ф 0 <sup>-</sup> Ga	in 2.5 #	
BeamID 8	θ 0 . φ 0	• Gain 12 as	BeamID 8	θ ο .	ф 0 <sup>-</sup> Ga	in 2.5 #	
BeamID 9	θ 0 . φ 0	• Gain 12 as	BeamID 9	θ ο .	ф 0 <sup>-</sup> Ga	in 2.5 #	
			BeamID 10	<b>0</b> .	ф <mark>0                                    </mark>	in 2.5 📾	



(5). After editing, click "Save Config" to save the configuration file.

NOTE: At this moment, the configuration file is only written on the PC and has not been written to BBox yet.

bbox yet.											
тмутек										0 -	o ×
Scan Local Device <	BBax One D2144E020-28										> ¢
	Device Controller	Beam Config Editor									
	Z Save Config	Control Method —					TMYTEK_280NE Import Mana		~		
	X				RX						
	BeamID 1	e d	ф <mark>0-397</mark> .	Gain 12	BeamID 1	θ ο	¢ 0	Gain 2.5 *			
	BeamID 2	<b>8</b> 0.	ф <u>о</u> .	Gain 12 de	BeamID 2	θ	¢ 0.	Gain 2.5 ª	.		
	BeamID 3	θ ο	ф <u>о</u> .	Gain 12 *	BeamID 3	0	ф <u>о</u> -	Gain 2.5 a			
	BeamID 4	θ ο	ф <u>о</u> .	Gain 12 *	BeamID 4	θ ο .	ф <u>о</u> -	Gain 2.5 a			
	BeamID 5	θ ο	ф <u>о</u> .	Gain 12 📾	BeamID 5	θ	Ф 0 .	Gain 2.5 a			
	BeamID 6	θ ο	ф <u>о</u> .	Gain 12 at	BeamID 6	0.	Ф 0 -	Gain 2.5			
	BeamID 7	θ ο	ф <u>о</u> .	Gain 12 at	BeamID 7	θ ο -	ф 0	Gain 2.5 #			
	BeamID 8	θ ο	ф <u>о</u> .	Gain 12 a	BeamID 8	θ ο .	ф <u>о</u> -	Gain 2.5			
	BeamID 9	θ ο	ф <u>о</u> .	Gain 12 *	BeamID 9	θ ο .	ф о	Gain 2.5			
					BeamID 10	0.	ф О	Gain 2.5 a			

(6). Control Method shows how BBox is controlled. In the "TLK" mode, the device is controlled by Ethernet.

тмутек										• - 🗆 ×
Scan Local Device <	BBax One D2144E020-28									> 0
	Device Controller	Beam Config Editor								
į	2 Save Config	Control Method					TMYTEK_280NE_ Import Manage	4x4_C2104L020-28 ProcedE	~	
	X				RX					
	BeamID 1	<b>θ d</b> 0°-45°	ф <mark>0</mark> .	Gain 12 m	BeamID 1	<b>9</b> 0 .	ф 0	Gain 2.5	-	
	BeamID 2	e o	ф <u>о</u> .	Gain 12 as	BeamID 2	θ ο	Ф 0	Gain 2.5		
	BeamID 3	e o	ф 0	Gain 12 🛤	BeamID 3	θ	ф [0	Gain 2.5		
	BeamID 4	e o	ф 0	Gain 12 👛	BeamID 4	θ	ф о	Gain 2.5		
	BeamID 5	θ ο	ф 0	Gain 12 d≊	BeamID 5	θ ο -	¢ 0.	Gain 2.5		
	BeamID 6	e o	ф 0	Gain 12 🛎	BeamID 6	θ ο .	ф 0	Gain 2.5		
	BeamID 7	e o	ф 🔲 .	Gain 12 da	BeamID 7	θ 0	ф 0	Gain 2.5	-	
	BeamID 8	9 o	ф <u>о</u> .	Gain 12 as	BeamID 8	θ ο .	ф 0	Gain 2.5		
	BeamID 9	e o	ф 0	Gain 12 as	BeamID 9	θ ο	ф 0	Gain 2.5		
					BeamID 10	θ	ф о.	Gain 2.5	•	

# 

## TMXLAB Kit Software User Manual

(7). Toggling the Control Method button can switch the control method of BBox. In the "SPI" mode, Beam Config is written to BBox and BBox cannot be controlled by TLK. All function is locked and "Please switch control method to TLK" will pop up on the screen.

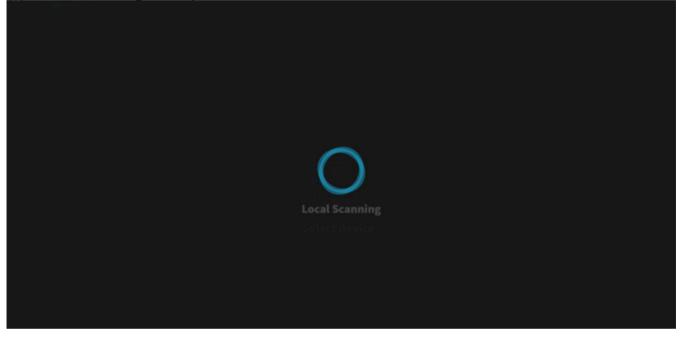
NOTE: If you switch to the "Device Controller" page now, the Control Method will be set to "TLK" automatically.

тмутек									• - 0	×
Scan Local Device <	88ax One D2144E020-28									۰
	Device Controller	Beam Config Editor								
		Control Method					TMYTEK_280NE_4x Import Manager			
ſ	— хт —				— RX ———					
			Please	switch cont	rol method t	OTIK				
			+ Incuse	. Switch cont	BeamID 6 0					



## 3. BBox Lite

- (1). Connect BBox Lite and PC with Ethernet, and then turn on the power of BBox Lite.
- (2). Open TMXLAB Kit.
- (3). Wait till scanning is completed.



(4). After scanning is completed, click the device icon above.

тмутек		o	×
Scan Local Device	BBox 02194.004.28		
	Select device		



(5). If the table of the clicked device has not been imported, the screen will show "No Calibration Table." Click anywhere to open the file selection window, choose the file(s) to be imported, and then click "Open" to import the table and expand the control panel.

