

# LED Workshop User Guide

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# **Table of Contents**

Development Environment	
System Configuration	
Software	
Hardware	3
Start the Software	5
Language Selection	5
Create a New Project	6
Evaluation Mode	6
Professional Mode	
Call Library Functions	
HT16D31A/B&HT16D33A/B Calling Method	
HT16D35A/B Calling Method	

## **Development Environment**

## System Configuration

LED Editor	
Load di	splay file
	Workshop System
	Link Flat Cable (Evaluation Mode) Customer Board
(P	12 Pin

## Software

HT16D3xA/B LED Workshop, HT16D3xA/B LED Editor and IDE-3000.

## HT16D3xA/B LED Workshop

Used for master MCU selection, MCU resource allocation, key configuration, HT16D3xA/B driver pin setup, external Flash size and pin configuration, LED program settings as well as programming the FLASHROM data to the development board and other functions.

## HT16D3xA/B LED Editor

Used for graphics editing and preview, implementing the HT16D3xA/B mode settings and other functions.

## IDE-3000

Used for editing and viewing the source program, downloading the program code and PROM data to the development board via the e-link.

## Hardware

The Holtek LED Workshop supported Development boards or customer development boards and the e-link (BICE000ELINK0B).

## LED Workshop Supported Development Boards

## Development Board Types

- Eight Top Boards:
  - 1 ESK-16D31B-C00, used when the HT16D31B COLOR mode is selected.
  - ② ESK-16D33A-C00, used when the HT16D33A COLOR mode is selected.
  - 3 ESK-16D31B-M00, used when the HT16D31B MONO mode or GRAY mode is selected.

- (4) ESK-16D33A-M00, used when the HT16D33A MONO mode or GRAY mode is selected.
- (5) ESK-16D35A-C00, used when the HT16D35A COLOR mode is selected.
- 6 ESK-16D35B-C00, used when the HT16D35B COLOR mode is selected.
- T ESK-16D35A-M00, used when the HT16D35A MONO mode or GRAY mode is selected.
- ⑧ ESK-16D35B-M00, used when the HT16D35B MONO mode or GRAY mode is selected.
- One General Bottom Board: ESK-LED-100





## **Data Storage**

- MCU Internal PROM (Master MCU: HT66F2390)
- External FLASHROM (SST26VF032B)

### e-link Connection

Users can develop the required development board on their own. However, due to downloading program and data requirements, the connection with the e-link needs to obey the rules which are shown in the figure below to make sure the programming is correct.





## Start the Software

Double-click the	📼 LED Workshop	icon and the following screen will appear.
🚥 LED Workshop		×
Project Name:		New Project Load Project Save Project Save New Project
Basic Setting		
LED Program		
Finish		

## Language Selection

Click the  $\boxed{1}$  icon in the upper right for the language selection.





## **Create a New Project**

The LED Workshop has two modes which are the Evaluation Mode and the Professional Mode. The Evaluation Mode needs to be demonstrated with the HT16D3xA/B EV Boards that have been developed by Holtek. The Professional Mode is provided to allow customers to use their own development boards. The following sections will describe how to create a new project in these two modes.

## **Evaluation Mode**

After completing the development board and the e-link connection, start the LED Workshop and then click the "New Project" button. A New Project dialog box will pop up as shown below. Then select the corresponding built-in mode according to the connected EV Board and click "OK" after completing the related settings.

	– 🗆 X
New Project Load Project Save Pr	roject Save New Project
New Project X	
Project Name:	
Untitled	
Project Path: C:\Users\llx035\Documents\HTK_Project	
C: \Users\IIXU35\Documents\HTK_Project	
Evaluation Mode     C Professional Mode	
(built-in code) (user code + library)	The companying
IC HT16D31A 🗸	The corresponding development board in the
	Evaluation Mode
Color 🗸	Evaluation Wrode
Matrix Type	Fox 160010 000
(X*Y)/Single	ESK-16D31A-C00
Interface SPI	ESK-16D31A-C00
	ESK-16D31A-M00_Mono
EV Board ESK-16D31A-C00	ESK-16D31A-M00_Gray ESK-16D31B-C00
	ESK-16D31B-C00
OK Cancel	



The LED Workshop operation includes three steps which are "Basic Setting", "LED Program" and "Finish".

