Description

MS-PRG-N1 is the bridge between computer and driver. The signal is transmitted by electromagnetic induction coupling mode of the wireless frequency part of the spectrum, and the data transmission can be completed without power on, and to realize the LED driver parameter configuration. The driver can be configured directly without power on, bring great convenience and cost saving to production, make driver programming easier.

Product Features

- Operating Voltage: USB 5VDC;
- RF Compatible: ISO15693；
- RF Output Power: Up to 1.4W (Max)；
- Wireless frequency: 13.56MHz;
- Reading and Writing Distance: Within 30 mm；
- IP20;
- 1 year warranty.

Application

Suitable for LED drivers with NFC function to be programmed by wireless NFC (U5, U6, U7, etc.), also suitable for current setting (X6E D, X7 A, etc.).

Connection Diagram

(Note: During configuration, the LED driver does not need to be turned on. The programmer's coil area must be close to the LED driver's NFC coil position, and the distance is less than 30 mm).

Program instructions

1. Connect to LED driver

Before the user prepares to program, please ensure that Configurer Tool and the driver software corresponding to NFC programmer have been correctly installed on the computer.

Login the Configurer Tool, which automatically scans the connected NFC Programmer, shows like “NFC0” in Figure 1.

Figure 1

Place the driver with the NFC programming function close to the NFC Programmer coil (at the NFC label, <10mm).

The Configurer Tool automatically reads the driver’s model (type) that is in close proximity, as the red box 1 shown in Figure 2 below and red box 2 shows the firmware revision and mode:

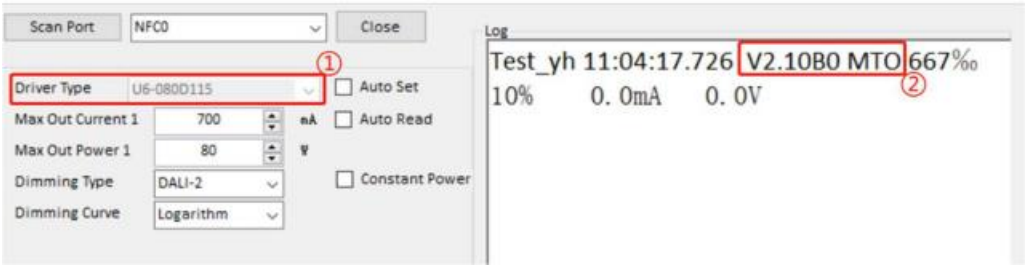

Figure 2

2. Description of Configurer Tool’s Main Interface:

(1) **“Driver Type”** bar in the Configurer is the present driver’s model, cannot be changed, it has been set before leaving our factory.

(2) **“Max Out Current 1”** The maximum output current can be set according to actual needs.

(Note: The adjustable range of current is 10%Iomax ~ 100%Iomax).

(3) **“Max Out Power 1”** set, set the maximum output power, ensure that the driver does not exceed this set Max power. If the output voltage is high resulting in the output power exceeding the set value, the output current will be decrease so that it does not exceed the set maximum power.

(4) **“Constant Power”** ensures that the output power of the LED driver is constant during the dimming process. (For example, when the user change an 80W-driver into 60W maximum output by the "Max Out Power 1" function, and sets the dimming ratio to 50%, the output power of the driver will be 30W instead of 40W.)

(5) **"Dimming Type"** has three options: DALI-2 dimming; Timing dimming; Timing_ DALI-2 dimming.

(6) After the above parameters are set, click on the **"Auto Set"** button for the batch programming.

(7) To read the parameters set inside the driver, users may click the "**Auto Read**" button to realize the function of automatically reading configured data of drivers within 6s (Programmer read data once every six seconds).

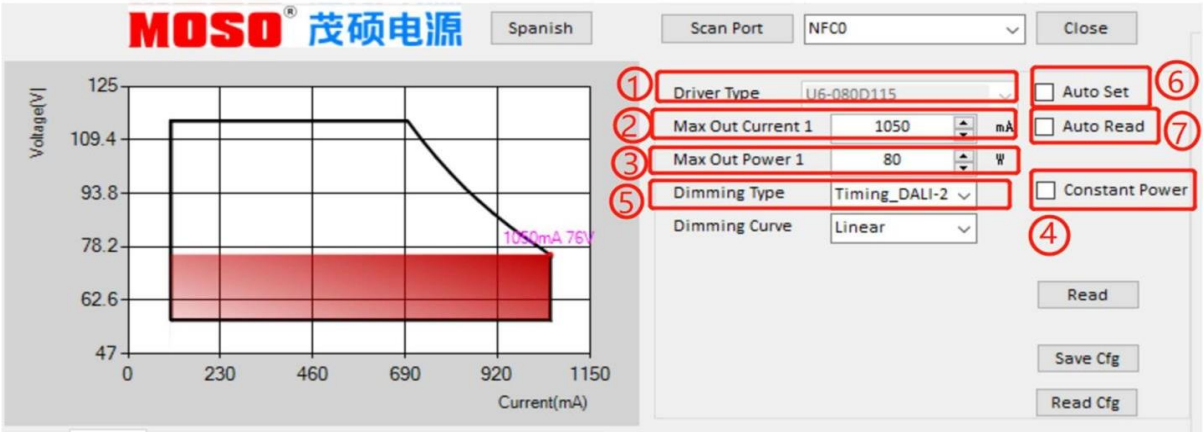

Figure 3

3. Generating the Configuration File

Place the driver with the NFC programming function close to the NFC Programmer coil (at the NFC label).

