

User Manual

PicoBT Universal Miner Tester

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Firmware version 8

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9/9/2022

1. Ports Of Tester

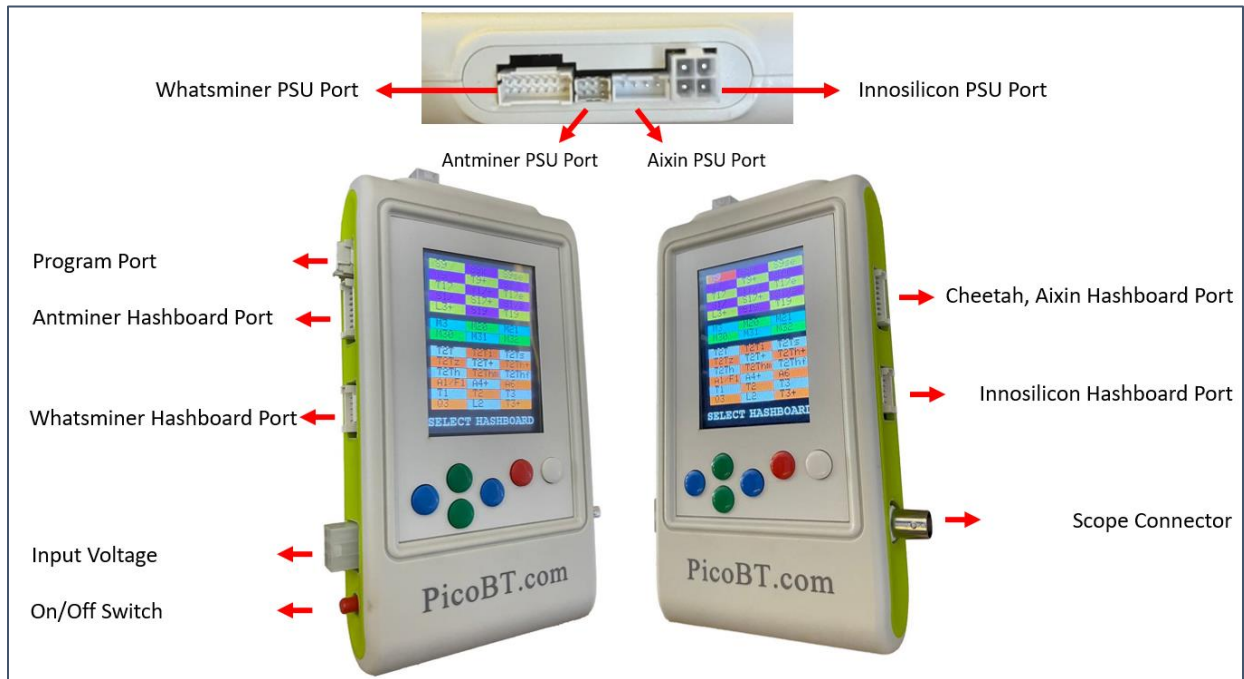


Figure 1: Ports of Tester

Input voltage: in order to turn on the tester, connect a standard “ATX 6 pin Male” cable to “input voltage” connector. Voltages between 8-21 volt is acceptable. Make sure the cable polarities (+ and -) be correct according to Figure 2.

Scope Connector: by connecting an “oscilloscope probe” (Figure 3) to this port, healthy chips of whatsminers and antminers hashboard can be detected in reverse directions.

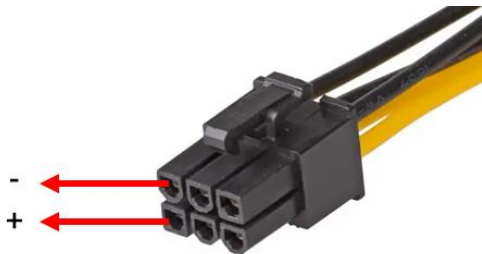


Figure 2: “ATX 6 pin Male” cable



Figure 3: “oscilloscope probe”

On/Off switch: you can turn on and turn off the tester using this switch.

Antminer Hashboard Port: if you want to test an Antminer hashboard, connect data cable (PHB2.0 2*9) from that hashboard to this port of the tester. Supported Antminer Hashboards are as bellow:

- S9, S9i, S9j, S9k, S9se, L3+, T17, T17+, T17e, T17pro, S17, S17+, S17e, S17pro, S11, T19, S19, S19pro S19j, S19Jpro, S19A, S19Apro, S19_88

Note: if you want to test T9+ hashboard, you must use T9+ riser. Connect T9+ hashboard to the tester according to figure 4. (T9+ has 3 lines of ASICs. Each line has 18 number of ASIC. There are 2 jumpers on this riser. If you placed both of them on the right, tester will test line 0 and 1. If you placed both of them left, tester will test lines 0 and 2)

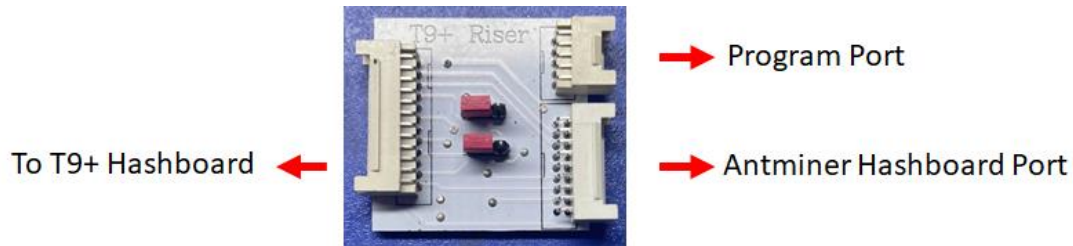


Figure 4: using T9+ Riser to connecting T9+ hashboard to the tester

Whatsminer Hashboard Port: if you want to test a Whatsminer hashboard, connect data cable (PHB2.0 2*7) from that hashboard to this port of the tester. Supported Whatsminer Hashboards are as bellow:

M20, M20s, M21, M21s, M30s, M30s+, M30s++, M31s, M31s+, M32, M32s and any other hashboard with these chips: KF1920, KF1921, KF1922, KF1930, KF1950

Note: if you want to test M3 hashboard, you must use M3 riser. Connect M3 hashboard to the tester according to figure 5.