Basic Setting LED Program Finish	
LED Program	
Finish	

## **Basic Setting**

## Available MCUs

The supported MCUs are shown in the following table, here only the HT66F2390 is shown.

Available M	CU:	
HT66F2390		

## **MCU Resources**

The configurable MCU resource options are the package, the high speed oscillator (FreqH), the low speed oscillator (FreqL) and the reset circuit.





### Key, Driver IC, Display Source

Click the HT66F2390 in the "Available MCU" table, and then setup the keys, driver IC and display source which are the necessary options. The interface in the following figure shows the mode in which the data is stored in the internal PROM. Here the used memory size (see the blue box below) should be noted. If it is exceeded, an external flash memory will be required to store the display data. In the Evaluation Mode, if the development board is selected which means the key pins, driver pins and communication interface pins are determined, there is no need to choose them again.



## External Flash

To save data into the FLASHROM, click the "External Flash" icon and select the Flash size based on the size of the soldered FLASHROM on the board.





## **Pin Settings**

All pin settings will be shown in the diagram. The complete information can be viewed by dragging the slide bar.

🚥 LED Workshop	[C:\Users\llx03	35\Documents\HTK_Project\Untitled]			- 0	×
Project Name:	Untitled		New Proje	ect Load Project Save Project	Save New Project	<u> </u>
Basic Setting LED Program Finish		Mode Selection         Image: Constraint of the selection of the sel	PO7 13 SCK 14 PA1/SCS 15 OCOSCO 16 SDO 17 PA4/SDI 18 OCOSDA 19 SCS1 20 SCS2 21 VDD 22 VDD 22 VDD 22 VDD 22 PH0 24 PH1 25 PE0/SCSA 28 PE1/SDOA 27	Vailabie MCU:           HT66F2390           MCU Resource:           ROM: 64Kx16           RAM: 4096x8           Package (84LOFP-A v)           Timer: 10-bit/2;16-bit/2           ADD: 12-bit/16           PWM: 2           GPIO: 58           FreqH:           FireqL:           LICC           RES           External	39 AVDD	- -



## LED Program

## Add Trigger Source

Click the "LED Program" on the left to enter the project logical design page. After clicking on the dashed box, the available trigger sources will be displayed in the dashed box. In the Evaluation Mode, the trigger source is the key.

📼 LED Workshop	[C:\Users\llx03	5\Documents\HTK_Project\Untitled]			-	- 🗆 🗙
Project Name:	Untitled		New Project	Load Project S	ave Project Save New	Project
Basic Setting		Display Program List Trigger Source Trigger So	urce Name	Function		<u>^</u>
LED Program						
Finish		Available Trigger Source		1		
Γ	Display	Program List				ר
		er Source Trigger	r Source Name		Function Play	]



## Add Display Actions

Click the "Play" button to set the functions, and then click the "+" button to add the display actions.

	Play action settings X
Display Program List Trigger Source Name Function Key1 Control Control Cont	FielAunber I  Ndrame Untdied.low  France I Page: I Staying Time Ome  Action Filome  OK
	None  None Shift Fade

The workshop supports three actions: PLAY+NONE, PLAY+SHIFT and PLAY+FADE. They are controlled by the library functions.

- PLAY+NONE: Display a single frame figure and its function.
- PLAY+SHIFT: Move a single frame figure left or right. The movements can include rotation. The HT16D35A/B supports up, down, left or right movement.