The Configurer Tool automatically reads the driver's model (type) that is in close proximity, as the red box 1 shown in Figure 4 below and red box 2 shows the firmware revision and mode:

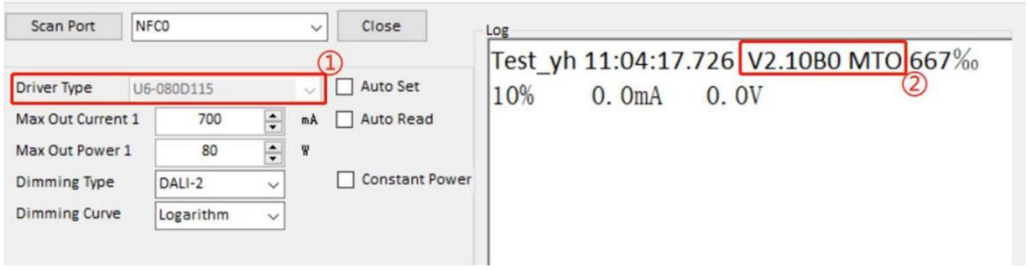

Figure 4

Set all the functions that users want to change or use (including setting current, output power, selecting dimming mode, enabling OTP function, etc.) Next, please click the "Save Cfg" button to save the configuration file as U6- 080D115. Cfg. This means that all the configuration files of U6-080D115 set by the user will be saved. Programming different drivers will have different file names.

Figure 5

4. Download the configuration file to the NFC tag of the driver

Click the “Read Cfg” button to read the configuration file U6-080D115. Cfg.

(Please check whether Auto Set is selected) Close the driver to the NFC Programmer. The Configurer Tool scans the driver and prompts “Reading and writing, please wait”.

The Configurer Tool automatically writes the set parameters together with the MTO into the NFC tag of the driver.

Note: DO NOT REMOVE the driver or NFC card Programmer at this time

If the writing succeeds, the software interface will prompt the operation result with green text, as shown in Figure 6 below:

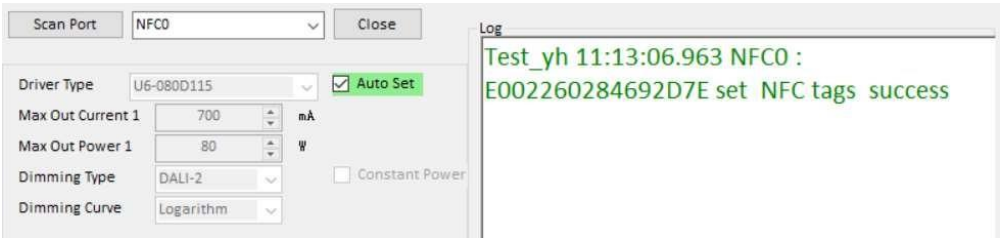

Figure 6

If fails, the software interface will display the operation result in red text, as shown in Figure 7:

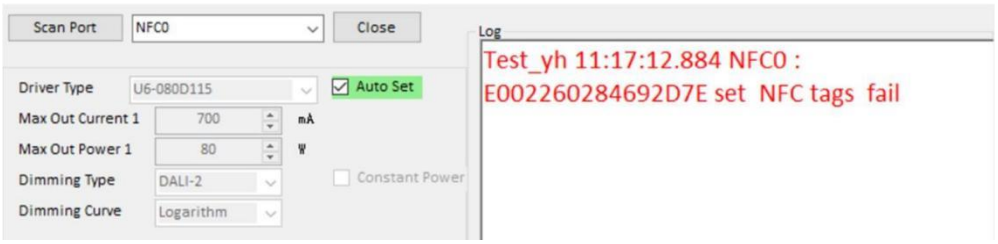

Figure 7

After the display fails, remove the driver from the coil area of the Programmer, and repeat above steps.

5. Checking Programming Success or not

First, please power on the configured driver. Then, the MCU of driver reads what was written into NFC tag.

The MCU of the driver will write the setting parameters, driver firmware version, USER and other information back to the NFC tag, overwriting the previous content.

Power off the driver and use the Configurer Tool to read the content of the NFC tag in the driver. User please check whether the parameters are consistent, and whether the MTO in the log interface changes to USER.

If MTO is found in the prompt string, the MCU of driver does not read the NFC setting parameters, and the NFC programming fails;

6. How to set dimming

If USER is found in the prompt string and all parameters are the same as the configuration parameters user set just now, it means NFC programming is successful.

Dimming types include DALI-2 dimming and Timing dimming. Logarithmic curve and linear curve can be selected for different dimming types. Logarithmic curve will be automatically selected by default when switching to DALI-2 dimming, while the linear one will be selected for Timing dimming.

(Note: When DALI-2 dimming is selected, the Timing dimming function will **not** be accessible.

While the Timing dimming is selected, the DALI-2 dimming function will **not** be accessible.)

6.1 Timing Dimming

After selecting "Timing Dimming", you can set relevant parameters within four Timing Dimming settings (Timing, Virtual Midnight, Self-Adaption, Customizations) according to your actual needs.