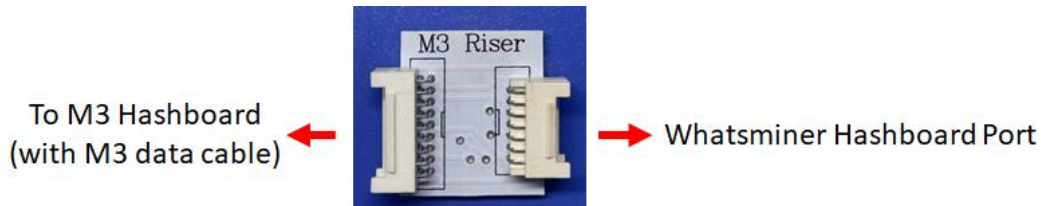


Figure 5: using M3 Riser to connecting M3 hashboard to the tester

Innosilicon Hashboard Port: if you want to test a Innosilicon hashboard, connect data cable (PHB2.0 2*7) from that hashboard to this port of the tester. Supported Innosilicon Hashboards are as bellow:

T1, T2, T3, T3+, S3, S3+, T3H, A4, A4+, A6, A6+, T2T, T2T+, T2Ti, T2Ts, T2Tz, T2Tzs, T2Tzu, T2Tza, T2Th, T2Ths, T2Thm, T2Thf, T2Th+, T2Ths+, T2Thm+, T2Thf+, T2Thl+, L1, L2, L2HU, L2HF, L2HL, L2HS, T1H

Cheetah, Aixin Hashboard Port: if you want to test a Cheetah or Aixin hashboard, connect data cable (PHB2.0 2*9) from that hashboard to this port of the tester. Supported Cheetah and Aixin Hashboards are as bellow:

A1, Q3, F1, S5

Innosilicon PSU Port: if you want to test a Innosilicon PSU, connect data cable of the PSU to this port of the tester. Supported Innosilicon PSU are as bellow:

G1138(T2), G1240(T2Tz), G1266(T2Th), G1286(T2Th+), G1306(T3+), QB2412-B(T2Tz), QB2412-C(T2Th)

Antminer PSU Port: if you want to test an Antminer PSU, connect data cable of the PSU to this port of the tester. Supported Antminer PSU are as bellow:

APW8, APW9, APW9+, APW12

Whatsminer PSU Port: if you want to test a Whatsminer PSU, connect data cable of the PSU to this port of the tester. Supported Whatsminer PSU are as bellow:

P20, P21, P21E, P21D, P221C, P222C

Cheetah, Aixin PSU Port: if you want to test a Cheetah or Aixin PSU, connect data cable of the PSU to this port of the tester. Supported Cheetah and Aixin PSU are as bellow:

TT240015P (A1), HQ2500-A02 (Q3)

2. Hashboard Tester

To enter hashboard tester mode, connect input voltage cable to the tester. Then just press On/Off switch. You will see the select hashboard page as bellow:



Figure 6: select hashboard page

In this figure you can see 3 different categories of hashboards. Antminer, whatsminer and innosilicon. By pressing green keys, categories can be selected. In each category, different hashboards can be selected by pressing blue keys.

Then, for example we want to select S17. Once you selected S17 option, press the white key to enter in the S17 analyzer page (figure 7).

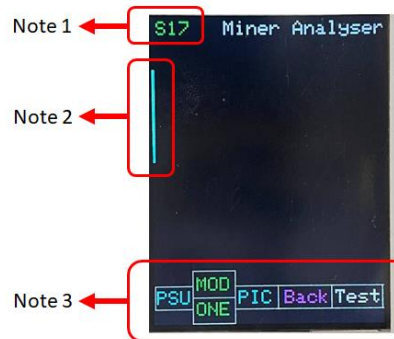


Figure 7: S17 analyzer page

Note 1: in figure 7, the name of the selected hashboard (now is S17) will be displayed here

Note 2: in figure 7, the narrow blue line appeared in the screen, indicates what connector of the tester must be used to connect to the selected hashboard (here is S17).

Note 3: in figure 7, you can see how different keys work.

2.1 Antminer hashboards

in figure 7, you can see how different keys work as bellow: (for example we want to test S17 hashboard)

- PSU** you can enable the S17 PSU (APW9 with 19v), by pressing **PSU** button. (You must had connected the PSU data cable between the tester and the PSU)
- MOD** you can select the mode of testing by pressing **MOD** button. For example, S17 has 2 testing modes: Mode1 and Mode2. (Please refer to figure 11 to know what each mode does for each selected hashboard)
- ONE** if you toggle this button, it changes to **999**. This means how many times you want to test the hashboard. Once or 999 times repetitively.
- PIC** if you toggle this button, it changes to **PC0** and **PC1**. If you select **PC0**, the tester enables PIC microcontroller in the hashboard that consequently the MOSFETs in the hashboard will turn on and then it allows the current to enter in the hashboard. In this situation, RST signal is kept 0v in the hashboard. If you select **PC1**, PIC microcontroller in the hashboard will be enabled but RST signal is kept HIGH (1.8v in test points). If you select **PIC**, it will turn off the MOSFETs in the hashboard. Note: if you select **PC0** or **PC1**, and then test the hashboard with **999** option, the PIC of the selected hashboard will be turn on as long as you test it. Otherwise, PIC will be turning on and off in each test.
- Back** you can go back to select hashboard page, if you press (or hold) **Back** button.
- TEST** after you adjust **PSU**, **MOD** and **ONE** options, you can test the hashboard by pressing **TEST** button.

Figure 8 shows an example of toggled keys on the screen of the tester.

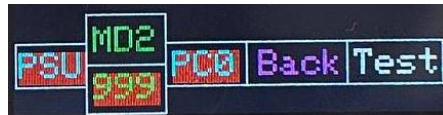


Figure 8: an example of toggled keys on the screen of the tester.

After you tested the hashboard, you will see the test result on the screen. (Figure 9)

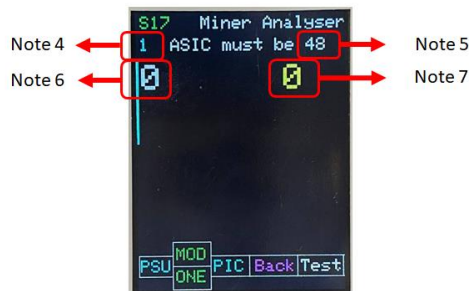


Figure 9: the test result of S17 hashboard with condition (Mode1, 1 time test, PSU off)

Note 4: in figure 9, this number indicates how many times the tester, tested this hashboard.

Note 5: in figure 9, This number shows how many chips the selected hashboard should have if it is healthy.

Note 6: in figure 9, This number shows how many healthy chips have been detected by the tester from the first ASIC to the front.

Note 7: in figure 9, This number shows how many healthy chips have been detected by the scope from last ASIC to the test point of reverse signal of any chip where you connected the scope probe. (You must connect the + pole of scope probe to the RI/RO (Antminers) or TX (Whatsminers) signal of any chip and connect negative of scope to the negative pole of that chip). You can see 2 examples of the reverse signal test points of Whatsminers and Antminers hashboards in figure 10.