тмутек		- 🗆 ×
	1890x 1021041204 28	>
	No Calibration Table Click here and import the table file to open BBox UI	

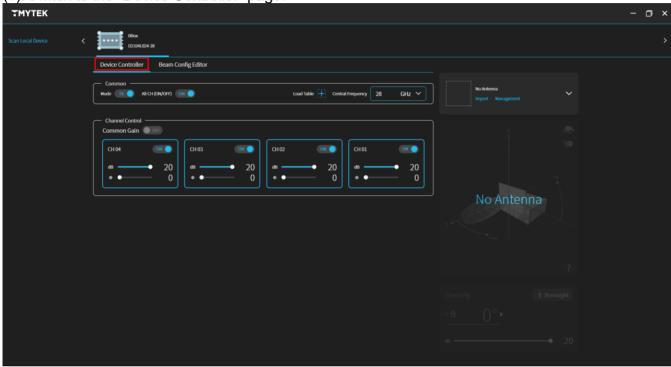
тмутек							-	ο×
Scan Local Device < Blox 02104.024-28								
	← → ◄ <mark> </mark> → 추	费 → OS(C:) → files						
	組合管理 ▼ 新増資料	<b>英</b>				li 🔹 💶 😮		
	★ 快速存取	名晴 ^	修改日期	調型				
	<b>E</b> #E	AAKIT_TMYTEK_28LITE_4x4_C2104L013-28.csv D2104L024-28_27GHz.csv	2021/11/18 上午 11:47 2021/12/8 下午 05:31	Microsoft Excel	1 KB 13,183 KB			
		D2104L024-28_28GHz.csv	2021/11/19 下午 04:45					
		\$₩(N) <sup>1</sup> 72104L024-28,27GHz.csv <sup></sup> 102104L024-28	1971b		All Files (*.*)			
	福宴	新聞(N):   *D2104L024-28_27GHz.csv* *D2104L024-28,	28GHz.csv*		All Files (*.*) 開啟(O)			

MYTEK

#### 3.1 Device Controller

• The "Device Controller" is designed to switch between Tx/Rx mode, change central frequency, control the power/gain/phase of each channel and set beam angle.

#### (1). Switch to the "Device Controller" page.



(2). Click the Mode toggle switch to switch between Tx/Rx mode.

<complex-block><complex-block><complex-block></complex-block></complex-block></complex-block>	тмутек		- 🗆 ×
	Scan Local Device		
	Device Controller Beam Config Editor		
Common Gain Common Gain Child		$\sim$	
	Common Gain © 07 CH04 OX © CH03 OX © CH02 OX © CH01 OX © d8 - 20 d8 - 20 d8 - 20		



### (3). Toggle All CH (ON/OFF) can switch all channels on/off.

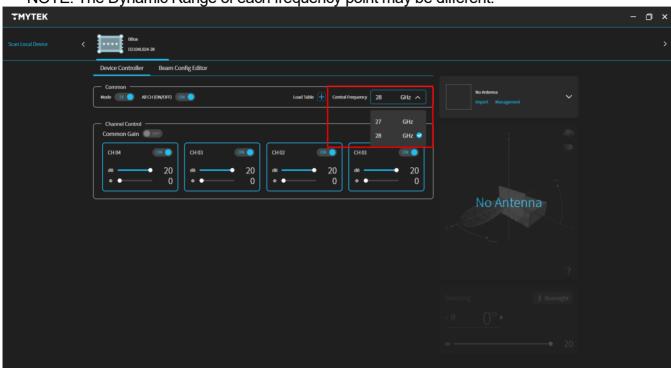
тмутек			- 🗖 ×
Scan Local Device <	690x 102104.024-28		
	Device Controller Beam Config Editor		
	Common Mode TX ALCH (XM/OFF) OK Load Table 🔆 Central Frequency 28 GHz V	No Anterna v	
	Channel Control		
	CH64 (@C) CH03 (@C) CH02 (@C) CH01 (@C)		
	$\begin{bmatrix} ds & \bullet & 20 \\ \bullet & \bullet & & 0 \end{bmatrix} \begin{bmatrix} ds & \bullet & 20 \\ \bullet & \bullet & & 0 \end{bmatrix} \begin{bmatrix} ds & \bullet & 20 \\ \bullet & \bullet & & 0 \end{bmatrix} \begin{bmatrix} ds & \bullet & 20 \\ \bullet & \bullet & & 0 \end{bmatrix}$		
		No Antenna	

(4). Click "Load Table" to import the calibration table. After selecting the file(s) to be imported, click Open to import the file(s).

тмутек		- 0 ×
Scan Local Device K Bisox 021040004-38		
Device Controller Beam Config Editor		
Contrad Table 🔆 Central Prequency 28 GHz V	No Anterna Import Management	
$\begin{bmatrix} Channel Control \\ Common Gain \\ \hline \\ cH04 \\ \hline \\ cs \\ \bullet \\ \bullet \\ \bullet \\ \bullet \\ ch02 \\ \hline \\ ch03 \\ \hline \\ ch03 \\ \hline \\ ch03 \\ \hline \\ ch03 \\ \hline \\ ch02 \\ ch02 \\ \hline \\ ch02 \\ ch02$		
	No Antenna	

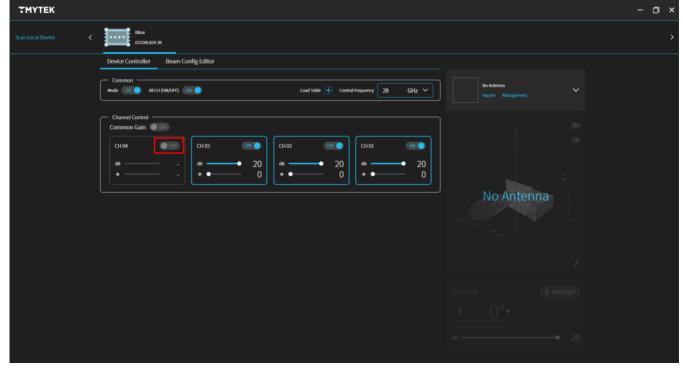


(5). All available frequency points are listed in the Central Frequency drop-down menu. You can choose the desired one.



NOTE: The Dynamic Range of each frequency point may be different.

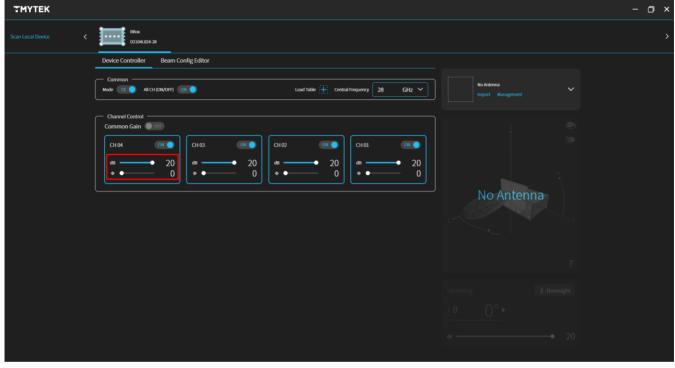
(6). Click the switch button in the upper right corner of the channel card(s) to switch the channel power on and off.

