

## LC75760 Evaluation Application Software User's Manual



ON Semiconductor®

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## APPLICATION NOTE

### Overview

This document describes the operation method of LC75760's evaluation application software "LC75760App.exe".

### Functions

- Change Serial Data of LC75760
- Monitor Diagnosis Result Data of LC75760
- LED Brightness Sweep Demonstration

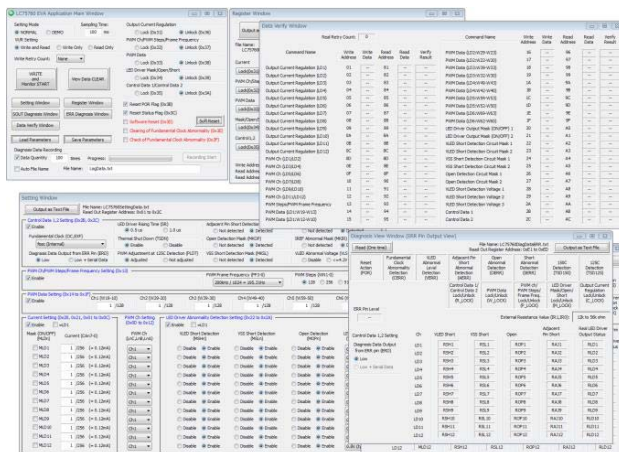


Figure 1. LC75760 GUI Application Screen Configuration

## SET UP

### Install the Evaluation Software (GUI)

Copy LC75760 executable evaluation software “LC75760App.exe” (hereinafter this is called “the application software”) to any folder on your PC.

Name	
LC75760App.exe	..... GUI execution file
libMPSSE.dll	..... DLL file
SetParam_EVADefault.prm	..... Setting file for EVA kit
SetParam_EVADemo.prm	..... Setting file for EVA kit
SetParamDefault.prm	..... Setting file for general purpose

### Install the Device Driver

Please download the device driver from the following URL and install it into your PC.

FTDI official web page: <http://www.ftdichip.com/>

Click "Drivers"

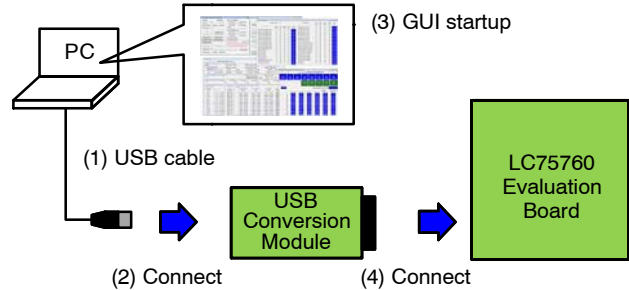
Click "D2XX Drivers"

Unzip the Zip File after Downloading it

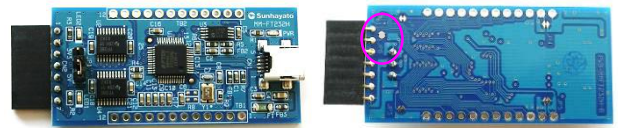
Operating System	Release Date	Processor Architecture				
		x86 (32-bit)	x64 (64-bit)	ARM	MIPS	SH4
Windows*	2017-08-10	2.12.28	2.12.28	-	-	-
Windows RT	2014-07-04	1.0.2				
Linux	2017-05-29	1.4.6	1.4.6	1.4.6 ARMv6 hard-float (uclibc) 1.4.6 ARMv7 hard-float 1.4.6 ARMv8 hard-float	1.4.6 MIPS32 hard-float 1.4.6 MIPS openwrt-uclibc	

### Connection Procedure of the Evaluation Board

1. Connect a USB cable to PC
2. Connect USB cable and USB conversion module (USB Dongle)
3. Startup of this software (LC75760App.exe)
4. Connect USB conversion module and LC75760's evaluation board



### About Jumper Setting of USB Conversion Module Made in Sunhayato (MM-FT232H)



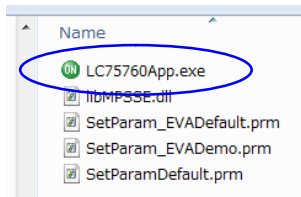
When using the USB conversion module made in Sunhayato (MM-FT232H), the pattern jumper JP6 is in the open state immediately after purchase. After connecting JP6, it has the following functions according to the setting of this software.

Table 1. PIN ASSIGNMENT OF CONNECTOR

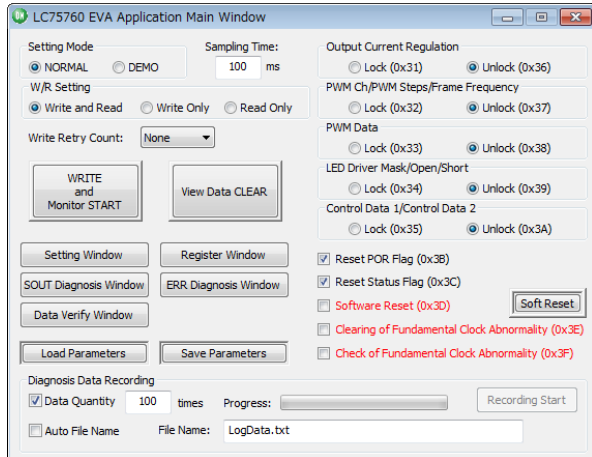
No.	Pin Name	Functions
1	VDD	Output of 3.3 V or 5.0 V with JP1 setting
2	GND	Ground pin
3	ADBUSB0	CLK output with this application setting
4	ADBUSB1	SIN output with this application setting
5	ADBUSB2	SOUT input with this application setting
6	ADBUSB4	ERR input with this application setting
7	ADBUSB3	LATCH output with this application setting

## STARTUP AND CLOSE

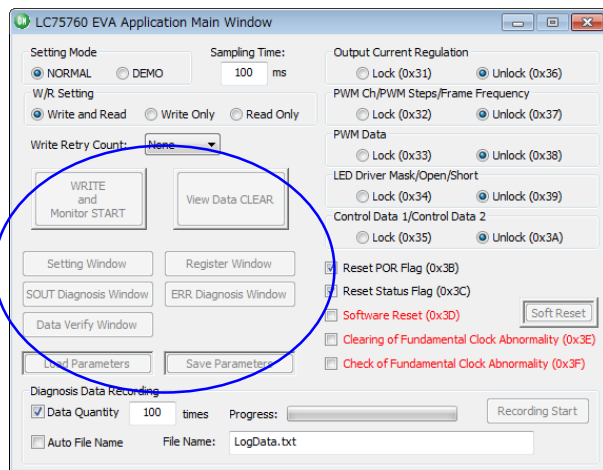
### How to Startup



Double-click on the LC75760App.exe file icon.