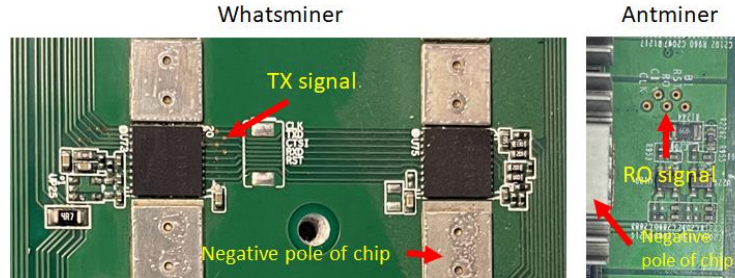


Figure 10: example of the reverse signal test points of Whatsminers and Antminers hashboards

2.1.1 Test modes for Antminer hashboards

PicoBT tester has different test modes for each hashboard. Figure 11, shows these test modes.

Option	Supported Hashboards	Modes
S9	S9, S9i, S9j	Mode1, Mode2
S9k	S9k	ASIC test, ASIC test using scope in reverse direction
S9se	S9se	ASIC test, ASIC test using scope in reverse direction
T9+	T9+	ASIC test, ASIC test using scope in reverse direction
T9	T9	ASIC test, ASIC test using scope in reverse direction
S11	S11	ASIC test, ASIC test using scope in reverse direction
T17	T17, T17 pro	Mode1, Mode2
T17+	T17+	Mode1, Mode2
T17e	T17e	Mode1, Mode2, Mode3
S17	S17, S17 pro	Mode1, Mode2
S17+	S17+	Mode1, Mode2
S17e	S17e	Mode1, Mode2, Mode3
L3+	L3, L3+, L3++	ASIC test, ASIC test using scope in reverse direction
S19	T19, S19, S19pro S19j, S19lpro, S19A, S19Apro, S19_88	ASIC test, TEMP sensors test, showing PIC firmware value, ASIC test using scope in reverse direction
T19	T19 series	ASIC test, TEMP sensors test, showing PIC firmware value, ASIC test using scope in reverse direction

Mode1: ASIC test, ASIC test using scope in reverse direction
 Mode2: TEMP sensors (internal and external) test
 Mode3: DOMAIN voltages test

Figure 11, test modes for Antminer hashboards

2.1.2 Test modes for Antminer hashboards

Please note that acceptable input voltages for Antminer hashboards are as figure 12.

Input voltages	hashboards
11	S11
12 - 12.5	S9, S9i, S9j, S9k, S9se, T9, L3+
15	T19, S19, S19pro S19j, S19Jpro, S19A, S19Apro, S19_88
15 - 19	T17, T17+, T17pro, S17, S17+, T17pro
17 - 19	T17e, S17e

Figure 12, acceptable input voltages for Antminer hashboards

2.1.3 Antminer test example 1

Selected hashboard: T17

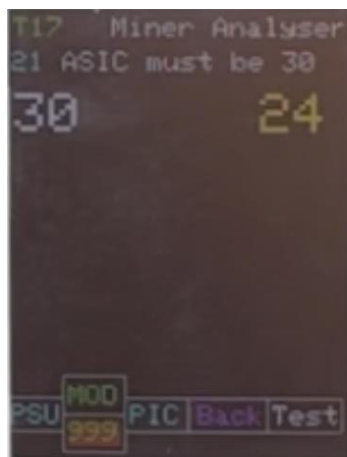
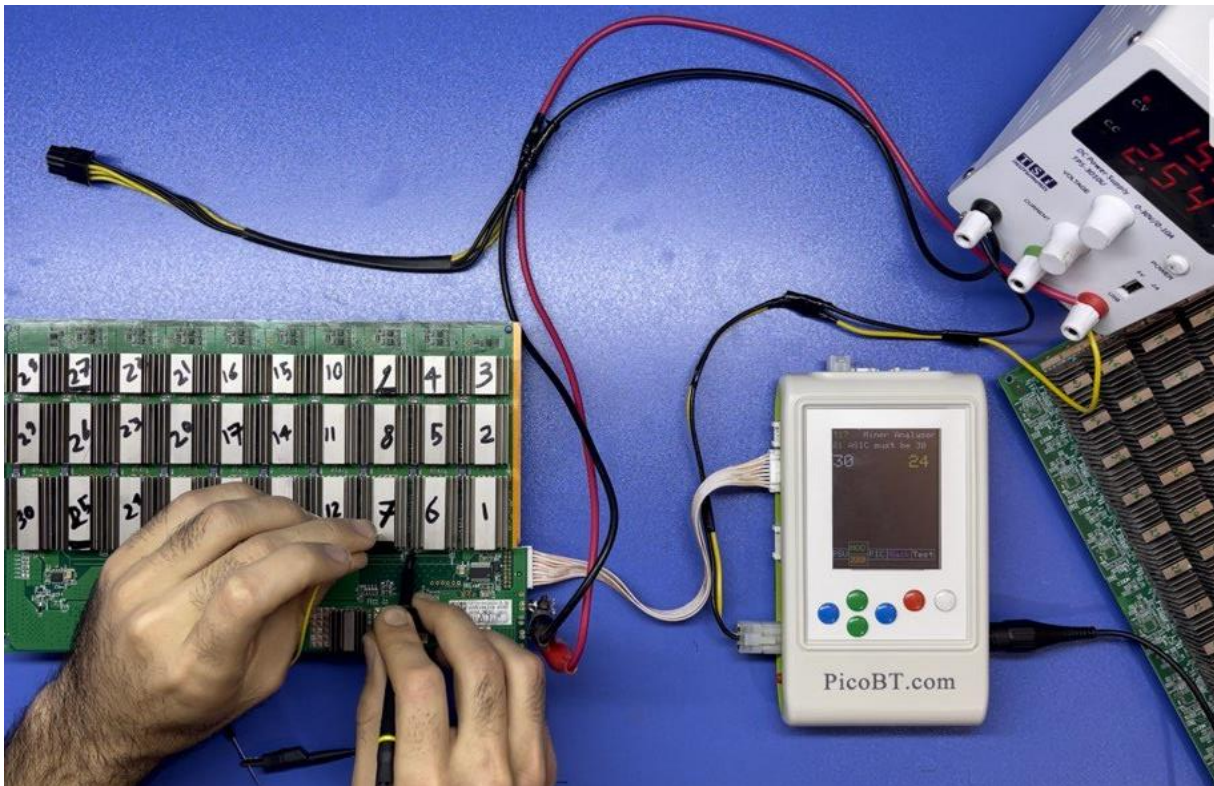
Testing mode: Mode1

Test number: 999

30 healthy ASIC detected

24 healthy ASIC detected using scope probe placed in "chip number 12"