First, after reading the model, we need to select Dimming Type, and we can select Timming-DALI-2 mode.

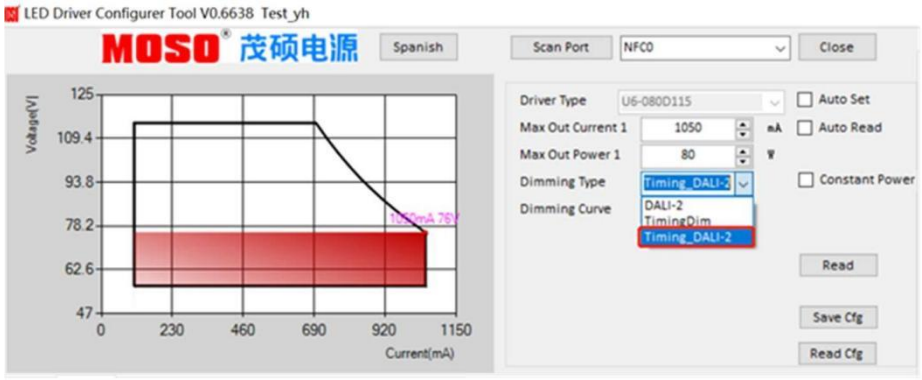

Figure 8

Special examples: Follow the principle of “the latter first” in this mode. If the user uses DALI-2 dimming to change the dimming value when using the Timing Dimming function, the driver will give priority to running the DALI-2 dimming function, but the timer of Timing Dimming keeps counting. If DALI signal is still present, DALI-2 dimming will always be run. When there is no DALI signal, the driver will switch back to Timing Dimming when the timer enters the next step; after using DALI-2 dimming, if the user uses the functions of the Timing Dimming, the driver will give priority to running the Timing Dimming function after the shutdown and restart.

Then select dimming curve. We need to select linear curve (Our software will automatically select the linear curve for Timing Dimming by default, which is the optimal dimming curve we recommend for Timing Dimming).

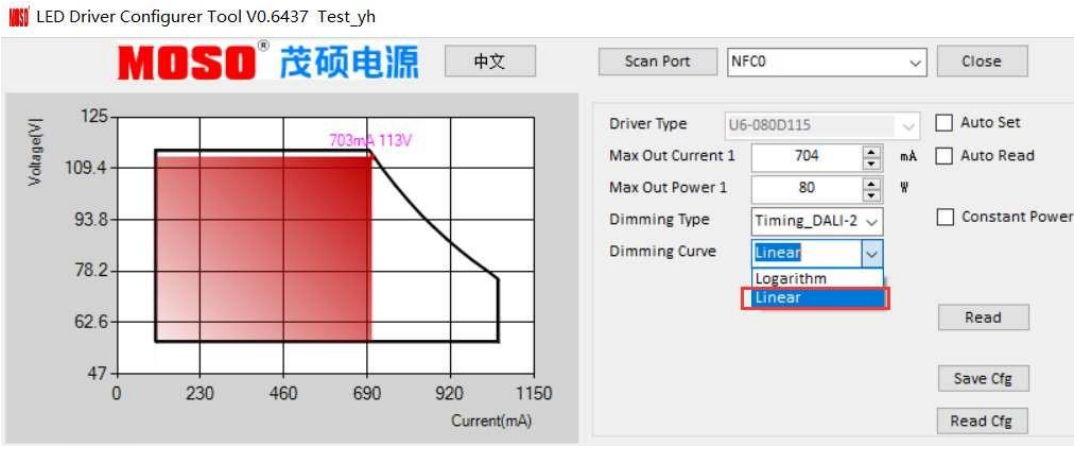

Figure 9

6.1.1 Timing Interface

For example: we set the parameters as shown in Figure 10.

Timer 1:	17:00
Timer 2:	19:00
Timer 3:	21:00
Timer 4:	00:00
Timer 5:	03:00
Timer 6:	05:00
Timer 7:	07:00

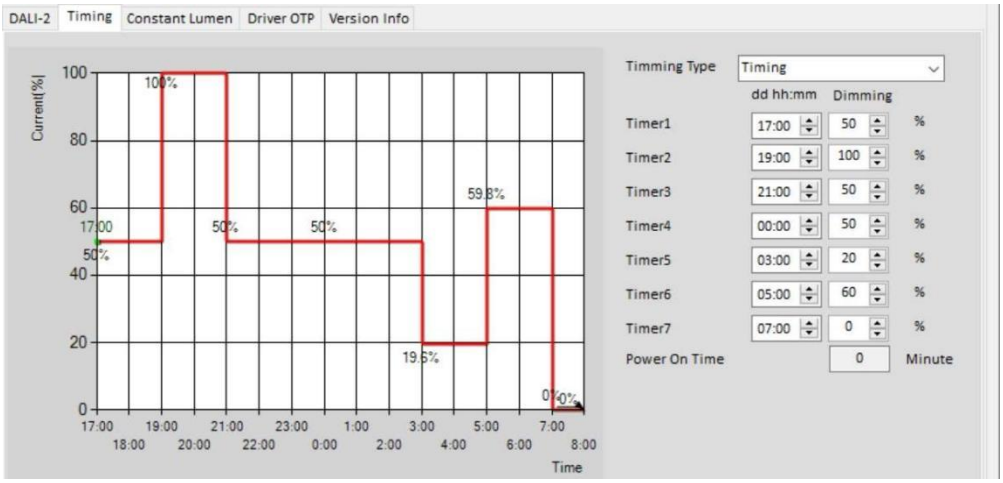

Figure 10

The output current of the drive will drop to 50% of **"Max Out Current 1"** at the moment of power on (Timer1). After two hours (Timer2), the current will become 100% of the **"Max Out Current 1"**.