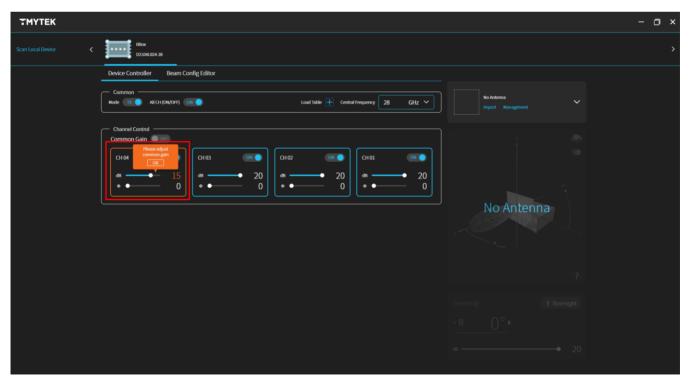


# 

## TMXLAB Kit Software User Manual

(7). Adjust the sliders of dB and Φ in the channel card(s) to control the channel gain and phase. When the element gain is minimal/maximal, the screen will show "Please adjust common gain." You need to adjust the common gain before you can continue to lower/higher the channel gain. Click "OK" to switch to the common gain adjustment mode.







(8). You can switch the common gain adjustment mode on and off by the toggle switch icon.

тмутек		- o ×
Scan Local Device < Bibox D0104L004-28		
Device Controller Beam Config Editor		
- Common Mode 📧 🚺 AT CH (CM/OFF) 💷 Load Table 拱 Central Prequency 28 GHz 🗡	No Anterna Import Management	
Common Gain 1 15		
CHIMAN Common		
	No Antenna	

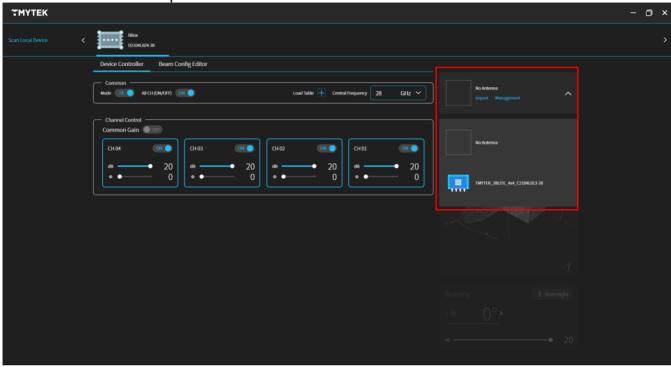
(9). Adjusting the common gain will simultaneously affect the gain of the 4 channels on the board. Take this screenshot as an example, if the common gain is changed to 0, the Channel01 is 5 dB, Channel04 is 0 dB. Then, the common gain and channel gain can be adjusted separately.

тмутек			- 🛛 ×
Scan Local Device 🖌	EBox 02104.024-28		
	Device Controller Beam Config Editor		
	- Common Mode 📧 💽 Al CH (ON/OFF) 🔍 💽 Load Table 🕂 Central Prequency 28 GHz 💙	No Anteena Import Management	
	Channel Control     Common Gain		
	Common Gain 1 — 15		
	CH04 dB 15 CH03 dB 20 CH02 dB 20 CH01 dB 20		
		No Antenna	

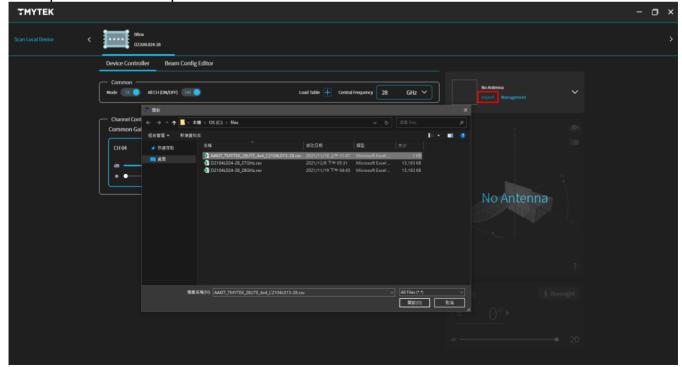


(10). If no antenna is selected, only the channel control mode is functional. The beam steering function is only available after an antenna is selected.

Click the antenna drop-down menu to select an antenna.



(11). Click "Import" to open the file selection window. Select the file(s) to be imported and click "Open" to use the imported antenna data in the antenna menu.





### (12). Click "Management" to open the customized antenna management interface.

тмутек			- 🗆 ×
Scan Local Device <	E80x 1021041024-28		
	Device Controller Beam Config Editor		
	Common	No Anterna Import Management	
	Channel Control Common Gain $\bigcirc$ CFH 03 $ar \rightarrow 20$ $\bullet \rightarrow 0$ CH 03 $ar \rightarrow 20$ $\bullet 0$ CH 03 $ar \rightarrow 20$ $ar \rightarrow 20$ ar	No Antenna	

#### (13). Click "Add" to enter the add mode.

Enter following in order: antenna name (for identification, the name cannot be repeated), SpacingX (the pitch-to-pitch spacing between two adjacent antenna elements on the Xcoordinate, Unit: mm), SpacingY (the pitch-to-pitch spacing between two adjacent antenna elements on the Y-coordinate, Unit: mm), Beam steering range, and phase offset of each channel. Click the arrow on the right to expand/collapse the offset input box. After completing the above action, click "Ok" to save the input data and return to the main control interface. You will see that the antenna option has been added to the antenna menu.

тмутек		- 🗅 ×
Scan Local Device <		
Devio		
Com		
Com	net Control Manage Custom Antenna	
Сн	Name Spacingx Spacingr	Theta Max
88 Ф		
	RX Offset TX Offset 0 0 0 0 0	

тмутек		- 🛚 ×
Scan Local Device	BBox 02104.024-28	
	Device Controller Beam Config Editor	
	Common Load Table 🕂 Central Trequency 28 GHz V	
	Channel Control           Common Gain           CH04         CH03         CH02         CH01         CH04         No Antenna	
	$ \begin{array}{c} as \\ \bullet \end{array} \\ \bullet \end{array} \\ \hline 0 \\ as \\ \bullet \end{array} \\ \hline 0 \\ \bullet \end{array} \\ \hline 0 \\ \bullet \end{array} \\ \hline 0 \\ as \\ \bullet \end{array} \\ \hline 0 \\ \hline 0 \\ \bullet \end{array} \\ \hline 0 \\ \hline 0 \\ \bullet \\ \bullet \end{array} \\ \hline 0 \\ 0 \\$	
	ТМТЕК 281/15_44_02104.013-28	



(14). Click the red "X" and then "OK" to delete the antenna data.

тмутек		- 🗆 ×
Scan Local Device < Hox Brown		
Device Controller Beam C		
Common		
Channel Control		
СН 04 (СП 🔘	Manage Custom Antenna	
dB 20	Name SpacingX SpacingY Theta Max	
	New antenna 1 5 5 30 × ~	



- (15). Press and hold the red dot on the tip of the Beam to rotate the Beam and adjust  $\theta$  and  $\phi$ . Press and hold the green dot on the xy-plane to adjust  $\phi$ .
- NOTE:  $\theta$  is the angle between the positive Z-axis and the vector in question ( $0 \le \theta \le$  Theta max angle).

 $\varphi$  is the angle between the projection of the vector onto the xy-plane and the positive X-axis (0  $\leq \varphi < 360^{\circ}$ ).