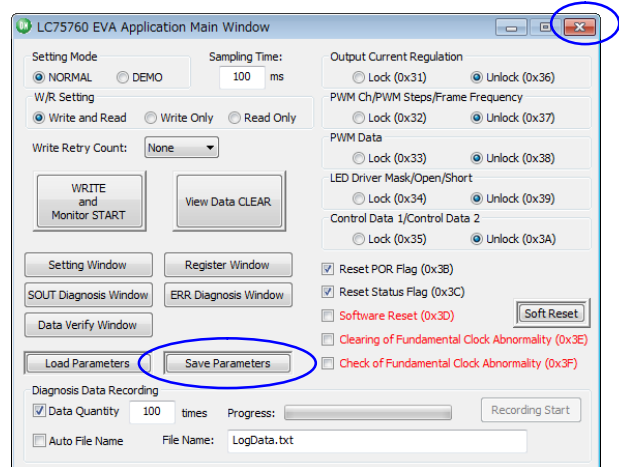


The main window is displayed.



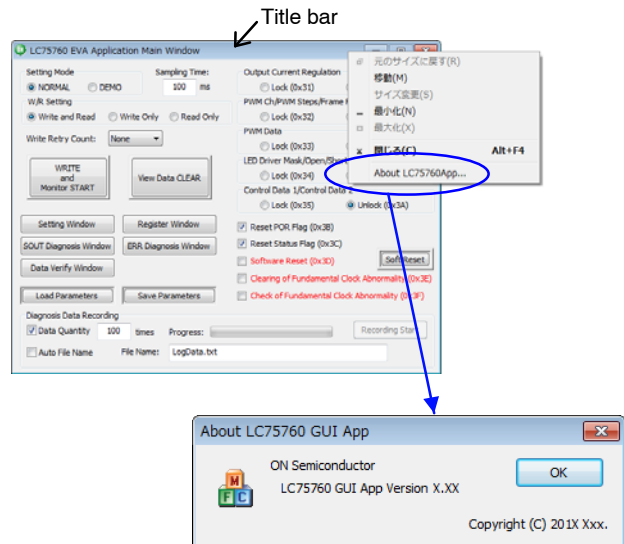
When the USB conversion module is activated without being connected to the PC, some controls (such as “WRITE and Monitor START” button) on the main window are displayed in the non-active state. In this case, please close this software once, then connect the USB conversion module and evaluation board correctly and restart this software.

### How to Close



Click the close button (“X” button) in the upper right on the main window. If you want to save parameter values of each window, please save by clicking “Save Parameters” on the main window.

### Version Information Display



The About window is displayed when the menu is displayed by right-clicking on the main window’s title bar, and “About LC75760App ...” is selected.

# WINDOW CONFIGURATION

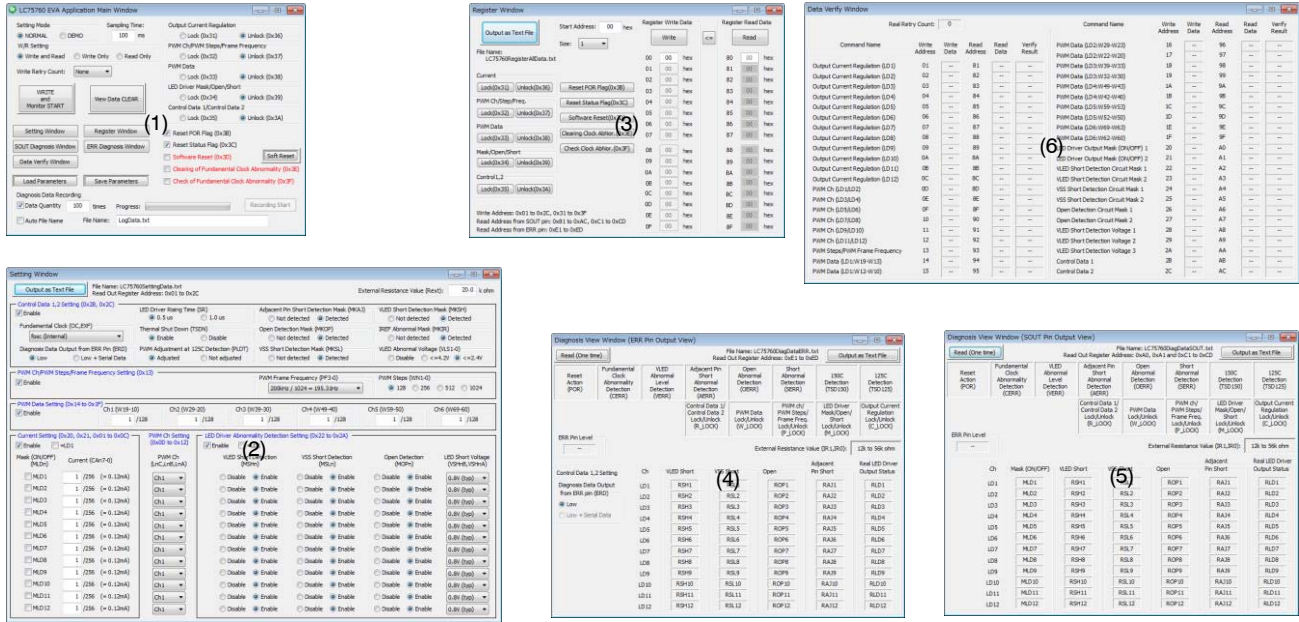
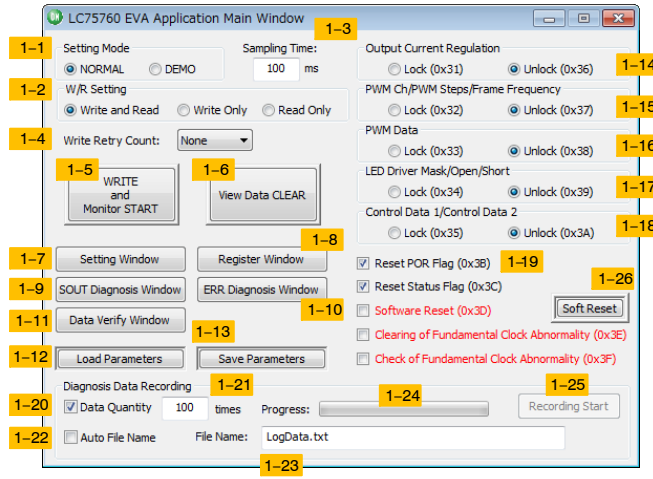