Play action settings	ĸ
File Number 1	
Nickname Untitled.ldw	
Frame 1	
Page: 1	
Staying Time 0 ms	
Action Shift	
Shift Direction Right	
Speed 248 ms 💌	
Shift Number 1	
Shift Loop 1	
Rotate Yes 💌	
ОК	



• PLAY+FADE: Includes two operations which are Blink and Fade. The optional time for T1~T4 can be set variously. These two operation waveforms are shown in the figures below.

Play action settings	×
File Number       1         Nickname       Untitled.Idw         Frame       1         Page:       1         Staying Time       0 ms         Action       Fade	Fade         100%       261       261       261       261         0%       T1       T2       T3       T4       Time 1044         Operation       Blink $\checkmark$ Iteration       Iteration       Iteration         100%       T1       T2       T3       T4       Time 1044         Operation       Blink $\checkmark$ $\checkmark$ $\top$ $\top$ 11       261 ms $\checkmark$ $\checkmark$ $\top$ $\top$ 12       261 ms(T1 * 1) $\checkmark$ $\top$ $\top$ $\top$ 13       261 ms(T1 * 1) $\checkmark$ $\top$ $\top$ $\top$ Blink Time:       4 s $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$
	ок
Play action settings	×
File Number       1         Nickname       Untitled.Idw         Frame       1         Page:       1         Staying Time       0 ms         Action       Fade	Fade         100%       261       261       261       261         0%       T1       T2       T3       T4       Time         1044       Operation       Fade       Image: Comparison of the tail of tail o



## Save Project

Click the "Save Project" button to save the current project after completing the settings. It will create a .pjlw file.

## Finish

Click "Finish" on the left to enter the generating display data steps, execute the IDE project, etc.





## **Open IDE Project**

To open the generated IDE files, follow the path: workshop Project Name\HT-IDE3000Prj\C or  $\land$  ASM. Use the e-link to connect with the development board and click the "execute" icon. Then the images which were setup in the LED Program page can be observed on the development board.