Take this screenshot as an example, the theta max is 45°.

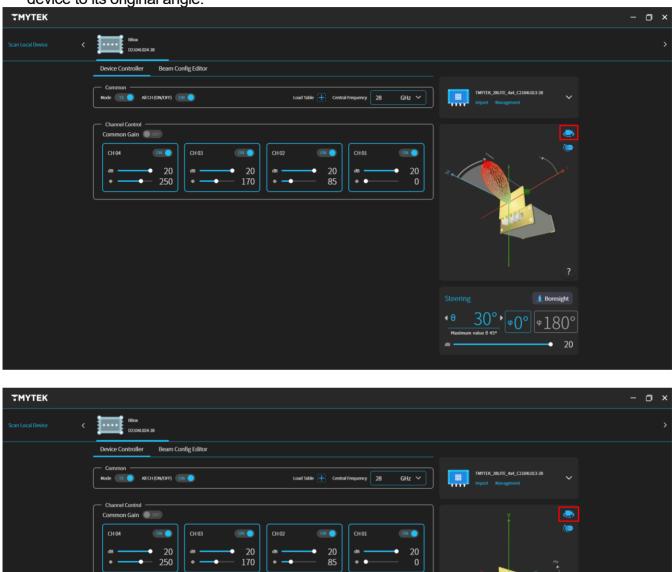
### ТМУТЕК - 🛛 × Beam Config Editor All CH (ON/OFF) ON ..... Load Table 🕂 Cer ncy 28 ON 🔵 сно ON 🔵 ON 🔵 снα ON 🔵 20 170 20 85 20 0 250 30° • • • • • •

(16). "Pressing "Boresight" can set  $\theta$  and  $\phi$  back to 0 degree.

тмутек		-	σ×
Scan Local Device <	B0x 02104.024-28		
	Device Controller Beam Config Editor		
	Common Micri(ox(off) ox • Load Table 🕂 Central Frequency 28 GHz ~	TM/TEX_20L/TE_464_C2104015-20	
	Channel Control     Common Gain     O     O	Y 👄	
		Por Por Por Por Por Por Por Por	
		Steering	



(17). When the device is rotated to an arbitrary angle, pressing the "Reset Angle" button can set the device to its original angle.



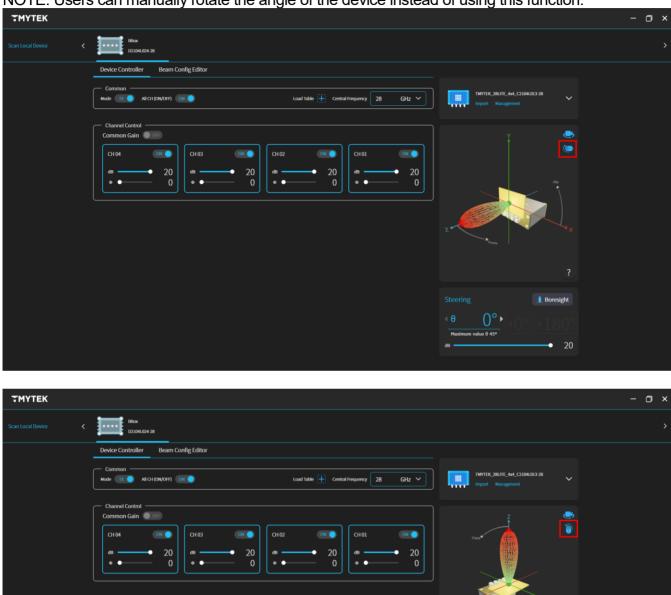
💧 Boresight

<u>30°</u>, 0° 9180°



(18). This button can quickly adjust the device to the upright or horizontal position.

NOTE: Users can manually rotate the angle of the device instead of using this function.

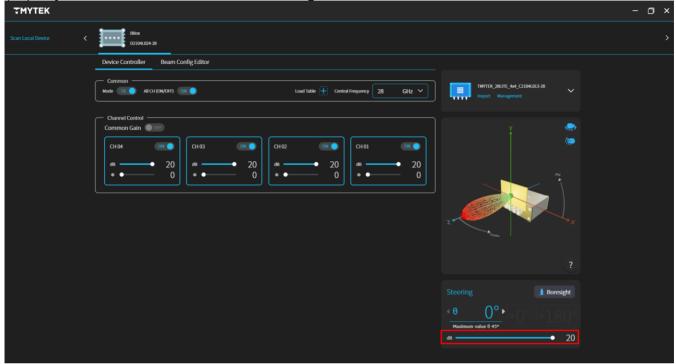


💧 Boresight

• 20



(19). Adjust the dB value to control the Beam gain.



#### 3.2 Beam Config Editor

 The Beam Config Editor can pre-edit up to 64 sets of beams in Tx/Rx mode each, and can write the beam table into the BBox. In the same power cycle, the user can switch the prewritten beam ID through the SPI interface.

#### (1). Switch to the "Beam Config Editor" page.

TMYTEK								- 0
	< BBox 02104L024	-28						
	Device Controller	Beam Config Editor						
						No Antenna Import Manaj	germent	
	<b>XT</b>			RX				
			Please sele	ect antenn	a <sub>。 .</sub> .			

(2). If no antenna is selected, the beam table cannot be edited, and "Please select antenna," will pop up on the screen.

тмутек							- 0 ×
Scan Local Device <	BBox D2104L024-	28					
	Device Controller	Beam Config Editor					
					No Antenna Import Manage	ment	
	хт			RX			
			Please sele	ct antenna			
	BeamID 10					Gain 13.5 da	

(3). After selecting an antenna, you can edit the beam table.

тмутек									- 🗆 ×
	BBox D2104L024-	28							
	Device Controller	Beam Config Editor							
	🖉 Save Config	Control Method TLK SPI					Import Mana	E_4x4_C2104L013-28	
	тх				RX				
	BeamID 1	θ ο.	ф 🔵 🐨	Gain 20 as	BeamID 1	θ 0 -	ф 🔵 🚥	Gain 13.5 m	
	BeamID 2	θ ο	ф 🔵 🔊	Gain 20 m	BeamID 2	θ ο	ф 🔵 от	Gain 135 m	
	BeamID 3	θ 0	ф 🔵 🖻	Gain 20 da	BeamID 3	<b>0</b> .	ф 🔵 т	Gain 135 at	
	BeamID 4	θ ο	ф 🔵 🖻	Gain 20 **	BeamID 4	€	ф 🔵 🚥	Gain 13.5 da	
	BeamID 5	e <u>o</u> .	ф 🔵 🕫	Gain 20 de	BeamID 5	θ ο	ф 🔵 😁	Gain 13.5 da	
	BeamID 6	θ 0	ф 🔵 🕫	Gain 20 da	BeamID 6	θ ο.	ф 🔵 🚥	Gain 13.5 da	
	BeamID 7	θ 0	ф 🔵 🖤	Gain 20 as	BeamID 7	<b>e</b>	ф 🔵 🖤	Gain 13.5 m	
	BeamID 8	θ 0	ф 🔵 🕫	Gain 20 an	BeamID 8	θ ο	ф 🔵 🖤	Gain 13.5 m	
	BeamID 9	θ Ο	φ 🔵 🖻	Gain 20 as	BeamID 9	<b>e</b>	ф 🔵 🖤	Gain 13.5 m	
	BeamID 10	θ ο	ф 🔵 🖻	Gain 20 da	BeamID 10	θ ο	ф 🔵 с	Gain 135 au	

(4).64 sets of beams can be stored in the Tx/Rx mode each, and the range of values that can be entered will be prompted below the input box.