Input voltage is 15 volt



2.1.4 Antminer test example 2

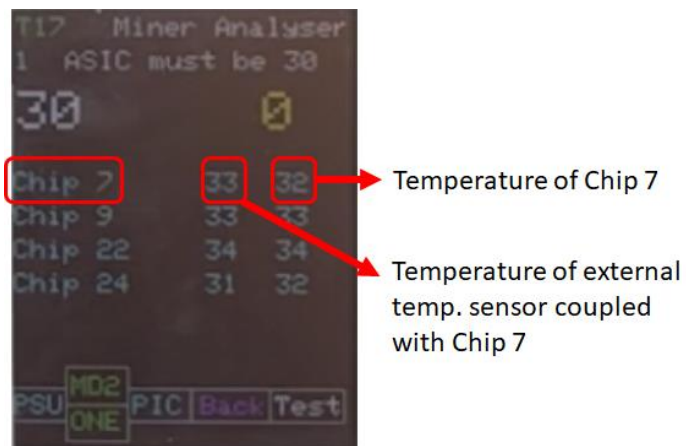
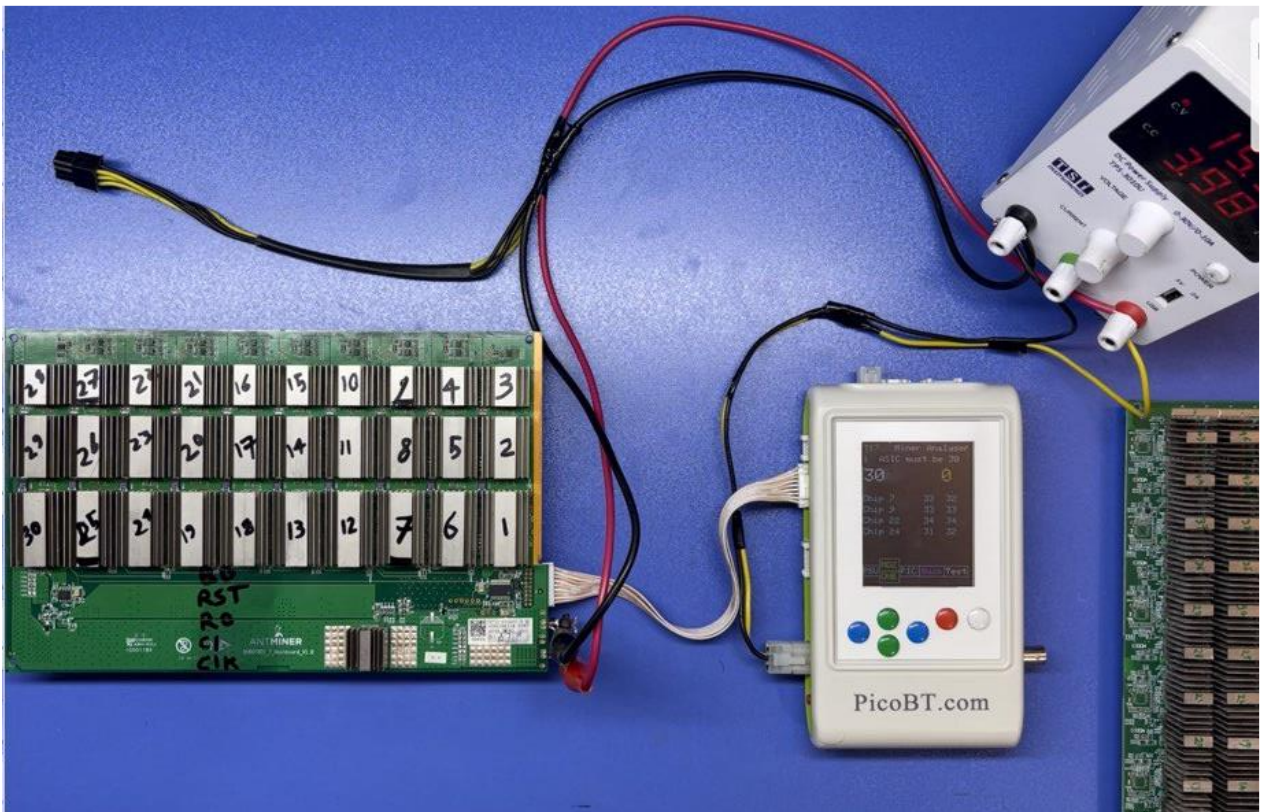
Selected hashboard: T17

Testing mode: Mode2 (ASIC test, showing temprures of 4 chips and their coupled external temp. sensor)