After two hours (Timer3), the drive current will become 50% of the **"Max Out Current 1"**. After

three hours (Timer4), the current will become 40% of the **"Max Out Current 1"**.

After three hours (Timer5), the current will become 20% of the **"Max Out Current 1"**.

After two hours (Timer6), the current will become 60% of the **"Max Out Current 1".** And

two hours later (Timer7), the current will become 0% of the **"Max Out Current1"**.

NOTE: The time we set is just for you to understand the usage of this function. When the program starts to run depends on when the driver starts to power on.

6.1.2 Virtual Midnight

First of all, according to the parameter settings in the Figure 11.

Timer 1:	19:00
Timer 2:	20:00
Timer 3:	22:00
Timer 4:	00:00 (Midnight point)
Timer 5:	02:00
Timer 6:	04:00
Timer 7:	05:00

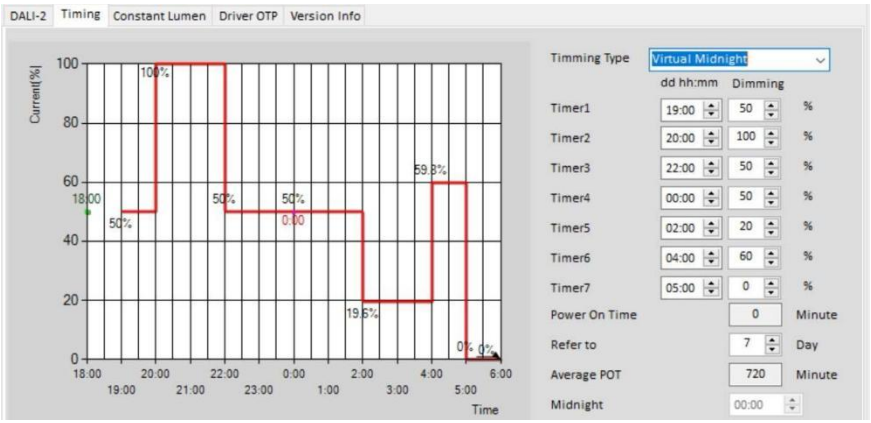

Figure 11

Because the set working hours are 10 hours, it can be calculated that the midnight point is the fifth hour, and at the same time, the software will collect the average working time of 7 days (The basis of explanation is when the reference days are set to 7 days)). If the average working hours of 7 days is 12 hours, therefore, the daily working hours will be increased by one hour((12-10)/2) each day at **Timer1** and **Timer7**. According to the calculated average time, increase or decrease the front end and rear end of the timing curve of the driver.

The actual working hours will be automatically adjusted as follows:

Timer 1:	18:00
Timer 2:	20:00
Timer 3:	22:00
Timer 4:	00:00 (Midnight point)
Timer 5:	02:00
Timer 6:	04:00

Timer 7:	06:00

NOTE: The time of settings is only for your understanding. “18:00” of Timer 1 doesn’t mean the actual 18 o'clock, the program starts to run depends on the time when your driver starts power on.

The customer is not allowed to modify midnight point. Every time the customer inputs the required parameters in the "Virtual Midnight" interface, the software will automatically calculate the total duration of Timer 1-Timer 7. For example: Timer 1 is 19:00(tonight); Timer 7 is 09:00 (next morning), the software automatically calculates the midnight point as 02:00 and locks the midpoint to run the virtual midnight function according to this value.

When the driver is used for the first time, there is no working data stored inside the driver. When the reference time is set to how many days, the driver will first run the corresponding days to set the parameters of this program.

(We strongly recommend that customers use the reference day function according to this idea, because the error is minimal. For detailed explanation, please refer to 6.1.4.)

6.1.3 Self-Adaption

For example, we set the parameters like the Figure 12 below:

Timer 1:	21:00
Timer 2:	22:00
Timer 3:	23:00
Timer 4:	00:00
Timer 5:	01:00
Timer 6:	02:00
Timer 7:	03:00

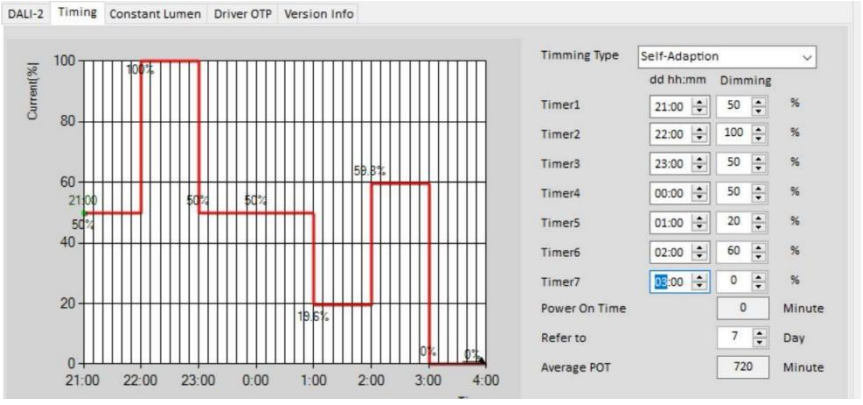

Figure 12

This function is used to adapt to the situation that the night time varies with the seasons. The setting parameters of Timing Dimming also change accordingly. To use this function, you need to set the parameters in "Timing Dimming", and the software will calculate the night time length of tonight according to the night time length of the previous days (reference days).