ASM					
jle Edit Yjew Favorites Iools	Help				
3 Back 🝷 🕥 - 🎓 🔎	Search 😥 Folders  🔢 🗸				
ddress 🛅 C:\Documents and Settings	s\holtek\My Documents\HTK_Project\Un	titled\HT-IDE3000Pr	j\ASM		-
	Name 🔺	Size	Туре	Date Modified	
File and Folder Tasks 🛛 🙁	🗐 define.inc	5 KB	INC File	6/22/2017 5:27 PM	
(*****) (***	DISPLAY.ASM	170 KB	ASM File	7/19/2017 7:40 PM	
💋 Make a new folder	DISPLAY.OBJ	54 KB	OBJ File	9/1/2017 1:02 PM	
Publish this folder to the Web	DISPLAY_IIC.ASM	38 KB	ASM File	7/19/2017 2:12 PM	
Share this folder	DISPLAY_IIC.OBJ	1 KB	OBJ File	9/1/2017 1:02 PM	
Share this folder	DISPLAY_MONO1.asm	33 KB	ASM File	7/17/2017 7:35 PM	
	DISPLAY_MONO1.OBJ	2 KB	OBJ File	9/1/2017 1:02 PM	
Other Places	DISPLAY_SPI.ASM	33 KB	ASM File	7/19/2017 10:40 AM	
other fraces	DISPLAY_SPI.OBJ	10 KB	OBJ File	9/1/2017 1:02 PM	
HT-IDE3000Prj	HT16D35_PLATFORM_ASM_V	2 KB	ASM File	6/21/2017 7:25 PM	
A My Documents	HT16D35_PLATFORM_ASM_V	2 KB	OBJ File	9/1/2017 1:02 PM	
Shared Documents	🖬 HT66F2390.bin	128 KB	BIN File	9/1/2017 1:02 PM	
-	HT66F2390.CV	129 KB	CV File	9/1/2017 1:02 PM	
V Computer	HT66F2390.DBG	42 KB	DBG File	9/1/2017 1:02 PM	
My Network Places	HT66F2390.MAP	32 KB	MAP File	9/1/2017 1:02 PM	
	HT66F2390.MEM	2 KB	MEM File	9/1/2017 1:02 PM	
Details 🚷	HT66F2390.MTP	129 KB	MTP File	9/1/2017 1:02 PM	
Details 🙁	- Contract 2000-opt	1 KB	OPT File	9/1/2017 1:02 PM	
ASM	HT66F2390.pjtx	J ND	PUTATIle	9/1/2017 1:02 PM	* i 🍪 🎬 🚟 🖬 🗐 🛞 🛽
File Folder	EII H166F239U.TSK	129 KB	TSK File	9/1/2017 1:02 PM	
Date Modified: Today,	INITIAL.asm	24 KB	ASM File	7/17/2017 3:02 PM	
September 01, 2017, 1:02 PM	initial.obj	7 KB	OBJ File	9/1/2017 1:02 PM	
	InterfaceMacro.inc	2 KB	INC File	9/1/2017 1:02 PM	
	KEYSCAN.asm	10 KB	ASM File	6/22/2017 1:34 PM	
	KEYSCAN.OBJ	3 KB	OBJ File	9/1/2017 1:02 PM	
	LED_DATA.inc	6 KB	INC File	9/1/2017 1:02 PM	
	🗐 LEDsub_IIC.asm	21 KB	ASM File	7/19/2017 9:41 AM	
	LEDsub_IIC.OBJ	1 KB	OBJ File	9/1/2017 1:02 PM	
	LEDsub_SPI.asm	20 KB	ASM File	7/19/2017 9:40 AM	
	ELEDsub_SPI.OBJ	7 KB	OBJ File	9/1/2017 1:02 PM	
	🗐 macro.inc	3 KB	INC File	6/15/2017 2:06 PM	
	TimerInterrupt.asm	2 KB	ASM File	6/1/2017 3:38 PM	
	TimerInterrupt.OBJ	2 KB	OBJ File	9/1/2017 1:02 PM	
	USER_PROGRAM.ASM	4 KB	ASM File	6/5/2017 7:11 PM	
	USER_PROGRAM.OBJ	2 KB	OBJ File	9/1/2017 1:02 PM	
	🗐 variable.asm	18 KB	ASM File	7/19/2017 4:12 PM	
	🖬 variable.OBJ	13 KB	OBJ File	9/1/2017 1:02 PM	

## **View Images**





## **Professional Mode**

After completing the connection of the development board and the e-link, start the LED Workshop and click the "New Project" button. A New Project dialog box as shown below will pop up. Then click "OK" after completing the related settings.

🊥 LED Workshop	- 0	$\times$
Project Name:	New Project Load Project Save Project Save New Project	<u>I</u>
	New Project X Project Name: Untitled	
Basic Setting	Project Path: C:\Users\Ux036\Documents\HTK_Project	
LED Program	C Evaluation Mode (built-in code) (user code + library)	
Finish	IC HT16D31A  Color	
	Matrix Type (X*Y)/Single ∎*3 ▼	
	Interface SPI	
	OK Cancel	



#### **Basic Setting**

#### **Driver IC, Display Source**

Click the HT66F2390 in the "Available MCU" table, and then setup the driver IC and display source which are necessary options. The interface in the following figure shows the mode and that the data is stored in the internal PROM.



#### **External Flash**

To save the data into the FLASHROM, click the "External Flash" icon and select the Flash size based on the size of the soldered FLASHROM on the board.





## MCU Resources

The configurable MCU resource options are the package, the high speed oscillator (FreqH), the low speed oscillator (FreqL) and the reset circuit.



## **LED Program**

## Add Trigger Source

Click the "LED Program" on the left to enter the project logical design page. After clicking on the dashed box, the available trigger sources will be displayed in the dashed box. In the Professional Mode, the trigger source is the command.