Table 2. WINDOW NAME AND FUNCTIONS

(1)	Main Window	This window performs the following operations: periodically read out the diagnosis result data of the LC75760, monitor data, acquires the data log
(2)	Setting Window	The window for setting register of LC75760
(3)	Register Window	The window for reading and writing any serial data
(4)	Diagnosis View Window (SOUT Pin Output View)	The window for read diagnosis result data monitoring from the SOUT pin of the LC75760
(5)	Diagnosis View Window (ERR Pin Output View)	The window for read diagnosis result data monitoring from the ERR pin of the LC75760
(6)	Data Verify Window	The window for displaying the result of verifying the contents after reading serial data after writing serial data to LC75760

## CONTROL OPERATION EXPLANATION

### MAIN WINDOW



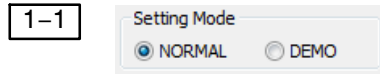
**Table 3. EXPLANATION OF THE CONTROL OPERATION OF THE MAIN WINDOW**

No.	Control Name	Operation Explanations
1-1	Setting Mode	Specify the setting mode of this GUI
1-2	W / R Setting	Specify how to write and read serial data to be transferred after clicking "WRITE and Monitor START" button
1-3	Sampling Time	Specify the sampling time of this GUI for monitoring
1-4	Write Retry Count	Specify the maximum number of times to retry when writing to the LC75760 fails at the time of setting update
1-5	WRITE and Monitor START	Write the register to LC75760 and start reading diagnosis result data
1-6	Monitor STOP	Stop reading the diagnosis result data of LC75760
	View Data CLEAR	Initialize window display
1-7	Setting Window	Display the setting window
1-8	Register Window	Display the register window
1-9	SOUT Diagnosis Window	Display the diagnosis view window from SOUT pin
1-10	ERR Diagnosis Window	Display the diagnosis view window from ERR pin
1-11	Data Verify Window	Display the data verify window
1-12	Load Parameters	Read the parameter recorded in the setting file (extension is ".prm") and reflects it in each window
1-13	Save Parameters	Specify the file name and save the parameter value of each window
1-14	Output Current Regulation Lock / Unlock	Specify the method to write the serial data of address 0x31 or 0x36 in the initial setting sequence
1-15	PWM Ch / PWM Steps / Frame Frequency Lock / Unlock	Specify the method to write the serial data of address 0x32 or 0x37 in the initial setting sequence
1-16	PWM Data Lock / Unlock	Specify the method to write the serial data of address 0x33 or 0x38 in the initial setting sequence
1-17	LED Driver Mask / Open / Short Lock / Unlock	Specify the method to write the serial data of address 0x34 or 0x39 in the initial setting sequence
1-18	Control Data 1 / Control Data 2 Lock / Unlock	Specify the method to write the serial data of address 0x35 or 0x3A in the initial setting sequence
1-19	Command from 0x3B to 0x3F	Specify the command of addresses from 0x3B to 0x3F to be transferred in the initial setting sequence

**Table 3. EXPLANATION OF THE CONTROL OPERATION OF THE MAIN WINDOW** (continued)

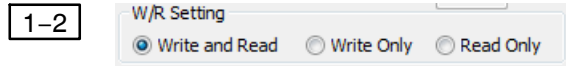
No.	Control Name	Operation Explanations
1-20	Data Quantity	If checked, specify the data logging count
1-21	Data logging count	Specify the data logging count
1-22	Auto File Name	If checked, the file name to save the data log is automatically generated
1-23	File Name	Specify the data logging file name freely
1-24	Progress of data log	The progress of data log is displayed for the specified number of logs
1-25	Recording Start	Read diagnosis result data from 0xC1 to 0xCD at acquisition time interval and start saving data to the data logging file
	Recording Stop	Stop the data logging
1-26	Soft Reset	Write the software reset command (0x3D)





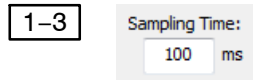
Specify the setting mode of this GUI.

- **NORMAL:** Evaluation mode to be used normally. Serial data is possible to arbitrarily set and evaluated
- **DEMO:** LED brightness sweep demonstration mode. The GUI automatically sweeps LED brightness from 0% to 100% at the interval time specified by [1-3] “Sampling Time”. Refer to [Appendix.2]



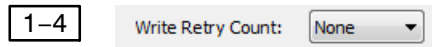
Specify how to write and read serial data to be transferred after clicking “WRITE and Monitor START” button.

- **Write and Read:** The GUI reads after writing and verifies both data. The verification result is displayed on the data verify window
- **Write Only:** Write only. The write contents are displayed on the data verify window
- **Read Only:** Read only. The read out contents are displayed on the data verify window



Specify the sampling time of this GUI for monitoring. This is the time interval for periodically reading diagnosis result data by LC75760 serial data and acquiring data. The input operation is prohibited during monitoring.

[1-1]	[2-5]	Settable Time
NORMAL	SRD = 0	4 to 9999 ms
NORMAL	SRD = 1	20 to 9999 ms
DEMO	SRD = 0	10 to 9999 ms
DEMO	SRD = 1	25 to 9999 ms

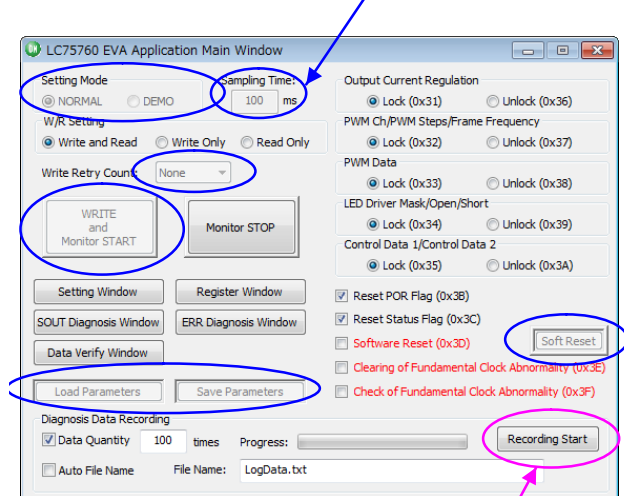


Specify the maximum number of times to retry when writing to the LC75760 fails at the time of setting update. The setting values that can be specified are “None”, “1 time”, “2 times”, “3 times”, “4 times” and “5 times”. For example, specify “2 times” when specifying retry twice (that is, when trying to write up to 3 times), specify “None” if not retrying at all. The selection operation is prohibited during monitoring.