Test number: ONE

30 healthy ASIC detected

Input voltage is 15 volt



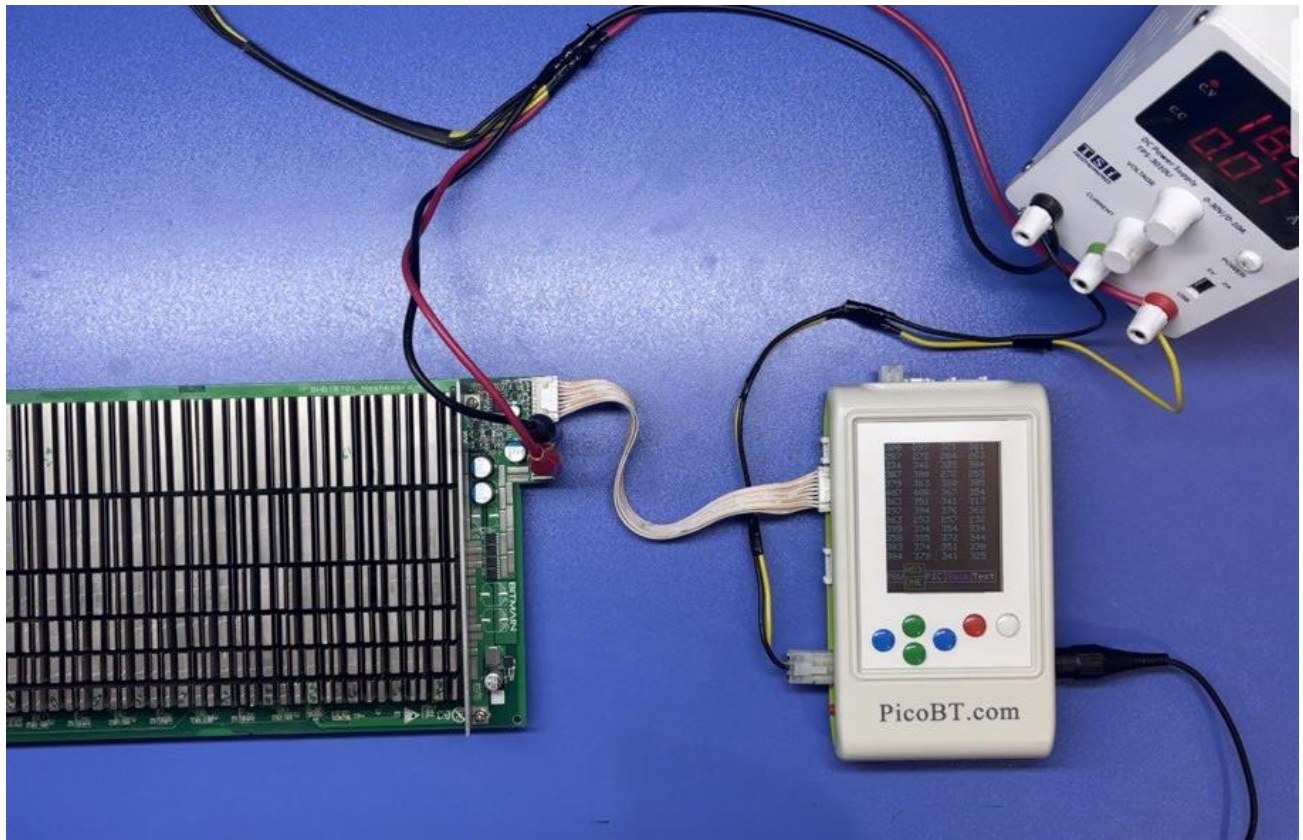
2.1.5 Antminer test example 3

Selected hashboard: T17e

Testing mode: Mode3 (showing domain voltges)

Test number: ONE

Input voltage is 17 volt



values for Domain 1

300	297	321	301
287	272	284	263
334	346	323	304
307	300	272	253
379	383	320	305
407	408	367	354
363	351	341	317
397	394	376	362
263	253	257	232
399	394	354	334
358	355	372	344
383	374	351	330
384	379	341	325

values for Domain 10

PSU MD3 ONE PIC Back Test

2.2 Whatsminer hashboards

For example, we want to select M21. Once you selected M21 option from [select hashboard page](#) (Figure 6), press the white key to enter in the [M21 analyzer page](#) (figure 13).

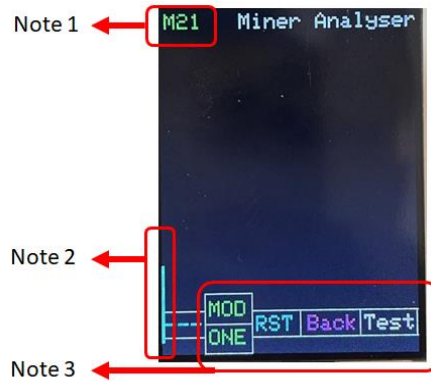


Figure 13: [M21 analyzer page](#)

Note 1: in figure 13, the name of the selected hashboard (now is M21) will be displayed here

Note 2: in figure 13, the narrow blue line appeared in the screen, indicates what connector of the tester must be used to connect to the selected hashboard (here is M21).

Note 3: in figure 13, you can see how different keys work.

in figure 13, you can see how different keys work as bellow: (for example we want to test M21 hashboard)

MOD you can select the mode of testing by pressing **MOD** button. For example, M21 has 2 testing modes: Mode1 and Mode2. (Please refer to figure 17 to know what each mode does for each selected hashboard)

ONE if you toggle this button, it changes to **999**. This means how many times you want to test the hashboard. Once or 999 times repetitively.

RST if you toggle this button, it changes to **RST**. This causes the *reset signal* across the entire hashboard to change from 0 to 1.8 volts. With this option alone, you can test healthiness of the RST signal for all the chips in the hashboard.

Back you can go back to [select hashboard page](#), if you press (hold) **Back** button.

TEST after you adjust **MOD** and **ONE** options, you can test the hashboard by pressing **TEST** button.

Figure 14 shows an example of toggled keys on the screen of the tester.

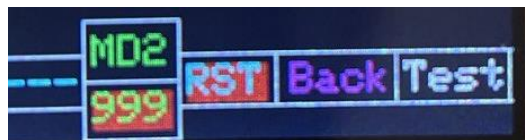


Figure 14: an example of toggled keys on the screen of the tester.

After you tested the hashboard, you will see the test result on the screen. (Figure 15)

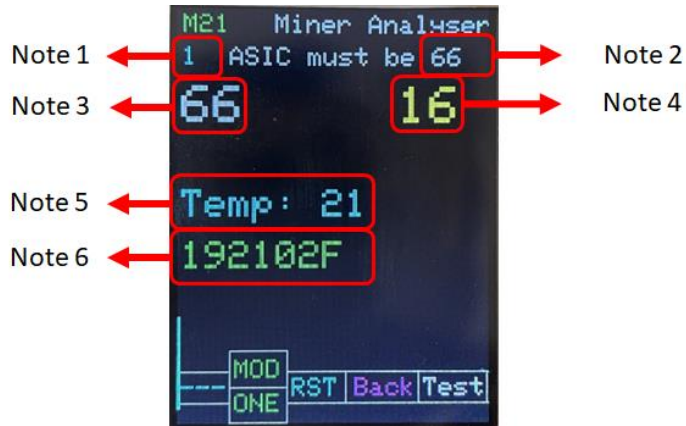


Figure 15: the test result of M21 hashboard with condition (Mode1, 1 time test)

Note 1: in figure 15, this number indicates how many times the tester, tested this hashboard.

Note 2: in figure 15, This number shows how many chips the selected hashboard should have if it is healthy.

Note 3: in figure 15, This number shows how many healthy chips have been detected by the tester from the first ASIC to the front.

Note 4: in figure 15, This number shows how many healthy chips have been detected by the scope from last ASIC to the test point of revers signal of any chip where you connected the scope probe. (You must connect the + pole of scope probe to the RI/RO (Antminers) or TX (Whatsminers) signal of any chip and connect negative of scope to the negative pole of that chip). You can see 2 examples of the reverse signal test points of Whatsminers and Antminers hashboards in figure 16.

Note 5: in figure 15, this number indicates the value of the temperature (centigrade) sensor on the hashboard.

Note 6: in figure 15, this section shows chip model number from EEPROM on the hashboard.

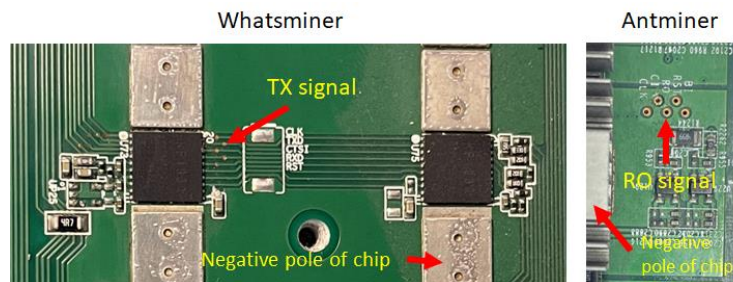


Figure 16: example of the reverse signal test points of Whatsminer and Antminer hashboards

2.2.1 Test modes for whatminer hashboards

PicoBT tester has different test modes for each whatminer hashboard. Figure 17, shows these test modes.

Note: hashboards with **KF1950** chip, can just be tested with M31 option on the tester.