When the software obtains that the average working time of 7 days is 720 minutes (12 hours), because the total working time we set is 6 hours for each day, and 12÷6=2, the time interval will be 2 times longer than the previously set time.

The driver's actual working time will be change according to the following 7 timers:

Timer 1:	18:00
Timer 2:	20:00
Timer 3:	22:00
Timer 4:	00:00
Timer 5:	02:00
Timer 6:	04:00
Timer 7:	06:00

Refer to: Total duration of sam 

6.1.4 Customizations

Customizations (as shown in Figure 13) is a new dimming setting designed when the above three dimming setting cannot achieve the customers' requirements. If customers want to use this function normally, they need to set the CSV file (as shown in Figure 13) and import correctly.

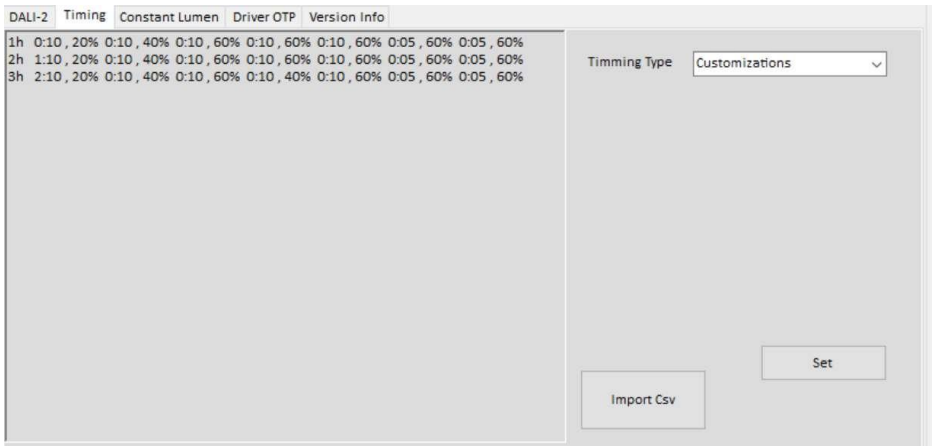

Figure 13

Note: Customizations can only be used when the driver writes the latest bottom layer. This function cannot be used in versions before February 2023.

Customer need to open an Excel table and write it in the correct format and save it in the format of. CSV file (as

shown in Figure 14)

allhour	t1	p1	t2	p2	t3	p3	t4	p4	t5	p5	t6	p6	t7	p7
1	0:10	20	0:10	40	0:10	60	0:10	60	0:10	60	0:05	60	0:05	60
2	1:10	20	0:10	40	0:10	60	0:10	60	0:10	60	0:05	60	0:05	60
3	2:10	20	0:10	40	0:10	60	0:10	40	0:10	60	0:05	60	0:05	60

Figure 14

All hour: Total working duration of each mode (Customers can set up to 10 modes to run this function).

T1-T7: Timer1-Timer7 (Customer can set at least one timer and at most seven timers).

P1-P7: Indicates the dimming value corresponding to Timer1- Timer7 (0≤ P≤ 100)

6.1.5 Note:

① All hour must ≤ 24Hrs (If the All hour is set to 25 hours, an error will appear as shown in Figure 15).

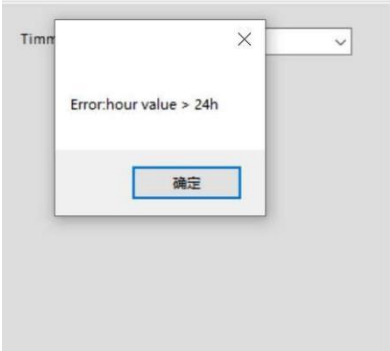

Figure 15

② When using multiple modes, the time sequence of the first column must follow the principle of "from small to large" (e.g. 1-2-3...8), not from "large to small" (e.g. 3-2-1), and the time length of All hour must be equal to the sum of the seven timers (All hour=T1+T2+T3+T4+T5+T6+T7), and the format must be correct. When the customer does not follow the above three points, the software will prompt the following error (see Figure 16).

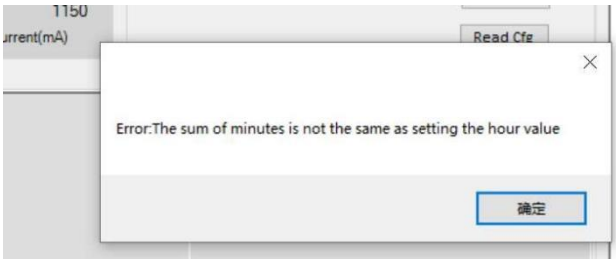

Figure 16

③ CSV file must be closed before importing, otherwise the following error will be prompted.