Write the register to LC75760 and start reading diagnosis result data. The GUI periodically acquires various data according to the time interval specified by the [1-3] “Sampling Time” and displays it in the diagnosis view window. Click the [1-6] “Monitor STOP” button to stop monitoring the LC75760. For the sequence when the “WRITE and Monitor START” button is clicked, refer to [Appendix.1].

Some button operations are prohibited during monitoring.



The diagnosis result data logging is possible during monitoring.

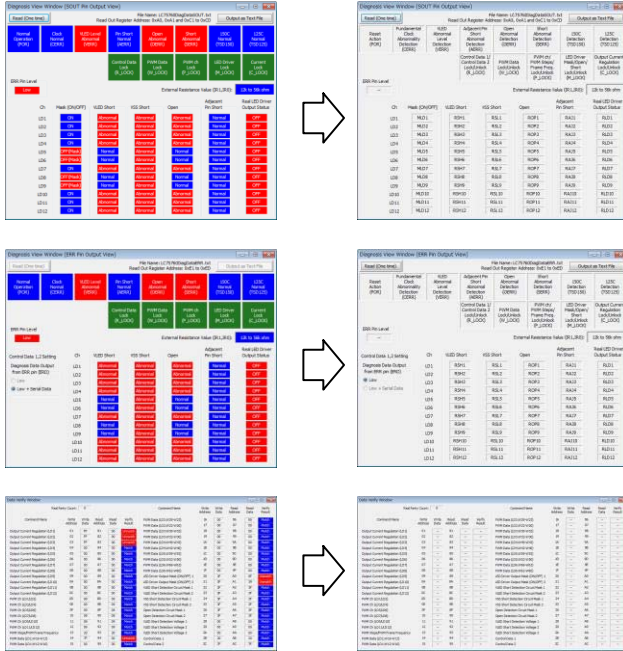


Stop reading the diagnosis result data of LC75760. The notation of this button changes to “Monitor STOP” during monitoring and returns to “View Data CLEAR” after stopping the monitor.

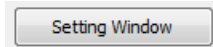
1-6



Initialize window display; the diagnosis view window from SOUT pin, the diagnosis view window from ERR pin, the data verify window.

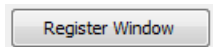


1-7



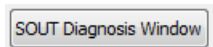
Display the setting window.

1-8



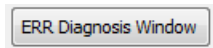
Display the register window.

1-9



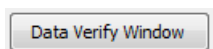
Display the diagnosis view window from SOUT pin.

1-10



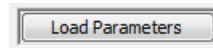
Display the diagnosis view window from ERR pin.

1-11



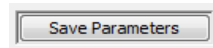
Display the data verify window.

1-12



Read the parameter recorded in the setting file (extension is “.prm”) and reflects it in each window. The button operation is prohibited during monitoring.

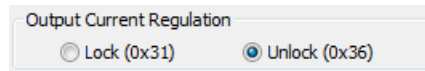
1-13



Specify the file name and save the parameter value of each window. The extension of the saved setting file is “.prm”. Specify an arbitrary file name if you want to save the parameter value set yourself. (For example, “SetParam\_test.prm”)

The button operation is prohibited during monitoring.

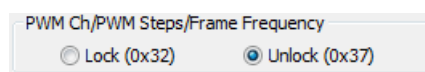
1-14



After the “WRITE and Monitor START” button is clicked, specify the method of writing address 0x31 or 0x36 in the initial setting sequence.

- Lock: Do not write serial data of the “Unlock of output current regulation (0x36)”, and write the serial data of addresses from 0x01 to 0x0C specified on the setting window. After that, write serial data of the “Lock of output current regulation (0x31)”
- Unlock: After writing the serial data of the “Unlock of output current regulation (0x36)”, write the serial data of addresses from 0x01 to 0x0C specified on the setting window. After that, write the serial data of the “Lock of output current regulation (0x31)” and the button is automatically changed to Lock

1-15



After the “WRITE and Monitor START” button is clicked, specify the method of writing address 0x32 or 0x37 in the initial setting sequence.

- Lock: Do not write serial data of the “Unlock of the PWM ch & PWM Steps & PWM frame frequency (0x37)”, and write the serial data of addresses from 0x0D to 0x13 specified on the setting window. After that, write serial data of the “Lock of the PWM ch & PWM Steps & PWM frame frequency (0x32)”
- Unlock: After writing the serial data of the “Unlock of the PWM ch & PWM Steps & PWM frame frequency (0x37)”, write the serial data of addresses from 0x0D to 0x13 specified on the setting window. After that, write the serial data of the “Lock of the PWM ch & PWM Steps & PWM frame frequency (0x32)” and the button is automatically changed to Lock



1-16

After the “WRITE and Monitor START” button is clicked, specify the method of writing address 0x33 or 0x38 in the initial setting sequence.

- Lock: Do not write serial data of the “Unlock of the PWM data (0x38)”, and write the serial data of addresses from 0x14 to 0x1F specified on the setting window. After that, write serial data of the “Lock of the PWM data (0x33)”
- Unlock: After writing the serial data of the “Unlock of the PWM data (0x38)”, write the serial data of addresses from 0x14 to 0x1F specified on the setting window. After that, write the serial data of the “Lock of the PWM data (0x33)” and the button is automatically changed to Lock

1-17

After the “WRITE and Monitor START” button is clicked, specify the method of writing address 0x34 or 0x39 in the initial setting sequence.

- Lock: Do not write serial data of the “Unlock of LED driver output mask / open / short (0x39)”, and write the serial data of addresses from 0x20 to 0x2A specified on the setting window. After that, write serial data of the “Lock of LED driver output mask / open / short (0x34)”
- Unlock: After writing the serial data of the “Unlock of LED driver output mask / open / short (0x39)”, write the serial data of addresses from 0x20 to 0x2A specified on the setting window. After that, write the serial data of the “Lock of LED driver output mask / open / short (0x34)” and the button is automatically changed to Lock

1-18

After the “WRITE and Monitor START” button is clicked, specify the method of writing address 0x35 or 0x3A in the initial setting sequence.

- Lock: Do not write serial data of the “Unlock of control data 1 & control data 2 (0x3A)”, and write the serial data of addresses 0x2B and 0x2C specified on the setting window. After that, write serial data of the “Lock of control data 1 & control data 2 (0x35)”
- Unlock: After writing the serial data of the “Unlock of control data 1 & control data 2 (0x3A)”, write the serial data of addresses 0x2B and 0x2C specified on the setting window. After that, write the serial data of the “Lock of control data 1 & control data 2 (0x35)” and the button is automatically changed to Lock

**(POINT!)**

The register of LC75760 is protected by each lock command (Address = 0x31 to 0x35), and cannot be rewritten if lock is set.