тмутек	· ·			1					- 🗆 ×
Scan Local Device <	BBox D2104L024-2	28							>
	Device Controller	Beam Config Editor							
	Z Save Config	Control Method					TMYTEK, 28LITE	_4x4_C2104L013-28	
	<u>х</u>				RX				
	BeamID 1	θ <mark>α</mark> . 0~45°	ф 🧿 от 0° or 180°	Gain 20 ds	BeamID 1	θ ο	ф 🔵 🖻	Gain 13.5 de	
	BeamID 2	θ ο	ф 🌒 🕫	Gain 20 as	BeamID 2	<b>0</b> -	ф 🔵 🕐	Gain 13.5 de	
	BeamID 3	e o	ф 🔵 🕫	Gain 20 da	BeamID 3	<b>6</b> 0 -	ф 🔵 🕐	Gain 13.5 da	
	BeamID 4	<b>e</b>	ф 🔵 🕫	Gain 20 da	BeamID 4	<b>0</b> .	ф 🔵 🐨	Gain 135 da	
	BeamID 5	θ 0	ф 🔵 🕐	Gain 20 das	BeamID 5	<b>9</b> 0 .	ф 🔵 🐨	Gain 13.5 du	
	BeamID 6	θ Ο	ф 🔵 🕫	Gain 20 da	BeamID 6	θ ο -	ф 🔵 🕐	Gain 13.5 du	
	BeamID 7	θ ο	ф 🔵 🕫	Gain 20 da	BeamID 7	θ Ο	ф 🔵 🕐	Gain 13.5 da	
	BeamID 8	θ ο	ф 🔵 🕫	Gain 20 da	BeamID 8	θ ο	ф 🔵 🕐	Gain 135 au	
	BeamID 9	θ Ο	ф 🔵 🕫	Gain 20 da	BeamID 9	θ ο	ф 🔵 🕫	Gain 135 au	
					BeamID 10	<b>0</b> .	ф 🔵 🚥	Gain 135 a	

(5). After editing, click "Save Config" to save the configuration file.

NOTE: At this moment, the configuration file is only written on the PC and has not been written to BBox yet.

DDOX yet.									
тмутек									- 🗆 ×
Scan Local Device	K BBox D2104L0	124-28							
	Device Controller	Beam Config Editor							
	Z Save Config	Control Method — TLK SPI					Import Mana	E_4x4_C2104L013-28	
	XX				RX			)	
	BeamID 1	<b>e</b>	ф 🔵 🕫	Gain 20 da	BeamID 1	<b>e</b>	¢ 🔵 🚥	Gain 13.5 <sup>da</sup>	
	BeamID 2	<b>e</b>	ф 🔵 🕖	Gain 20 m	BeamID 2	<b>e</b> o	ф 🔵 🕐	Gain 13.5 m	
	BeamID 3	<b>e</b> o	ф 🔵 🕝	Gain 20 das	BeamID 3	<b>0</b> .	ф 🔵 о	Gain 13.5 de	
	BeamID 4	θ ο	ф 🔵 🕫	Gain 20 da	BeamID 4	θ ο	o 🕒 م	Gain 13.5 as	
	BeamID 5	<b>e</b>	ф 🔵 🕫	Gain 20 da	BeamID 5	<b>e</b> o	ф 🔵 🐨	Gain 13.5 de	
	BeamID 6	<b>e</b>	ф 🔵 🕫	Gain 20 da	BeamID 6	<b>e</b>	ф 🔵 с	Gain 13.5 a	
	BeamID 7	θ ο	ф 🔵 🕫	Gain 20 da	BeamID 7	θ ο	ф 🔵 🕐	Gain 13.5 an	
	BeamID 8	<b>8</b> 0	ф 🔵 🕫	Gain 20 dat	BeamID 8	θ ο	ф 🔵 🕐	Gain 13.5 an	
	BeamID 9	<b>e</b> o	ф 🔵 🕫	Gain 20 da	BeamID 9	θ ο	ф 🔵 с	Gain 13.5 a	
	BeamID 10	θ ο	ф 🔵 🗉	Gain 20 da	BeamID 10	θ ο	۰ 🔵 م	Gain 13.5 a	

(6). Control Method shows how BBox is controlled. In the "TLK" mode, the device is controlled by Ethernet.

тмутек									- 🗆 ×
Scan Local Device	BBax D2104L02	4-28							
	Device Controller	Beam Config Editor							
	🖉 Save Config	Control Method — TLK SPI					TMYTEK_28LITE	_4x4_C2104L013-28	
	<u>х</u>				RX				
	BeamID 1	θ ο	ф 🔵 🕐	Gain 20 da	BeamID 1	θ ο	ф 🔵 с	Gain 13.5 m	
	BeamID 2	θ ο	ф 🔵 🔊	Gain 20 das	BeamID 2	θ ο	ф 🔵 с	Gain 13.5 dat	
	BeamID 3	θ ο	ф 🔵 🔊	Gain 20 das	BeamID 3	θ ο	ф 🔵 с	Gain 13.5 au	
	BeamID 4	θ	ф 🔵 🖝	Gain 20 da	BeamID 4	θ ο	ф 🔵 от	Gain 13.5 au	
	BeamID 5	θ	ф 🔵 🖝	Gain 20 da	BeamID 5	θ ο	¢ 🔵 😁	Gain 13.5 du	
	BeamID 6	θ ο	ф 🔵 🖝	Gain 20 ds	BeamID 6	θ ο	Ф 🔵 🖤	Gain 13.5 <sup>au</sup>	
	BeamID 7	e o	ф 🔵 🐨	Gain 20 ds	BeamID 7	<b>e</b>	ф 🔵 🖤	Gain 13.5 <sup>au</sup>	
	BeamID 8	e o	ф 🔵 🐨	Gain 20 ds	BeamID 8	<b>e</b>	ф 🔵 🖤	Gain 13.5 m	
	BeamID 9	θ ο	ф 🔵 🐨	Gain 20 da	BeamID 9	θ ο	ф 🔵 от	Gain 13.5 m	
	BeamID 10	θ ο	ф 🔵 🖝	Gain 20 da	BeamID 10	θ ο	¢ 🔵 🐨	Gain 135 au	



(7). Toggling the Control Method button can switch the control method of BBox. In the "SPI" mode, Beam Config is written to BBox and BBox cannot be controlled by TLK. All function is locked and "Please switch control method to TLK" will pop up on the screen.