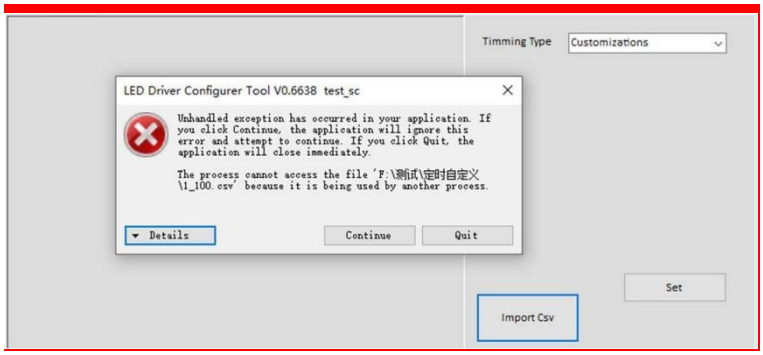

Figure 17

After editing the CSV file in the correct format, click the Import Csv button to import the CSV file. When the C interface can present the parameters you just set, the import is successful.

Set the operation results as shown in Figure 18:

The first mode (All Hour: 1h) will be triggered when the driver samples for 1 hour in the previous day. Complete the operation of Timer1-Timer7 according to the 1-hour mode in the first hour when power-on on the second day. If the driver continues to power on for up to two hours after one hour of operation on the second day, the driver will trigger the 2-hour working mode (All Hour: 2h), and the driver will operate according to the 2-hour working mode in the first two hours of the third day. If the driver continues to power on for up to three hours after two hours of operation, the driver will trigger the 3-hour working mode (All Hour: 3h). On the third day, the 3-hour working mode will be run in the first three hours, and so on. In the future, when the driver runs to the corresponding time, the driver will trigger the corresponding mode.

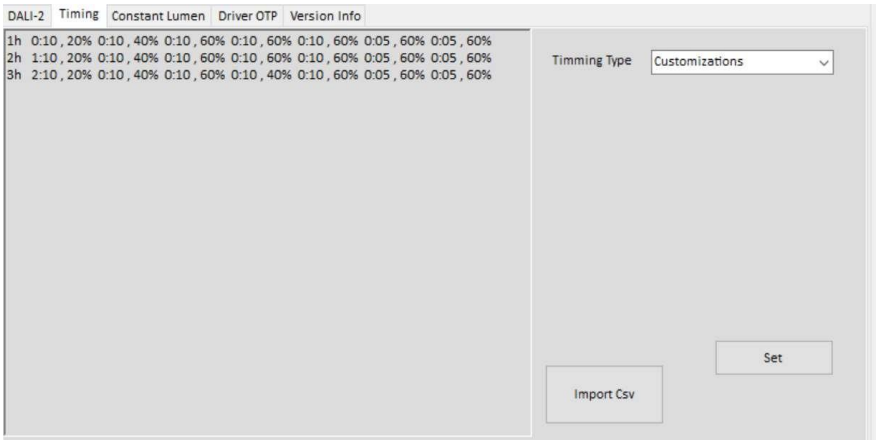

Figure 18

When the working time is within 2-3 hours, less than 2 hours and 30 minutes, driver will trigger the 2-hour working mode, if more than 2 hours and 30 minutes are counted as 3 hours.

Special example: When the working mode has only 2-hour mode and 4-hour mode. Power on time <2 hours and 30

minutes → trigger 2-hour working mode, Power on time >2 hours and 30 minutes → trigger 4-hour working mode. Because this function uses a single-chip timer, the error from the actual time is five minutes.

④ The reference days can be set by yourself. When the driver is used for the first time, a cycle will start to form after the continuous work within reference days.

"Refer to" is a tool to reduce errors. In fact, when you set the Timing Dimming, the driver will immediately start running the Timing Dimming. The reference days are not a tool for activating the Virtual Midnight or Self-Adaption. Just like numerator and denominator, the number of reference days can be regarded as the denominator, and the total working duration as the numerator. When calculating the average working time, the more reference days, the more accurate for the average result calculated, and also for the error will be smaller. The length of the reference days will only affect the driver's error correction speed.

⑤ How to judge a valid reference day:

When the actual power on time of the driver reaches four fifths or more of the set working time, and the driver is powered off, the driver will consider that it has completed the one reference day working cycle.(PS: This explanation of the valid reference day is only applicable to drivers shipped before February 2023.)

The driver judges a valid day basing on: Actual daily on/off hours≥ .cfg file's total setting hours *(4/5). If .cfg file total setting hours(Timer 1~Timer 7) set as 16hrs, while actual run time is as below:

Day 1	Day 2	Day3	Day4	Day5	Day 6	Day 7
13hrs	10hrs	14hrs	9hrs	15hrs	12.5hrs	16hrs
Day 8	Day 9	Day10	Day 11	Day 12	Day 13	Day14
11hrs	8hrs	16hrs	8hrs	18hrs	8hrs	13hrs

Because 16*（4/5）=12.8hrs

≥12.8 hrs =valid working time (valid day)

Refer to: 7 valid days

If the driver works 14 days continuously, when the 15th day begins without manual intervention,

DAY15:=(average hours for 7 valid woking days)

=(Day1+Day3+Day5+Day7+Day10+Day12+Day14)/7=(13+14+15+16+16+18+13)/7 =15hrs

(PS: For those drivers shipped after February 2023, please see the explanation below.)