If you want to rewrite the register, first write each unlock command (Address = 0x36 to 0x3A) and then rewrite the register. Lastly, in order to reflect the set register at LC75760 internal operation, write each lock command (Address = 0x31 to 0x35).

In other words, if you wish to rewrite the serial data in addresses from 0x01 to 0x2C specified on the setting window, start monitoring with the Lock / Unlock button from [1-14] to [1-18] with unlock check enabled.

1-19

If checked, transfer the serial data at addresses from 0x3B to 0x3F in the initial setting sequence after the “WRITE and Monitor START” button is clicked.

For the sequence when the “WRITE and Monitor START” button is clicked, refer to [Appendix.1].

- Unchecked: Do not transfer the target serial data
- Checked: Transfer target serial data

1-20

If checked, specify the data logging count.

- Unchecked: The data logging count [1-20] is invalid. If “Recording Start” is clicked, data logging is started, then continue data logging until “Recording Stop” is clicked
- Checked: The data logging count [1-20] can be specified. If “Recording Start” is clicked, data logging is started, then data logging is automatically stopped when log data getting up to the specified count

1-21

**Data Logging Count Input**

Specify the number of data logging times. The data logging time interval is specified in [1-3] “Sampling Time”. Data logging count can be entered from 1 to 999,999 times. The input operation is prohibited when the [1-20] “Data Quantity” check box is unchecked.

1-22

☐ Auto File Name

If checked, the file name to save the data log is automatically generated.

- Unchecked: The file name can be freely specified by [1-23] “File Name”
- Checked: The file name to save the data log is automatically generated. The file name is “LogDataYYYYMMDD\_XXXX.txt” where “YYYYMMDD” is the year, month and day, “XXXX” is the serial number

1-23

File Name: LogData.txt

Specify the data log file name freely. The input operation is prohibited when the [1-22] “Auto File Name” check box is checked.

1-24

Progress: 

The progress of data log is displayed for the specified number of logs.

1-25

Recording Start

Reads the diagnosis result data (addresses from 0xC1 to 0xCD) from the SOUT pin at the data logging time interval and starts saving to the specified file. The notation of this button changes to “Recording STOP” during logging, and after logging stops, button notation returns to “Recording Start” button.

1-25

Recording Stop

If this button is clicked, data logging is stopped.

1-26

Soft Reset

If this button is clicked, the software reset command (0x3D) will be transferred immediately. It is used when you want to turn off the LED immediately.

# SETTING WINDOW

**Table 4. EXPLANATION OF THE CONTROL OPERATION OF THE SETTING WINDOW**

No.	Control Name	Operation Explanations
2-1	Output as Text File	The contents of addresses from 0x01 to 0x2C set on the setting window are saved
2-2	External Resistance Value (Rext)	Specify the resistance value connected to the IREF pin
2-3	Control 1, 2 Setting Enable	If checked, transfer the serial data at addresses 0x2B and 0x2C in the initial setting sequence
2-4	Fundamental Clock (OC, EXF)	Specify the internal oscillation operation mode or the external clock operation mode
2-5	Diagnosis Data Output from ERR pin (ERD)	Specify whether to output diagnosis result serial data from the ERR pin
2-6	LED Driver Rising Time (SR)	Specify the rise time of the LED driver output current
2-7	Thermal Shut Down (TSDN)	Specify enable or disable of thermal shutdown function
2-8	PWM Adjustment at 125C Detection (PLDT)	Specify enable or disable of the PWM duty adjustment function when the temperature sensor detects 125 degrees
2-9	Adjacent Pin Short Detection Mask (MKAJ)	Specify the adjacent pin short detection mask of all LED driver outputs
2-10	Open Detection Mask (MKOP)	Specify the open detection mask of all LED driver outputs
2-11	VSS Short Detection Mask (MKSL)	Specify the VSS short detection mask of all LED driver outputs
2-12	VLED Short Detection Mask (MKSH)	Specify the VLED short detection mask of all LED driver outputs
2-13	IREF Abnormal Mask (MKIR)	Specify the external resistance abnormal value detection mask of IREF pin
2-14	VLED Abnormal Voltage (VLS1-0)	Specify the abnormal voltage value of VLED for LED pull-up
2-15	PWM Ch / PWM Steps / Frame Frequency Setting Enable	If checked, transfer the serial data at addresses from 0x0D to 0x13 in the initial setting sequence

**Table 4. EXPLANATION OF THE CONTROL OPERATION OF THE SETTING WINDOW** (continued)

No.	Control Name	Operation Explanations
2-16	PWM Frame Frequency (PF3-0)	Specify the PWM output waveform frame frequency
2-17	PWM Steps (WN1-0)	Specify the maximum number of PWM output steps of the LED driver output
2-18	PWM Data Setting Enable	If checked, transfer the serial data at addresses from 0x14 to 0x1F in the initial setting sequence
2-19	Ch1 to Ch6 PWM Data (Wn9-Wn0)	Specify the PWM data of the LED driver output
2-20	Current Setting Enable	If checked, transfer the serial data at addresses from 0x01 to 0x0C, 0x20 and 0x21 in the initial setting sequence
2-21	Current Setting =LD1	If checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12
2-22	Mask (ON / OFF) (MLDn)	Specify the LED driver output mask
2-23	Current (CAn7-0)	Specify the current value setting of the LED driver output
2-24	LED driver output current calculated value display	The LED driver output current calculation value is displayed by the specified [2-2] and [2-23] input
2-25	PWM Ch (LnC, LnB, LnA)	Specify Ch of the PWM circuit that performs LED brightness adjustment
2-26	LED Driver Abnormality Detection Setting Enable	If checked, transfer the serial data at addresses from 0x22 to 0x2A in the initial setting sequence
2-27	LED Driver Abnormality Detection Setting =LD1	If checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12
2-28	VLED Short Detection (MSHn)	Specify the VLED short detection circuit mask of each LED driver output
2-29	VSS Short Detection (MSLn)	Specify the VSS short detection circuit mask of each LED driver output
2-30	Open Detection (MOPn)	Specify the open detection circuit mask of each LED driver output
2-31	LED Short Voltage (VSHnB, VSHnA)	Specify the VLED short detection voltage of each LED driver output

2-1

Output as Text File File Name: LC75760SettingData.txt  
Read Out Register Address: 0x01 to 0x2C

The contents of addresses from 0x01 to 0x2C set on the setting window are saved to a file. The filename is “LC75760SettingData.txt”. The button operation is prohibited during monitoring.