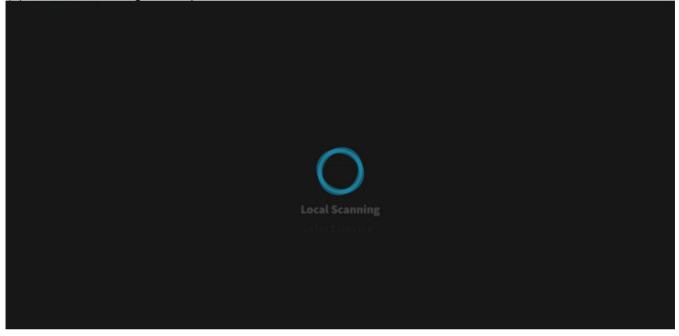
NOTE: If you switch to the "Device Controller" page now, the Control Method will be set to "TLK" automatically.

ТМҮТЕК									- 0
	<	BBox D2104L024-2	28						
	Dev	vice Controller	Beam Config Editor						
			Control Method TLK SPI					TMYTEK_28LITE	
	<b>ر</b> _ 1	x				RX			
				Pleas	e switch cont	rol methc	d to TLK		

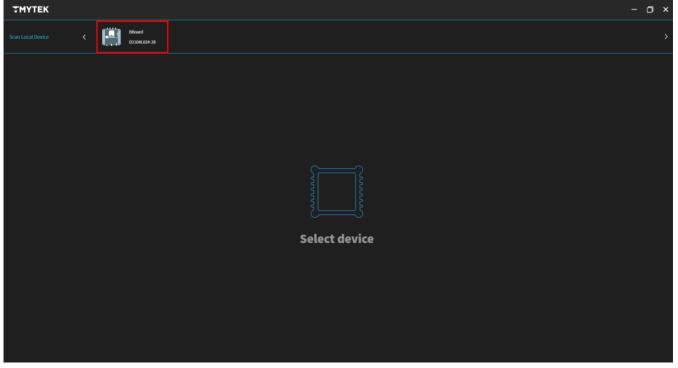


### 4. BBoard

- (1). Connect BBoard and PC with Ethernet, and then turn on the power of BBoard.
- (2). Open TMXLAB Kit.
- (3). Wait till scanning is completed.



(4). After scanning is completed, click the device icon above.





(5). Click the Mode toggle switch to switch between Tx/Rx mode.

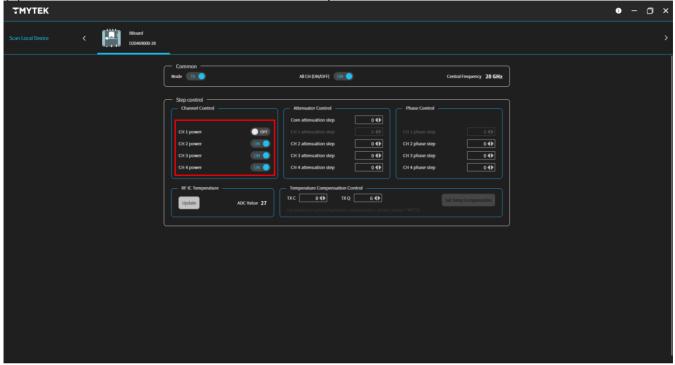
тмутек									0	- 0 >	×
Scan Local Device 🖌	BBoard D20469000-28	_									>
		Common Mode 🛛 💽		ALI CH (ON/OFF)	DN 🔵		Central Frequency 28 GHz	]			
		Step control — Channel Control CH 1 power CH 2 power CH 3 power CH 4 power CH 4 power RF IC Temperature Update	CR C	Attenuator Control - Com attenuation step CH 1 attenuation step CH 2 attenuation step CH 3 attenuation step CH 4 attenuation step CH 4 attenuation step Temperature Compensa IXC 8 ⊕ Cet advanced note temperat	TX Q 6 <b>€</b>	Phase Control – CH 1 phase step CH 2 phase step CH 3 phase step CH 4 phase step	0 (1)       0 (1)       0 (1)       0 (1)       0 (1)       set temp Cooperation				

(6). Toggle All CH (ON/OFF) can switch all channels on/off.

тмутек		6	- 1	o ×
Scan Local Device < EBoard Doverson 20				
	Common Node TX Central Frequency 28 GHz			
	Step control       Attenuation control       Place control         CH appear Internation Control       Cm attenuation step       0.00         CH appear Internation       Cm attenuation step       0.00         CH appearature       Cm appearature Compensation Control       Treperature Compensation Control         TMC Value       21       TMC Tot			



### (7). Click the switch button to switch the channel power on and off.



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

тмүтек		• - 🗆 ×
Scan Local Device C Bloard Doversion 28		
	Common	Hz .
	Step control       Attenuator Control         CH anneel Control       CH anneel Control         CH a power       CH a tenuation step       0.01         CH 3 power       CH 3 power       CH 3 power       CH 3 power         CH 4 power       CH 4 power       CH 4 tenuation step       0.01         CH 4 power       CH 4 power       CH 4 tenuation step       0.01         SF IC Temperature       Temperature Compensation Control       Texperature Compensation Control         Update       ADC Value 27       Cet a stanced adds emperature compensation paper control 1 HYTEK	



#### (9). Adjust the phase step to set the phase of each channel. Step range is 0-63.

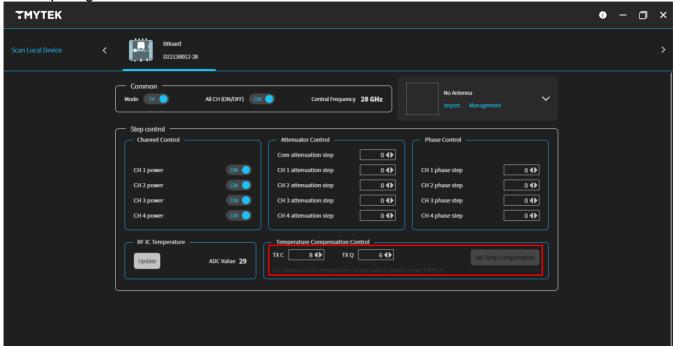
тмутек		• – 🗇 X
Scan Local Device < EBoard D20469000-28		
	Common	IGHZ
	Step control       Charmet Control       Phase Control         CH 1 power       Control       Control       CH 1 phase step       CH 1 phase step       CH 1 phase step       CH 2 ph	