When the actual power on time of the driver reaches four hours or more(less than 24 hours), and then the driver is powered off, the driver will consider that it has completed one reference day working cycle.

⑥ In the dimming type of Timing_Dali-2, when the driver is running Timing Dimming mode, the DALI dimming control is performed. At this time, the driver's brightness will follow the DALI dimming value and will not change until the next timer is reached, and the remaining timer in Timing Dimming will automatically continue to run.

Let's take Timer 1: 18:00 & Timer 2: 20:00 as the example:

When DALI dimming is performed at any time from 18:00 to 22:00, the driver will follow the DALI dimming value and keep the light unchanged .Until 22:00, when the driver reach the Timer 2, it will immediately switch back to the dimming value set by Timing Dimming.

Note: When the driver reaches timer7, it will execute DALI dimming and output the dimming value according to DALI dimming, and will not switch back to timing dimming.

⑦ When the actual power-on time of the driver is more than 24 hours, the driver will return to Timer1, which is equivalent to a cycle of 24 hours.

The 24 hours are not included in the calculation of sampling time and are invalid.

7. How to Set Constant Lumen Output

As the red box 1 shown in Figure 19 below. Set a current value in the "Max Out Current 1", which must be lower than the maximum current value of 1050mA. After setting the value, user must press the "Enter" key on the keyboard. After

pressing the key, you can see the following two non-overlapping curves on the Configurer interface, and then you can set the CLO function.

The "**Enable**" check box must be checked before the constant lumen function can be used normally. (Red box 2)

As the red box 3 shown in Figure 19, Press "Default" button. The optimal setting for the curve of CLO function we recommend will appear. Of course, if you want to set the CLO according to your own needs, you can also enter the value where the red box 4 located.

Then, press "**Auto Set**" button (red box 5) write all parameters to NFC tag.

Follow the red box 6 and press "Read" button to read the constant Lumen parameters on MCU through Configurer. After reading, when the curve set in the corresponding percentage column appears in the Configurer interface curve, it means that the setting is correct.

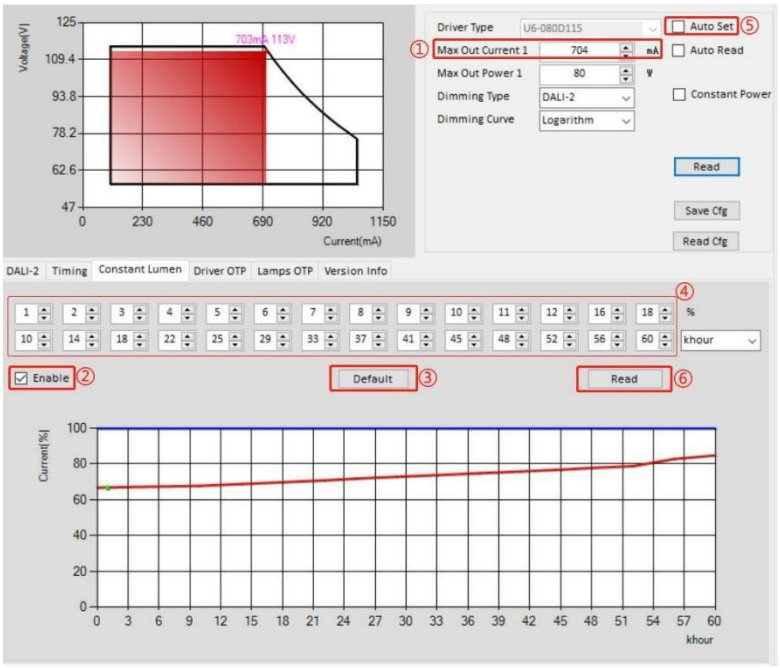

Figure 19

NOTE: The minute option bar is only for test verification. After running this function to verify that constant lumen can be used normally, power off the driver and reread the drive's data. After finding that this option bar changes to hour display, don't worry. This function is normal. The minute option is only for test use. After the test is completed, the default hour option will be restored.

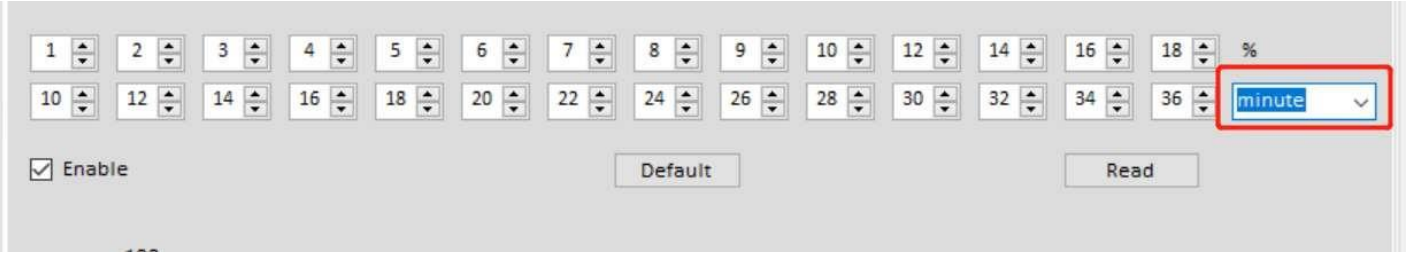

Figure 20

Calculate the current dimming value according to the following formula,

Val = (254-Voor) * (T-Ts) / (Te - Ts) + Voor

Val is the current dimming value,

Voor is the corresponding dimming value of the OTP out Ratio, the OTP Out Ratio is the percentage of the maximum output current.