2-2

External Resistance Value (Rext): 20.0 k ohm

Current Setting (0x20, 0x21, 0x01 to 0x0C)		
<input checked="" type="checkbox"/> Enable	<input type="checkbox"/> =LD1	
Mask (ON/OFF) (MLDn)	Current (CA <sub>n7-n</sub> )	
<input checked="" type="checkbox"/> MLD1	128 / 256	(= 15.00mA)
<input checked="" type="checkbox"/> MLD2	256 / 256	(= 30.00mA)
<input checked="" type="checkbox"/> MLD3	1 / 256	(= 0.12mA)

Specify the resistance value connected to the IREF pin. The LED driver output current value calculated from the specified resistance value is displayed in [2-24].

2-3

Control Data 1, 2 Setting (0x2B, 0x2C)

☒ Enable

Fundamental Clock (OC, EXF): fosc (Internal)

Diagnosis Data Output from ERR Pin (ERD): ☒ Low ☐ Low + Serial Data

If checked, transfer the serial data at addresses 0x2B and 0x2C in the initial setting sequence after the “WRITE and Monitor START” button is clicked. If check box is unchecked, the button operation is prohibited and serial data of addresses 0x2C and 0x2D are not transferred.

2-4

Fundamental Clock (OC, EXF)

fosc (Internal)

fOSC1 (External 200kHz)

fOSC2 (External 150kHz)

Specify the internal oscillation operation mode or the external clock operation mode (In addition, the external clock operating frequency is 200 kHz or 150 kHz). The list contents of the [2-16] “PWM Frame Frequency (PF3-0)” change depending on the specified operation mode. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the selection operation is prohibited.

< Serial data address: 0x2C >

- fosc (Internal): OC = 0, EXF = 0
- fOSC1 (External 200 kHz): OC = 1, EXF = 0
- fOSC2 (External 150 kHz): OC = 1, EXF = 1

2-5

Diagnosis Data Output from ERR Pin (ERD)

☒ Low ☐ Low + Serial Data

Specify whether to output diagnosis result serial data from the ERR pin. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2C >

- Low: Low output only when abnormal. (ERD = 0)
- Low + Serial Data: Low output and diagnosis result data are outputted by serial data when abnormal. (ERD = 1)

2-6

LED Driver Rising Time (SR)

☒ 0.5 us ☐ 1.0 us

Specify the rise time of the LED driver output current. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2C >

- 0.5 us: LED driver rising time is typ 0.5 us. (SR = 0)
- 1.0 us: LED driver rising time is typ 1.0 us. (SR = 1)

2-7

Thermal Shut Down (TSDN)

☒ Enable ☐ Disable

Specify whether to output diagnosis result serial data from the ERR pin. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2C >

- Enable: Thermal shutdown function is enabled. (TSDN = 0)
- Disable: Thermal shutdown function is disabled. (TSDN = 1)

2-8

PWM Adjustment at 125C Detection (PLDT)

☒ Adjusted ☐ Not adjusted

Specify enable or disable of the PWM duty adjustment function when the temperature sensor detects 125 degrees. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2C >

- Adjusted: The PWM output waveform is adjusted automatically when 125 degrees or above were detected by a temperature sensor. (PLDT = 0)
- Not adjusted: The PWM output waveform is not adjusted even if 125 degrees or above are detected by a temperature sensor. (PLDT = 1)

2-9

Adjacent Pin Short Detection Mask (MKAJ)

☐ Not detected ☒ Detected

Specify the adjacent pin short detection mask of all LED driver outputs. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2D >

- Not detected: The adjacent pin short of all LED driver outputs are not detected. (MKAJ = 0)
- Detected: The adjacent pin short of all LED driver outputs are detected. (MKAJ = 1)

2-10

Open Detection Mask (MKOP)

☐ Not detected ☒ Detected

Specify the open detection mask of all LED driver outputs. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2D >

- Not detected: The open of all LED driver outputs are not detected. (MKOP = 0)
- Detected: The open of all LED driver outputs are detected. (MKOP = 1)

2-11

VSS Short Detection Mask (MKSL)

☐ Not detected ☒ Detected

Specify the VSS short detection mask of all LED driver outputs. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2D >

- Not detected: The VSS short of all LED driver outputs are not detected. (MKSL = 0)
- Detected: The VSS short of all LED driver outputs are detected. (MKSL = 1)

2-12

VLED Short Detection Mask (MKSH)

☐ Not detected ☒ Detected

Specify the VLED short detection mask of all LED driver outputs. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2D >

- Not detected: The VLED short of all LED driver outputs are not detected. (MKSH = 0)
- Detected: The VLED short of all LED driver outputs are detected. (MKSH = 1)

2-13

IREF Abnormal Mask (MKIR)

☐ Not detected ☒ Detected

Specify the external resistance abnormal value detection mask of IREF pin. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2D >

- Not detected: The external resistance abnormal value of IREF pin is not detected. (MKIR = 0)
- Detected: The external resistance abnormal value of IREF pin is detected. (MKIR = 1)

2-14

VLED Abnormal Voltage (VLS1-0)

☐ Disable ☐ <=4.2V ☒ <=2.4V

Specify the abnormal voltage value of VLED for LED pull-up. If the [2-3] “Control 1, 2 Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x2D >

- Disable: The VLED abnormal detection function is disabled. (VLS1 = 0, VLS0 = 0)
- <=4.2 V: When the VLED is 4.2 V (typ) or less, it is judged that the VLED supply voltage is abnormal and the status flag VERR is set to “1”. (VLS1 = 0, VLS0 = 1)
- <=2.4 V: When the VLED is 2.4 V (typ) or less, it is judged that the VLED supply voltage is abnormal and the status flag VERR is set to “1”. (VLS1 = 1, VLS0 = 1)

2-15

PWM Ch/PWM Steps/Frame Frequency Setting (0x13)

☒ Enable ☐ Disable

PWM Frame Frequency (PF3-0) 200kHz / 1024 = 195.31Hz

PWM Steps (PW1-0) 128 256 512 1024

If checked, transfer the serial data at addresses from 0x0D to 0x13 in the initial setting sequence after the “WRITE and Monitor START” button is clicked. If check box is unchecked, the button operation is prohibited and serial data of addresses from 0x0D to 0x13 are not transferred.