📼 LED Workshop (	C:\Users\lk035\Documents\HTK_Project\Untitled]	- 🗆	
Project Name:	Untitled New Project Load Project Save Project Save	e New Project	
Basic Setting LED Program Finish	Display Program List          Trigger Source       Trigger Source Name       Function         Available Trigger Source       Image: Command to the system       Image: Command to the system		
	Display Program List Trigger Source Trigger Source Name Function		
	Command 1 Play		



### Add Display Actions

Click the "Play" button to set the functions, and then click the "+" button to add the display actions. In the Professional Mode, the workshop also supports three actions which are the PLAY+NONE, PLAY+SHIFT and PLAY+FADE. The following operation is the same as in the Evaluation Mode, so it is not described here.



## **Call Library Functions**

The three actions of the PLAY+NONE, PLAY+SHIFT and PLAY+FADE mentioned above are controlled by dedicated library functions respectively. The following content will describe how to call these library functions. Currently the library functions can only be used when two HT16D3xA/B devices are driven.

## HT16D31A/B&HT16D33A/B Calling Method

## PLAY+NONE

void \_PLAY\_PICTURE\_DISPLAY(INT8U LU8U\_LDW\_INDEX,INT8U LU8U\_FRAME\_INDEX,INT8U LU8U\_PAGE\_INDEX) Inlet parameters:

① LU8V\_LDW\_INDEX: The file No. of the LDW file which is selected in the added files

② LU8V\_FRAME\_INDEX: The frame No. of the selected LDW file

③ LU8V\_PAGE\_INDEX: The page No. of the selected frame

Call method:

\_PLAY\_PICTURE\_DISPLAY(INT8U\_LU8U\_LDW\_INDEX,INT8U\_LU8V\_FRAME\_INDEX,INT8U\_LU8V\_PAGE\_INDEX)

Description: The Inlet parameters should be assigned first before calling the library function. In this example, they are the LU8V\_LDW\_INDEX, LU8V\_FRAME\_INDEX and LU8V\_PAGE\_INDEX. For example, set LU8V\_LDW\_INDEX=2, LU8V\_FRAME\_INDEX=1 and LU8V\_PAGE\_INDEX=1 and then call the function. The first page of the first frame in the No.2 LDW file will be displayed.



#### PLAY+SHIFT

void \_PLAY\_PICTURE\_SHIFT\_SETTING(INT8U DIRECTION,INT8U SPEED,INT8U SHIFT\_NUM,INT8U SHIFT\_LOOP,INT8U ROTATE)

Inlet parameters:

(1) DIRECTION: The image shifting direction

=0, right

=1, left

② SPEED: The image shifting speed

=0~255, the actual speed: shift the image once in the time of (248ms + setting value  $\times$  8ms)

③ SHIFT\_NUM: The column number that the image will be shifted every time

= $1 \sim 255$ , the number of the left or right shifted columns.

④ SIFT\_LOOP: The image shifting times

= $1 \sim 255$ , the total times that the image will be shifted.

(5) Rotate: The image shifting includes rotation or not

=0: No rotation

=1: Rotation

Call method:

#### \_PLAY\_PICTURE\_SHIFT\_SETTING(INT8U DIRECTION,INT8U SPEED,INT8U SHIFT\_NUM,INT8U SHIFT\_LOOP,INT8U ROTATE)

Description: The Inlet parameters should be assigned first before calling the library function. In this example, they are the DIRECTION, SPEED, SHIFT\_NUM, SHIFT\_LOOP and ROTATE. For example, set DIRECTION=0, SPEED=1, SHIFT\_NUM=1, LOOP=2 and ROTATE=1 and then call the function. The display effects: The image will move one column to the right in every 256ms, including rotation and move totally two times.