Option	Supported Hashboards	Modes
M3	M3v1, M3v2	ASIC Test, Temp Sensor Test
M20	M20, M20s, (hashboards with KF1920, KF1921, KF1922 chip)	Mode1, Mode2
M21	M21, M21s, (hashboards with KF1920, KF1921, KF1922 chip)	Mode1, Mode2
M30	M30s, M30s+, M30s++, (hashboards with KF1930 chip)	Mode1, Mode2
M31	M31s, M31s+, (hashboards with KF1950 chip)	Mode1
M32	M32, M32s, (hashboards with KF1930 chip)	Mode1, Mode2

Mode1:

- 1) ASIC test (in forward direction)
- 2) ASIC test (in reverse direction) using scope probe
- 3) Showing chips model in EEPROM
- 4) Showing external temp sensor value

Mode2:

- 1) Testing READ CHIPS MODEL command for chips (KF1921, KF1921, KF1922, KF1930)

Figure 17, test modes for whatsmineer hashboards



Figure 18, testing READ CHIP MODEL command for whatsmineer hashboards (MODE2)

2.2.2 acceptable input voltages

Please note that acceptable input voltages for whatsmineer hashboards are as figure 18.

Input voltages	hashboards
12 - 12.5	M3
13 - 13.5	M20, M20s, M21, M21s, M30s, M30s+, M30s++, M32, M32s
11 - 11.5	M31s, M31s+,

Figure 18, acceptable input voltages for whatsmineer hashboards

2.3 Innosilicon hashboards

For example, we want to select T2Tz. Once you selected T2Tz option from [select hashboard page](#) (Figure 6), press the white key to enter in the [T2Tz analyzer page](#) (figure 19).



Figure 19: T2Tz analyzer page

Note 1: in figure 19, the name of the selected hashboard (now is T2Tz) will be displayed here

Note 2: in figure 19, the narrow blue line appeared in the screen, indicates what connector of the tester must be used to connect to the selected hashboard (here is T2Tz).

Note 3: in figure 19, you can see how different keys work.

in figure 19, you can see how different keys work as bellow: (for example we want to test T2Tz hashboard)

MOD you can select the mode of testing by pressing **MOD** button. For example, T2Tz has 3 testing modes: Mode1, Mode2 and Mode3. (Please refer to Figure 23 to know what each mode does for each selected hashboard)

ONE if you toggle this button, it changes to **999**. This means how many times you want to test the hashboard. Once or 999 times repetitively.

PSU you can enable the T2Tz PSU (19v), by pressing **PSU** button. (You must had connected the PSU data cable between the tester and the PSU)

Back you can go back to [select hashboard page](#), if you press (hold) **Back** button.

TEST after you adjust **MOD** and **ONE** options, you can test the hashboard by pressing **TEST** button.

If you choose **Mode1**, after you tested the hashboard, you will see the test result on the screen. (Figure 20)



Figure 20: the test result of T2Tz hashboard with condition (Mode1)

Note 1: in figure 20, this number indicates how many times the tester, tested this hashboard.

Note 2: in figure 20, this number shows how many chips the selected hashboard should have if it is healthy.

Note 3: in figure 20, this number shows how many healthy chips have been detected by the tester.

Note 4: in figure 20, this this is number shows the exact number of WEAK chips.

Note 5: in figure 20, this number shows the exact number of BROKEN chips.

If you choose **Mode2**, after you tested the hashboard, you will see the test result on the screen. (Figure 21)

Note: in Mode2 you can see the temperatures of each chip.

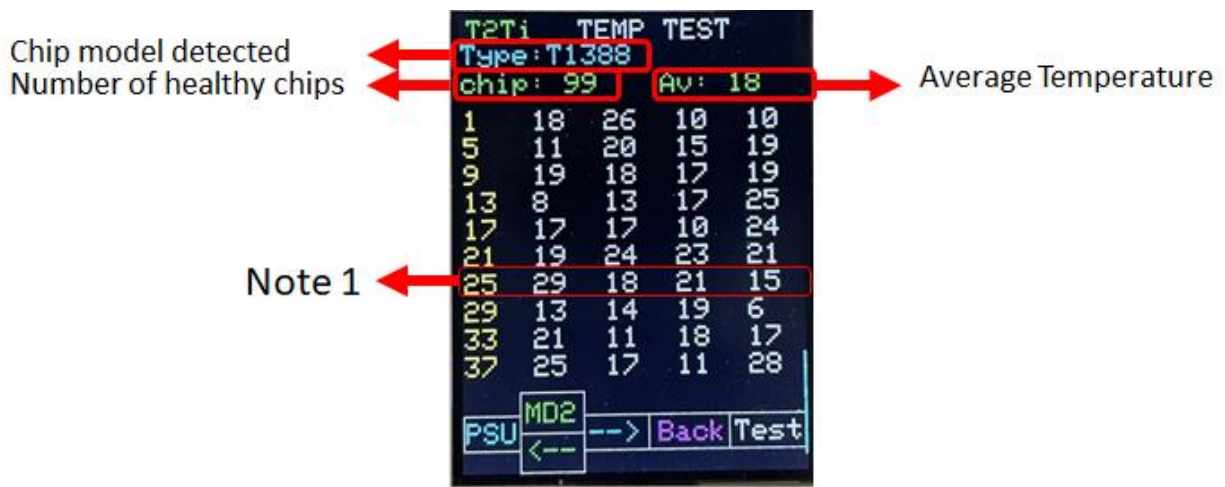


Figure 21: the TEMP test result of T2Tz hashboard with condition (Mode2)

The temperature of all chips for T2Ti hashboard are shown in Figure 21. You can see chip model detected, number of healthy chips, average temperature and also the temperature of each chip in the result.

Note1: in figure 22 you can read the temperature of each chip as bellow:

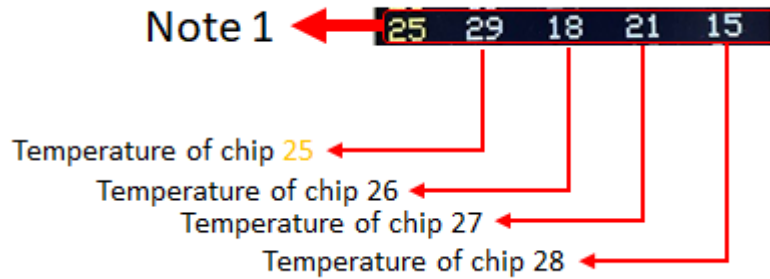


Figure 21: how to read the temperature of each chip on the screen (Mode2)

If you choose **Mode3**, after you tested the hashboard, you will see the test result on the screen. (Figure 22)

note: if you test the hashboard in MODE3, in addition to capability to choose the level of testing accuracy, you will see 4 numbers in the left column of the screen that show you how many chips are determined in these categories (chip models).