### (10). Click "Update" to update the real-time ADC Value.

тмутек		• – • ×
Scan Local Device 🗸	BBoard D22138012-28	>
l	Common Mode TX All CH (ON/OFF) ON Central Frequency 28 GHz Import Management	
	Channel Control Attenuator Control Phase Control Phase Control Com attenuator step 0 ()	
	CH 1 power     ON     CH 1 attenuation step     0 <b>(</b> )     CH 1 phase step     0 <b>(</b> )       CH 2 power     ON     CH 2 attenuation step     0 <b>(</b> )     CH 2 phase step     0 <b>(</b> )	
	CH 3 power     ON     CH 3 attenuation step     0 4 CH 3 phase step     0 4 CH 3 phase step       CH 4 power     ON     CH 4 attenuation step     0 4 CH 4 phase step     0 4 CH 4 phase step	
	RF KC Temperature       Temperature Compensation Control         Update       ADC Value 29         Cet advanced auto temperature compensation, please contact TMYTEK	



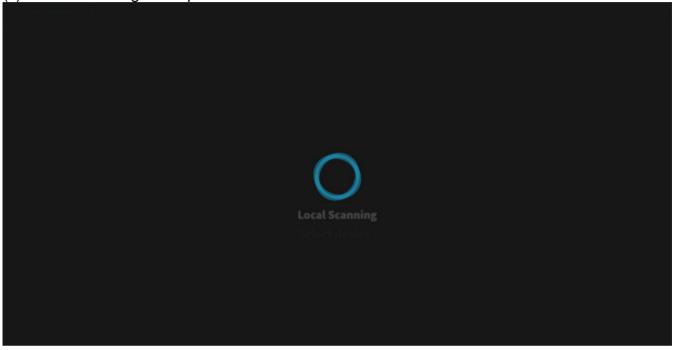
(11). TX C/TX Q (Tx mode) and RX C/RX Q (Rx mode) are temperature compensation coefficients. TX C and RX C contribute about 1dB gain, and TX Q and RX Q contribute about 0.5 dB gain. Step range is 0-15.





## 5. UD Box 5G

- (1). Connect the UD Box and PC with Ethernet, and then turn on the power of the UD Box.
- (2). Open TMXLAB Kit.
- (3). Wait till scanning is completed.



(4). After scanning is completed, click the device icon above.

тмутек				• - 🗆 ×
Scan Local Device <	UD Box UD-8022070012-24	UD Bax UD-8022290015-24		> ¢
			Select device	



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

тмутек		• - 🗆 ×
Scan Local Device C UD Box UD-B022070012-34	LUD Box UID-80022290015-24	> ¢
	Current Value E 28000 Miz 2000 Miz 10 26000.00 Miz Frequency Setting Ref 0 24,000-44,000 >	
	Channel Control       Output Voltage         Channel Control       Output Voltage         Channel Control       Output Voltage         Image: Channel Control       Image: Channel Control         Image: Channel Control       Image: Channel Control	

(6). Changing the value in the bandwidth drop-down list would modify the value in the calculation of harmonic.





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

After entering RF, click the arrow below or Enter to enter the IF input box.

After entering the IF, click the arrow below or Enter to automatically compute LO, and Bandwidth will be used to calculate the reference value of frequency range. Click "Save" to set the UD Box. Click "Reset" to clear all input values and return to the RF input box.

тмутек		• – • ×
Scan Local Device < UD Box UD-B072070012-24	UD Box UD-8022990015-24	> ¢
	<complex-block></complex-block>	

(8). If the input frequency is the same 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 vellow warning is shown. UD Box will still execute this setting.

тмутек		• - 🗆 ×
Scan Local Device < UD Box UD-8022070012-24	UD Rox UD-8022250015-24	> <b>¢</b>
	Current Value	
	Frequency Setting       Bandwidth DMr     Image: Constraint of the set o	
	Channel Control CH1 CH2 CH1 CH2 CH2 CH1 CH2 CH2 CH2 CH1 CH2 CH2 CH2 CH2 CH2 CH2 CH2 CH2 CH2 CH2	

MYTEK

(9). You can click the toggle switch to switch each item on and off.

тмутек		• - 🗆 ×
Scan Local Device < UD Box UD Box UD Box22070012-34	UD Box UD H0022900(5-54	> 0
	Current Value se 28000 Mix The 2000 Mix to 26000.00 Mix Harmonic	
	FrequencySetting       100HHz         Bandwidth       0         J4000-44,000       0         Jewet       0         Image: Setting in the set of the	
	Channel Control CH1 CH2 Ref Control Output Voltage •5V ext •9V ext Ref Source • Internal O External	

(10). You can choose either internal source or external source in the Ref Source section.

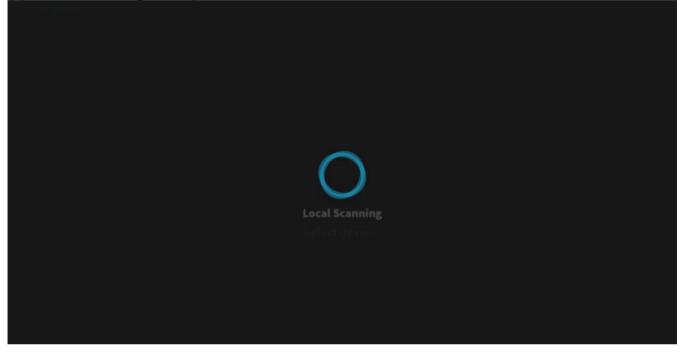
тмутек		• – 🗇 ×
Scan Local Device < UD Box UD 8022070012-24	UD Box UD-8022290015-24	> <b>o</b>
	Current Value se 28000 Mtz <sup>™addit Automatic</sup> IF 2000 Mtz <sup>10</sup> 26000.00 Mtz <sup>®</sup> Lock © Harmonic	
	Frequency Setting     100MHz       Bandwidth     0HHz       Image: Constraint of the set of the s	
	Channel Control Channel Control CH1 CH2 CH1 CH2 CH1 CH2 CH1 CH2 CH1 CH2	



### 6. Power Detector

- (1). Connect the Power Detector and PC with USB.
- (2). Open TMXLAB Kit.

(3). Wait till scanning is completed.



(4). After scanning is completed, click the device icon above.

тмутек			• - • ×
Scan Local Device <	Power Detector PD-23160003		> 0
		Select device	



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

тмутек		• – 🗆 ×
Scan Local Device <b>&lt;</b> Power Detector P0-23160003		> <b>o</b>
vin Sw	Repercy (GHz) 28 Current Power Value (dBm) Current — records. Maximum 960 records. © recon	
	Single Continuous datas Estats (ms.) 20 Read	
•	Advanced Settings ~	

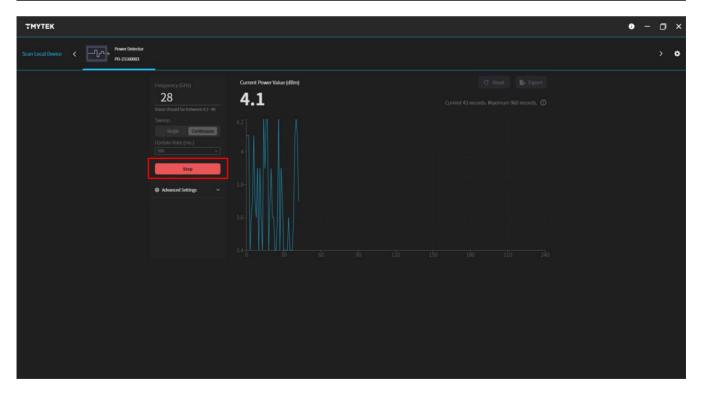
(6). When Sweep setup is "Single", click Read to measure once and the value will be shown in the Current Power Value (dBm) and also plotted in the figure.