#### PLAY+FADE

#### void \_PLAY\_PICTURE\_FIREFLY\_SETTING(INT8U LGS,INT8U FBS,INT8U T1,INT8U T2,INT8U T3,INT8U T4)

Inlet parameters:

- ① LGS: Linear/Gamma effect select
  - =0, Linear
  - =1, Gamma
- 2 FBS: Fade/Blink effect select

=0, Fade

=1, Blink

③ T1: T1 time

=0~7 (0: off; 1: 256, 2: 512; 3: 1024; 4: 1536; 5: 2048; 6: 2560; 7: 3072) frame

④ T2: T2 time

=0~3 (0: T1×0.25; 1: T1×0.5; 2: T1; 3: T1×2)

⑤ T3: T3 time

=0~1 (0: T1; 1: T1×2)

⑥ T4: T4 time

=0~3 (0: T1×0.25; 1: T1×0.5; 2: T1; 3: T1×2)





Call method:

\_PLAY\_PICTURE\_FIREFLY\_SETTING(INT8U LGS,INT8U FBS,INT8U T1,INT8U T2,INT8U T3,INT8U T4)

Description: The Inlet parameters should be assigned first before calling the library function. In this example, they are the LGS, FBS, T1, T2, T3 and T4. For example, set LGS=0, FBS=1, T1=1, T2=1, T3=1 and T4=1 and then call the function. The effects: The time of the T1~T4 are all 1 time of T1, where the T1 value can be obtained from the corresponding datasheet.

## HT16D35A/B Calling Method

#### Inlet parameter is variable

The Inlet parameters of the following functions must be variables.

## PLAY+NONE

## \_PLAY\_PICTURE\_DISPLAY MACRO Play\_Number,Frame

Inlet parameters:

① Play\_Number: The file No. of the LDW file which is selected in the added files

② Frame: The frame No. of the selected LDW file

Call method:

## \_PLAY\_PICTURE\_DISPLAY GU8V\_LDW\_INDEX,GU8V\_FRAME\_INDEX

Description: Define two variables for storing data. In this example, they are the GU8V\_LDW\_ INDEX and GU8V\_FRAME\_INDEX. The two variables should be assigned first before calling the library function. For example, set GU8V\_LDW\_INDEX=2, and GU8V\_FRAME\_INDEX=1 and then call the function. The first frame of the No.2 LDW file will be displayed.



## PLAY+SHIFT

\_PLAY\_PICTURE\_SHIFT MACRO COLOR\_Direction,COLOR\_Speed,COLOR\_ShiftNum,COLOR\_ShiftLoop,COLOR\_Rotate Inlet parameters:

1) COLOR\_Direction: The image shifting direction

=0~3 (0: up; 1: down; 2: right; 3: left)

② COLOR\_Speed: The image shifting speed

=0~255, the actual speed: shift the image once in the time of  $(96ms + setting value \times 8ms)$ 

3 COLOR\_ShiftNum: The row or column number that the image will be shifted every time

=1 $\sim$ 255, the number of the up or down shifted rows or the left or right shifted columns.

④ COLOR\_ShiftLoop: The image shifting times

= $1\sim255$ , the total times that the image will be shifted.

⑤ COLOR\_Rotate: The image shifting includes rotation or not

=0: No rotation

=1: Rotation

Call method:

#### \_PLAY\_PICTURE\_SHIFT\_GU8U\_SHIFT\_DIRECTION,GU8U\_SHIFT\_SPEED,GU8U\_SHIFT\_NUM,GU8U\_SHIFT\_LOOP,GU8U\_SHIFT\_ROTATE

Description: Define five variables for storing data. In this example, they are the GU8V\_SHIFT\_ DIRECTION, GU8V\_SHIFT\_SPEED, GU8V\_SHIFT\_NUM, GU8V\_SHIFT\_LOOP, and GU8V\_SHIFT\_ROTATE. The five variables should be assigned first before calling the library function. For example, set GU8V\_SHIFT\_DIRECTION=2, GU8V\_ SHIFT\_SPEED=1, GU8V\_SHIFT\_NUM=1, GU8V\_SHIFT\_LOOP=2, and GU8V\_ SHIFT\_ROTATE=1 and then call the function. The display effects: The image will move one column to the right in every 104ms, including rotation and move totally two times.