Te is the end derating temperature, End Derating Ts is start derating temperature, Start Derating T is the current temperature

8. How to Set Lamps OTP

As “the red box 1”shown in Figure 21 below. User can set the target value in the “**Start Derating**”, “**End Derating**”, “**OTP Out Ratio**” (Other parameters can be set based on actual needs).

The “**Lamps OTP**” check box must be checked to make sure that the Lamps OTP function can be used normally. (Red box 2)Then, press “**Auto Set**” button (red box 3) write all parameters to NFC tag.

Power on the driver and wait five seconds before powering it off (This is to ensure that the data edited by the NFC programmer is successfully written into the MCU of drivers.).The “Read” button located in main interface (red box 5) is to read all parameters written into the MCU through NFC programmer.

The “Read” button located in “Lamps OTP” interface (red box 6) read only the Lamps OTP parameters from MCU. Only what Configurer read out is exactly the parameter the user set before, it means that the OTP function has been set successfully.

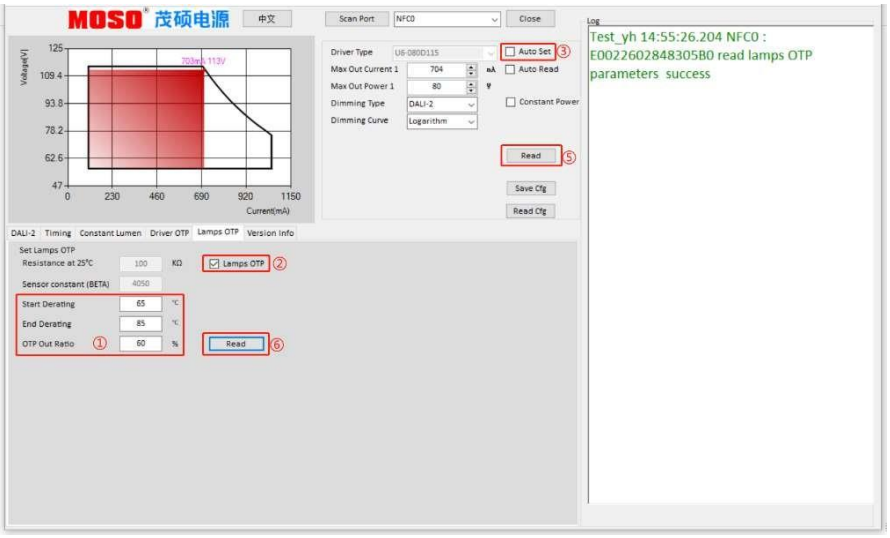

Figure 21

Note: NTC resistance at 25℃ recommended value 100KΩ, Sensor constant (BETA) value 4050.NTC resistance can be selected by customers, but we still recommend the use of 100k Ω thermistors, because the error between the use of 100k Ω thermistors and the actual temperature is the smallest.

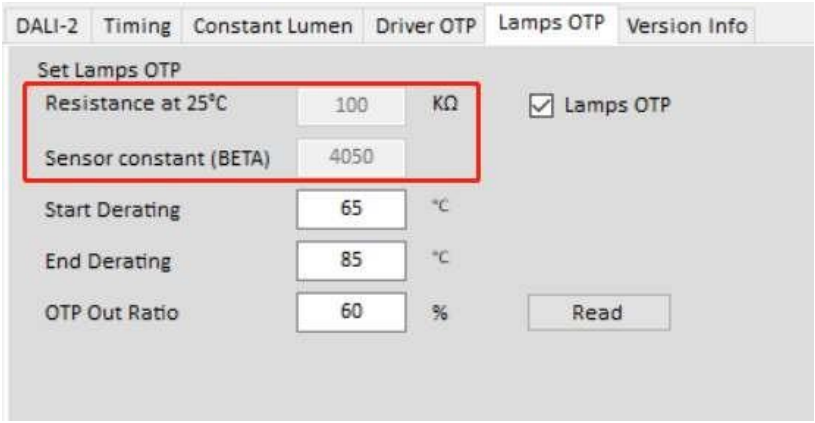

Figure 22

9. Version information

The Configurer interface version function is used to display the number of version updates of the software and the contents of each version update.

Figure 23

Version

A.1	First release	2023-01-04

Specification for Approval

Product Name： MS-PRG-N1 Programmer

Product Model： MS-PRG-N1

Rev ： A.1

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Prepared By	Checked By	Approved By

Specification for Approval

Product Name： MS-PRG-N1 Programmer

Product Model： MS-PRG-N1

Rev： A.1

CUSTOMER AUTHORIZED SIGNATURE		
Tested By	Checked By	Approved By
(Company seal)Return one copy to MOSO with approved signature and company seal.		

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