тмутек					• - • ×
Scan Local Device <b>&lt;</b> Power Detector P0-23160003					> 0
	Frequency (GHz) 28 Value should be between 0.1-40	Current Power Value (dBm)		C Reset Export	
	Sweep Single Continuous Update Rate (ms.) Soo V				
[	Read  Advanced Settings ~				



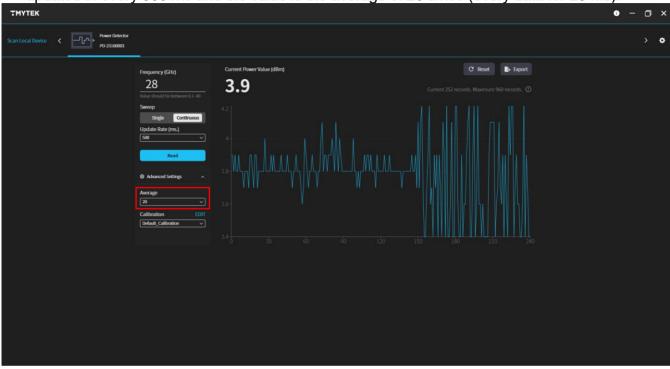
(7). When Sweep setup is "Continuous", select and setup the Update Rate (ms.), click Read to continuously measure. The measurement can be stopped when click the Stop. The measured value is shown in the in the Current Power Value (dBm) and also plotted in the figure.

тмутек					• – 🗆 ×
Scan Local Device 🖌	Power Detector PD-23160003				> 0
		Frequency (GHz)	Current Power Value (dBm) <b>3.4</b>		
		Value should be between 0.1-40 Sweep Single Continuous Update Rate (ms.) [500 Read			





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



(9). Calibration is the calibrated file. Use the system default calibrated file in normal situation. If there is some measured tolerance, user can add and use new calibrated file. Click "EDIT" to enter the page for calibration file editing.

тмутек		0 – 🗇 ×
Scan Local Device <b>&lt;</b> Power Detector PD-23160003		> •
	Frequency (Gt/z)     Current Power Value (dBm)     C Roset     B - Export       28 Wate should be between 0.1-40     3.9     Current records. Maximum 960 records. ©	
	Single Continuous Update Rate (ms.) 500 ~ ) Read	
	Advanced Settings Average 20 Calibration EDT	
	Calibadon Calibration V	



(10). Click "Add new Config" to add new calibration file. User can change Config File Name. New file name will be shown in the tab. Click "Delete" to remove the calibration file. User can save up to 5 calibration files.

тмутек					• - • ×
	Power 0 PD-2316				> 0
		⊙ Add New Config	Edit Calibration Configuration File		
				ОК	

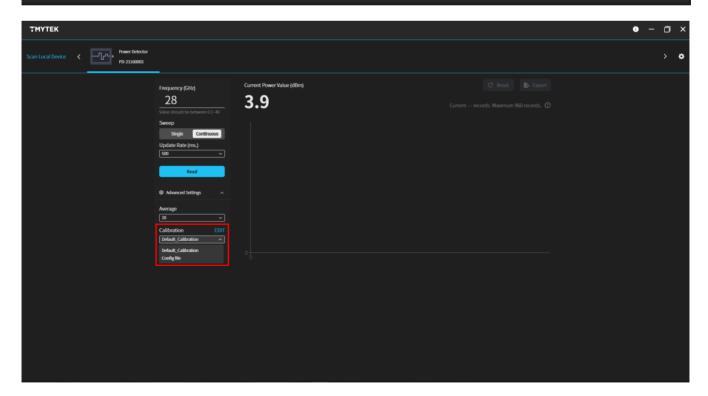
тмутек						• – • ×
Scan Local Device 🖌 🚽 🖓 🕨	ower Delector D-23160003					> 0
			Edit Calibration Configurati	on File		
	Config 0515-1022-398	Add New Config				
	Config File Name Config 0515-1022-398				Delete	
	To set up the calibration configuration 1. Input the corresponding power val 2. For each frequency, both high and	lue for the desired frequenc	sy into the device, and then click the re e completed. Any unfinished items will	lated → button to receive the devic be highlighted with a blue outline.		
	100MHz	300MHz	500MHz	1GHz	10GHz	
	dBm mV	dBm mV	dBm mV	dBm mV	dBm mV	
	-35	-36	-36	-36	-36	
	-5	-5 >	-5 >	-5	-5	
					Close Save	

MYTEK

(11). After setting up the external signal source, click "→" at each calibrated frequencies and power to record the dc voltage (mV). For each frequency, 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. User can choose the calibration file in the "Calibration" menu.

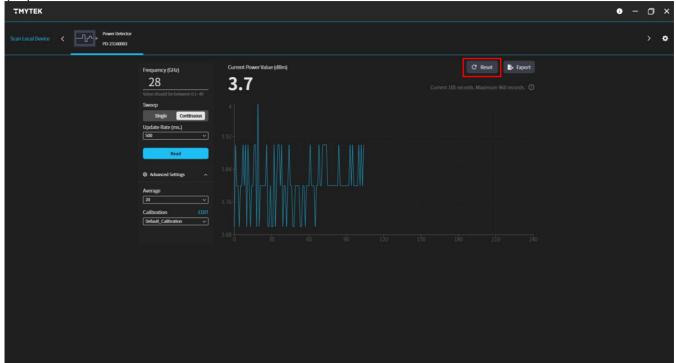
Note: User can only calibrate the frequency point which is needed. No need to finish all frequency points.

Image: Po-21140003       Frequency (Gld)       Currert Power Value (dBm)       C2 Hood       Bo Lood	> <b>¢</b>
Edit Calibration Configuration File	
Config file	
Config File Name Config file Name	
To set up the calibration configuration file:	
<ol> <li>Input the corresponding power value for the desired frequency into the device, and then click the related → button to receive the device voltage.</li> <li>For each frequency, both high and low power settings must be completed. Any unfinished items will be highlighted with a blue outline.</li> </ol>	
100MHz <b>3</b> 00MHz 500MHz 1GHz 10GHz	
$-35 \rightarrow 1.2$ $-36 \rightarrow$ $-36 \rightarrow$ $-36 \rightarrow$ $-36 \rightarrow$	
$-5 \rightarrow 1.2$ $-5 \rightarrow$ $-5 \rightarrow$ $-5 \rightarrow$ $-5 \rightarrow$	
Close	





(12). Click" Reset" to clean the measured record.



(13). Click "Export" to download the measured data with .csv file. User can record up to 960 points. Note: Data format of the export file: measured time, measured frequency, measured value.