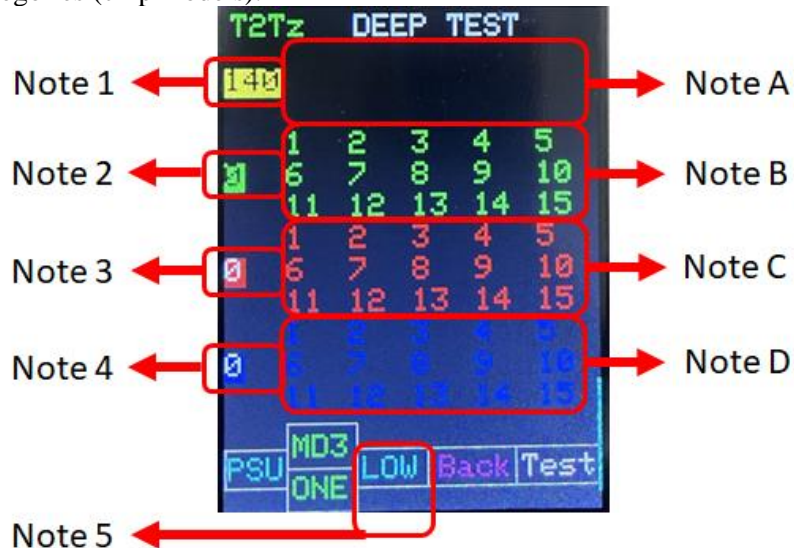


Figure 22: the test result of T2Tz hashboard with condition (Mode3)

Note 1: in figure 22, this number indicates how many are determined in category (chip model 1)

Note 2: in figure 22, this number indicates how many are determined in category (chip model 2)

Note 3: in figure 22, this number indicates how many are determined in category (chip model 3)

Note 4: in figure 22, this number indicates how many are determined in category (chip model 4)

Note 5: in figure 22, by pressing the right blue key, you can select the accuracy level of testing of the hashboard. This 5-level are: **LOW**, **MED**, **NOR**, **HIH**, **FUL**

Note A: in figure 22, the numbers in this section are the (first 15 number of) broken chips if chips are determined as chip model 1.

Note B: in figure 22, the numbers in this section are the (first 15 number of) broken chips if chips are determined as chip model 2.

Note C: in figure 22, the numbers in this section are the (first 15 number of) broken chips if chips are determined as chip model 3.

Note D: in figure 22, the numbers in this section are the (first 15 number of) broken chips if chips are determined as chip model 4.

2.2.2 Test modes for Innosilicon hashboards

PicoBT tester has different test modes for each innosilicon hashboard. Figure 23, shows these test modes.

Option	Supported Hashboards	Modes
T2T	T2T turbo (93 ASIC)	Mode1, Mode2, Mode3
T2Ti	T2Ti (99 ASIC)	Mode1, Mode2, Mode3
T2Ts	T2Ts (105 ASIC)	Mode1, Mode2, Mode3
T2Tz	T2Tz, T2Tzs, T2Tzu, T2Tza (140 ASIC)	Mode1, Mode2, Mode3
T2T+	T2Ts (164 ASIC)	Mode1, Mode2, Mode3
T2Th+	T2Th+, T2Ths+, T2Thm+, T2Thf+, T2Thl+ (140 ASIC)	Mode1, Mode2, Mode3
T2Th	T2Th, T2Ths (140 ASIC)	Mode1, Mode2, Mode3
T2Thm	T2Thm (140 ASIC)	Mode1, Mode2, Mode3
T2Thf	T2Thf, T1H (140 ASIC)	Mode1, Mode2, Mode3
A1/F1	A1, F1, S5	Mode1, Mode2, Mode3
A4	A4, A4+	Mode1, Mode2, Mode3
A6	A6, A6+	Mode1, Mode2, Mode3
T1	Innosilicon, Dragon, lovecore, Aladdin	Mode1, Mode2, Mode3
T2	T2	Mode1, Mode2, Mode3
T3	T3, S3, T3H	Mode1, Mode2
Q3	Q3	Mode1, Mode2, Mode3
L2	L1, L2, L2HU, L2HF, L2HL, L2HS	Mode1, Mode2, Mode3
T3+	T3+, S3+	Mode1, Mode2

Mode1: ASIC test, detecting WEAK chips

Mode2: Temp value of chips

Mode3: showing chips model

Figure 23: test modes for Innosilicon hashboards

2.3.2 acceptable input voltages

Please note that acceptable input voltages for innosilicon hashboards are as figure 24.

Input voltages	hashboards
12	T1
15	T2, T3, T3+, S3, S3+, T3H, A4, A4+, A6, A6+,T2T, T2T+, T2Ti, T2Ts, T2Tz, T2Tzs, T2Tzu, T2Tza, T2Th,T2Ths, T2Thm, T2Thf, T2Th+, T2Ths+, T2Thm+, T2Thf+,T2Thl+ , L1, L2, L2HU, L2HF, L2HL, L2HS, T1H
15	A1, Q3, F1, S5

Figure 24: acceptable input voltages for Innosilicon hashboards

3. PSU Tester

To enter the PSU tester mode, First connect input voltage cable to the tester (On/Off switch must be Off). Turn on the switch while you are holding the **white** key for 2 seconds. You will see a new page on the lcd as bellow (Figure 25)

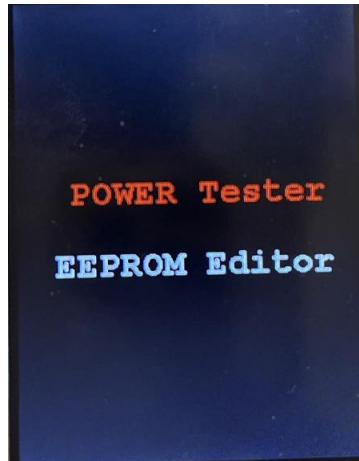


Figure 25: choose PSU tester or EEPROM editor

Now press the **red** key to enter on PSU Tester. You will see the Power Tester page as bellow (figure 26):

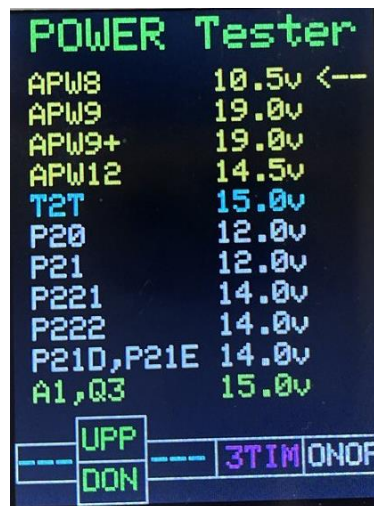


Figure 26: POWER TESTER page

In figure 26 you can select the desired PSU by pressing green keys. After you selected the PSU, you can press the white key to turn on and off the PSU. Also, you can press **3TIM** key to turning on and off 3 time repetitively every 2 seconds.