2-16

Fundamental Clock (OC,EXF)

fosc (Internal)

Dis fosc (Internal)

FOSC1 (External 200kHz)

FOSC2 (External 150kHz)

PWM Frame Frequency (PF3-0) 200kHz / 1024 = 195.31Hz

200kHz / 2048 = 97.66Hz

200kHz / 1920 = 104.17Hz

200kHz / 1792 = 111.61Hz

200kHz / 1664 = 120.19Hz

200kHz / 1536 = 130.21Hz

200kHz / 1408 = 142.05Hz

200kHz / 1280 = 156.25Hz

200kHz / 1152 = 173.61Hz

200kHz / 1024 = 195.31Hz

200kHz / 896 = 223.21Hz

200kHz / 768 = 260.42Hz

200kHz / 640 = 312.50Hz

200kHz / 512 = 390.63Hz

Specify the PWM output waveform frame frequency. The contents of the list change depending on the operation mode specified by [2-4] “Fundamental Clock (OC, EXF)”. If the [2-15] “PWM Ch / PWM Steps / Frame Frequency Setting Enable” check box is unchecked, the selection operation is prohibited.



< Serial data address: 0x13 >

**fosc (INTERNAL) OR fOSC1 (EXTERNAL 200 kHz)**

List	PF3	PF2	PF1	PF0
200 kHz / 2048 = 97.66 Hz	0	0	0	0
200 kHz / 1920 = 104.17 Hz	0	0	0	1
200 kHz / 1792 = 111.61 Hz	0	0	1	0
200 kHz / 1664 = 120.19 Hz	0	0	1	1
200 kHz / 1536 = 130.21 Hz	0	1	0	0
200 kHz / 1408 = 142.05 Hz	0	1	0	1
200 kHz / 1280 = 156.25 Hz	0	1	1	0
200 kHz / 1152 = 173.61 Hz	0	1	1	1
200 kHz / 1024 = 195.31 Hz	1	0	0	0
200 kHz / 896 = 223.21 Hz	1	0	0	1
200 kHz / 768 = 260.42 Hz	1	0	1	0
200 kHz / 640 = 312.50 Hz	1	0	1	1
200 kHz / 512 = 390.63 Hz	1	1	0	0

**fOSC2 (EXTERNAL 150 kHz)**

List	PF3	PF2	PF1	PF0
150 kHz / 2048 = 73.24 Hz	0	0	0	0
150 kHz / 1920 = 78.13 Hz	0	0	0	1
150 kHz / 1792 = 83.71 Hz	0	0	1	0
150 kHz / 1664 = 90.14 Hz	0	0	1	1
150 kHz / 1536 = 97.66 Hz	0	1	0	0
150 kHz / 1408 = 106.53 Hz	0	1	0	1
150 kHz / 1280 = 117.19 Hz	0	1	1	0
150 kHz / 1152 = 130.21 Hz	0	1	1	1
150 kHz / 1024 = 146.48 Hz	1	0	0	0
150 kHz / 896 = 167.41 Hz	1	0	0	1
150 kHz / 768 = 195.31 Hz	1	0	1	0
150 kHz / 640 = 234.38 Hz	1	0	1	1
150 kHz / 512 = 292.97 Hz	1	1	0	0

**2-17**

PWM Steps (WN1-0) **2-17**

☒ 128 ☐ 256 ☐ 512 ☐ 1024

15 (W59-50) **2-19** Ch6 (W69-60) **2-19**

1 / 128 1 / 128

Specify the maximum number of PWM output steps of the LED driver output. The maximum number of steps displayed in the [2-19] “Ch1 to Ch6 PWM Data (Wn9–Wn0)” are changed by the number of steps specified

in [2-17]. If the [2-15] “PWM Ch / PWM Steps / Frame Frequency Setting Enable” check box is unchecked, the button operation is prohibited.

< Serial data address: 0x13 >

- 128: 128 steps effective from Wn9 to Wn3.  
(WN1 = 0, WN0 = 0)
- 256: 256 steps effective from Wn9 to Wn2.  
(WN1 = 0, WN0 = 1)
- 512: 512 steps effective from Wn9 to Wn1.  
(WN1 = 1, WN0 = 0)
- 1024: 1024 steps effective from Wn9 to Wn0.  
(WN1 = 1, WN0 = 1)  
(n = 1 to 6)

**2-18**

PWM Data Setting (0x14 to 0x1F)

☒ Enable **2-18** Ch1 (W19-10) **2-19** 1 / 128 Ch2

PWM Data Setting (0x14 to 0x1F)

☐ Enable Ch1 (W19-10) Ch2

1 / 128

If checked, transfer the serial data at addresses from 0x14 to 0x1F in the initial setting sequence after the “WRITE and Monitor START” button is clicked. If check box is unchecked, the button operation is prohibited and serial data of addresses from 0x14 to 0x1F are not transferred.

**2-19**

PWM Steps (WN1-0) **2-17** ☒ 128 ☐ 256 ☐ 512 ☐ 1024

PWM Steps (WN1-0) **2-17** ☐ 128 ☐ 256 ☐ 512 ☒ 1024

15 (W59-50) **2-19** Ch6 (W69-60) **2-19** 1 / 128 1 / 128

15 (W59-50) **2-19** Ch6 (W69-60) **2-19** 1 / 1024 1 / 1024

Specify the PWM data of the LED driver output. The maximum number of steps of PWM data that can be input to [2-19] are limited by the number of steps specified in [2-17] “PWM Steps (WN1-0)”. If the [2-18] “PWM Data Enable” check box is unchecked, the input operation is prohibited.

< Serial data addresses: 0x14 to 0x1F >

**(POINT!)**

PWM Frame Frequency (PF3-0) **2-16** 200kHz / 2048 = 97.66Hz

PWM Steps (WN1-0) **2-17** ☐ 128 ☐ 256 ☐ 512 ☒ 1024

PWM Frame Frequency (PF3-0) **2-16** 200kHz / 1920 = 104.17Hz

PWM Steps (WN1-0) **2-17** ☒ 128 ☐ 256 ☐ 512 ☐ 1024

It has PWM step which cannot be selected by the combination of the [2-16] “PWM Frame Frequency (PF3-0)” and the [2-17] “PWM Steps (WN1-0)”.