#### PLAY+FADE

#### \_PLAY\_PICTURE\_FIREFLY MACRO COLOR\_BFS,COLOR\_T1,COLOR\_T2,COLOR\_T3,COLOR\_T4,COLOR\_Times

#### Inlet parameters:

1 COLOR\_BFS: Blink/Fade effect select

=0, Blink

=1, Fade

2 COLOR\_T1: T1 time

=0~3 (0: 0.5s; 1: 1.0s; 2: 1.5s; 3:2.0s)

③ COLOR\_T2: T2 time

=0~3 (0: 0.5s; 1:1.0s; 2: 1.5s; 3:2.0s)

④ COLOR\_T3: T3 time

=0~3 (0: 0.5s; 1:1.0s; 2: 1.5s; 3:2.0s)

⑤ COLOR\_T4: T4 time

=0~3 (0: 0.5s; 1:1.0s; 2: 1.5s; 3:2.0s)

#### 6 COLOR\_Times:

= $1 \sim 255$ , the number of the image flashing times





Call method:

\_PLAY\_PICTURE\_FIREFLY\_GU8U\_FIREFLY\_FADE,GU8U\_FIREFLY\_T1,GU8U\_FIREFLY\_T2,GU8U\_FIREFLY\_T3,GU8U\_FIREFLY\_T4,GU8U\_FIREFLY\_CYCLETIME

Description: Define six variables for storing data. In this example, they are the GU8V\_FIREFLY\_ FADE, GU8V\_FIREFLY\_T1, GU8V\_FIREFLY\_T2, GU8V\_FIREFLY\_T3, GU8V\_ FIREFLY\_T4, and GU8V\_FIREFLY\_CYCLETIME. The six variables should be assigned first before calling the library function. For example, set GU8V\_FIREFLY\_ FADE=0, GU8V\_FIREFLY\_T1=1, GU8V\_FIREFLY\_T2=1, GU8V\_FIREFLY\_ T3=1, GU8V\_FIREFLY\_T4=1, GU8V\_FIREFLY\_CYCLETIME=1 and then call the function. The effects: The time of the T1~T4 are all 1.0s, blinking effect with flashing one time.

#### Inlet parameter is immediate data

Except that the inlet parameters must be immediate data, the following three functions are the same as the above functions whose inlet parameter is variable, so the definition of each inlet parameter is not described here.

#### PLAY+NONE

#### \_PLAY\_PICTURE\_DISPLAY\_IM MACRO Play\_Number\_IM,Frame\_IM

Call method: \_PLAY\_PICTURE\_DISPLAY\_IM 2,1

Description: The first frame of the No.2 LDW file will be displayed.

#### **PLAY+SHIFT**

\_PLAY\_PICTURE\_SHIFT\_IM MACRO COLOR\_Direction\_IH,COLOR\_Speed\_IM,COLOR\_ShiftHum\_IH,COLOR\_ShiftLoop\_IM,COLOR\_Rotate\_IM

#### Call method: \_PLAY\_PICTURE\_SHIFT\_IM 2,1,1,2,1

Description: The image will move one column to the right in every 104ms, including rotation and move totally two times.

#### PLAY+FADE

\_PLAY\_PICTURE\_FIREFLY\_IN MACRO COLOR\_BFS\_IN,COLOR\_T1\_IM,COLOR\_T2\_IM,COLOR\_T3\_IM,COLOR\_T4\_IN,COLOR\_TImes\_IM

#### Call method: \_PLAY\_PICTURE\_FIREFLY\_IM 0,1,1,1,1,1

Description: The time of the T1~T4 are all 1.0s, blinking effect with flashing one time.



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