Note: you can enable all innosilicon PSU's by selecting “**T2T 15.0v**” option.

4. EEPROM Editor

Copy, flash and save EEPROM contents for Whatsminers and Antminers – you can save 4 EEPROM data in PicoBT tester permanently.

To enter the EEPROM Editor, First connect input voltage cable to the tester (On/Off switch must be Off). Turn on the switch while you are holding the **white** key for 2 seconds. You will see a new page on the lcd as bellow (Figure 27)

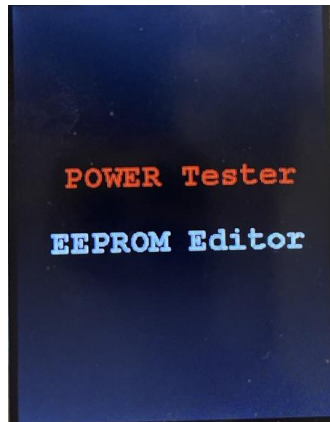


Figure 27: choose PSU tester or EEPROM editor

Now press the **white** key to enter on EEPROM Editor. You will see the EEPROM Editor page as bellow (figure 28):

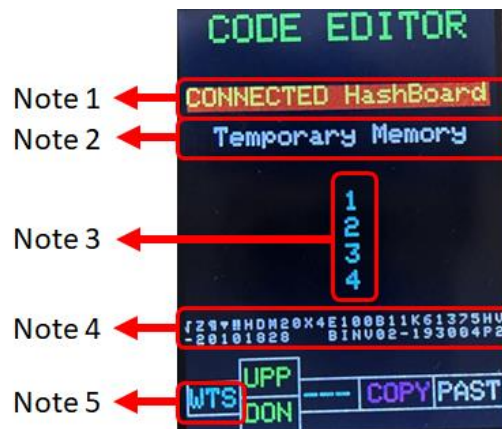


Figure 28: EEPROM editor page

Note 1: in figure 28, if you select **CONNECTED HASHBOARD**, you can copy or program (paste) data to the hashboard that connected to the tester.

Note 2: in figure 28, any data that you copy from the hashboard or 4 permanent memories on the tester, will be temporary saved on **Temporary Memory**.

Note 3: in figure 28, there are 4 permanent memories on the tester that you can save 4 EEPROM data in these memories.

Note 4: in figure 28, any data that you copy from any option, will be shown here.

Note 5: in figure 28. you should choose **WTS** or **BIT** option by pressing this blue key. If the hashboard is Whatsminer, select **WTS**, if the hashboard is Antminer select **BIT**.

You can select the memories by pressing the green keys on the tester.

You can copy the content of any selected memory by pressing the red key on the tester.

You can past the content of any selected memory by pressing the white key on the tester.

5. Update the Tester

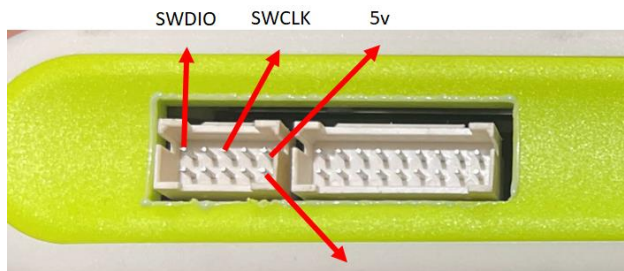
How to UPDATE the tester?

1- Turn off the tester. Turn on the switch while you are holding the RED key for 2 seconds. You will see a screen like as bellow:



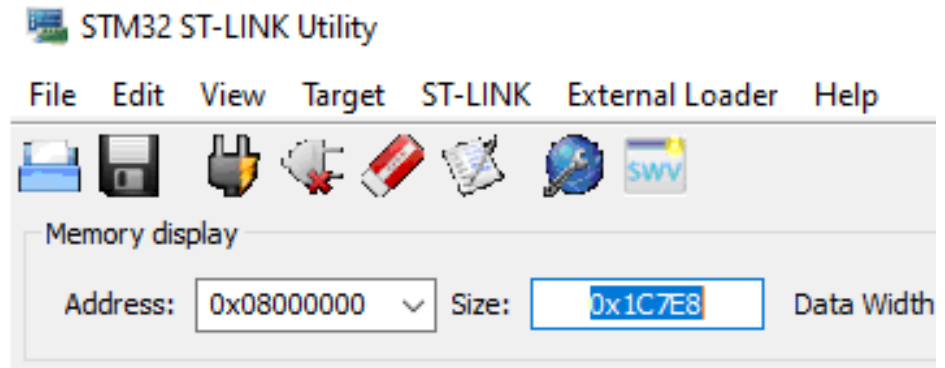
2- Send the ID of the tester (12 digital numbers) to picobt.com@gmail.com and ask the latest firmware. You will get a new HEX file after 2 days as the last firmware for your tester.

3- using a 2*5 PHB2.0 cable, connect (5v - GND - SWDIO - SWCLK) pins of the tester to the ST-LINK V2 Programmer.

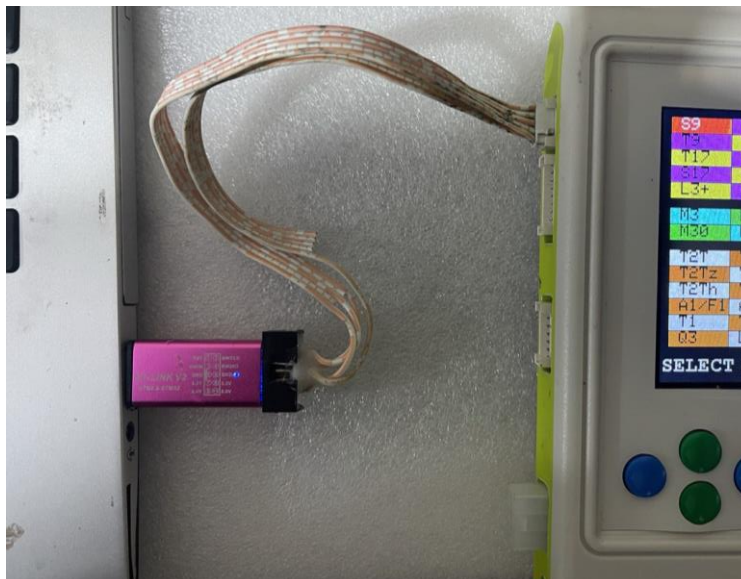



4- download STM32 ST-LINK Utility and setup that on your PC.


5- ...




5- connect the made programmer to the tester and PC. (No other cables must be connected to the tester) as below:



6- press icon  to connect to the tester

7- press icon  to save your old firmware (with Hex format)

8- press icon  to load your new firmware (with Hex format)

9- press icon  to programming