**2-20** Current Setting (0x20, 0x21, 0x01 to 0x0C)

☒ Enable ☐ =LD1 **2-21**

Mask (ON/OFF) (MLDn) Current (CA<sub>n</sub>7-0) **2-24**

**2-22** ☒ MLD1 **2-23** 1 /256 (= 0.12mA)

☒ MLD2 1 /256 (= 0.12mA)

---

Current Setting (0x20, 0x21, 0x01 to 0x0C)

☐ Enable ☐ =LD1

Mask (ON/OFF) (MLDn) Current (CA<sub>n</sub>7-0)

☒ MLD1 1 /256 (= 0.12mA)

☒ MLD2 1 /256 (= 0.12mA)

If checked, transfer the serial data at addresses from 0x01 to 0x0C, 0x20 and 0x21 in the initial setting sequence after the “WRITE and Monitor START” button is clicked. If check box is unchecked, the button operation is prohibited and serial data of addresses from 0x01 to 0x0C, 0x20 and 0x21 are not transferred.

**2-21** Current Setting (0x20, 0x21, 0x01 to 0x0C) PWM Ch Setting (0x0D to 0x12)

☒ Enable ☐ =LD1 **2-21**

Mask (ON/OFF) (MLDn) Current (CA<sub>n</sub>7-0) **2-24**

**2-22** ☒ MLD1 **2-23** 1 /256 (= 0.12mA)

☒ MLD2 1 /256 (= 0.12mA)

PWM Ch (LnC, LnB, LnA) **2-25**

Ch1

---

Current Setting (0x20, 0x21, 0x01 to 0x0C) PWM Ch Setting (0x0D to 0x12)

☒ Enable ☒ =LD1

Mask (ON/OFF) (MLDn) Current (CA<sub>n</sub>7-0)

☒ MLD1 1 /256 (= 0.12mA)

☒ MLD2 1 /256 (= 0.12mA)

PWM Ch (LnC, LnB, LnA)

Ch1

If checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12: [2-22] “Mask (ON / OFF) (MLDn)”, [2-23] “Current (CA<sub>n</sub>7-0)”, [2-25] “PWM Ch (LnC, LnB, LnA)”.

- Uncheck: Specify LD1 to LD12 separately
- Checked: The content of LD1 is reflected (set all) in the data from LD2 to LD12

**2-22** Mask (ON/OFF) (MLDn)

☒ MLD1

☒ MLD2

Specify the LED driver output mask. If the [2-20] “Current Setting Enable” check box is unchecked, the check operation is prohibited. And, if the [2-21] “Current Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x20 and 0x21 >

- Uncheck: LED turned off (OFF) (MLDn = 0)
- Checked: LED lighting (ON) (MLDn = 1)  
(n = 1 to 12)

**2-23** Current (CA<sub>n</sub>7-0)

256 /256 (= 30.00mA)

128 /256 (= 15.00mA)

1 /256 (= 0.12mA)

Specify the current value setting of the LED driver output. Current value setting can be entered from 1 to 256. If the [2-20] “Current Setting Enable” check box is unchecked, the input operation is prohibited. And, if the [2-21] “Current Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x01 to 0x0C >

Current Value Setting Input	CA n7	CA n6	CA n5	CA n4	CA n3	CA n2	CA n1	CA n0
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	1	0
4	0	0	0	0	0	0	1	1
:								
:								
253	1	1	1	1	1	1	0	0
254	1	1	1	1	1	1	0	1
255	1	1	1	1	1	1	1	0
256	1	1	1	1	1	1	1	1

**2-24** External Resistance Value (Rext): 20.0 k ohm **2-2**

Current Setting (0x20, 0x21, 0x01 to 0x0C)

☒ Enable ☐ =LD1

Mask (ON/OFF) (MLDn) Current (CA<sub>n</sub>7-0) **2-24**

☒ MLD1 **2-23** 128 /256 (= 15.00mA)

☒ MLD2 256 /256 (= 30.00mA)

☒ MLD3 1 /256 (= 0.12mA)

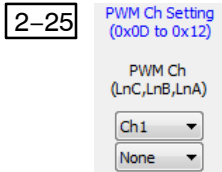
The LED driver output current calculation value is displayed in [2-24] according to the specified [2-23] “Current (CA<sub>n</sub>7-0)” and [2-2] “External Resistance Value (Rext)”.

The calculation formula of the LED driver output current is shown below:

$$ID_{max} = (1.2 \text{ V} / R_{ext}) \times 500$$

$$ID = ID_{max} \times \{ ( [CA_{n7} \text{ to } CA_{n0}] + 1 ) / 256 \} \text{ [mA]}$$

If the LED driver output current calculation value exceeds the LC75760’s output current maximum rating of 60 mA, “Spec.Over” is displayed.

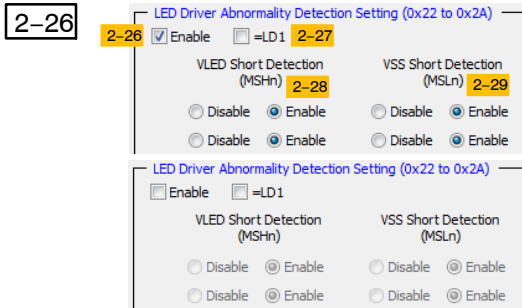


Specify Ch of the PWM circuit that performs LED brightness adjustment. The setting values that can be specified are “None” and from “Ch1” to “Ch6”.

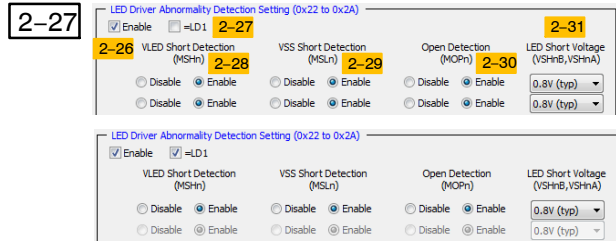
If the [2–15] “PWM Ch / PWM Steps / Frame Frequency Setting Enable” check box is unchecked, the selection operation is prohibited. And, if the [2–21] “Current Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x0D to 0x12 >

PWM Ch (LnC, LnB, LnA) Selection	Corresponding [2–19] PWM Data Input	LnC	LnB	LnA
None	PWM circuit is not selected (Duty = 100%)	0	0	0
Ch1	Ch1 PWM Data	0	0	1
Ch2	Ch2 PWM Data	0	1	0
Ch3	Ch3 PWM Data	0	1	1
Ch4	Ch4 PWM Data	1	0	0
Ch5	Ch5 PWM Data	1	0	1
Ch6	Ch6 PWM Data	1	1	0

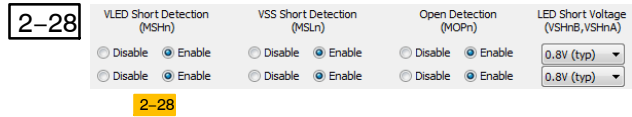


If checked, transfer the serial data at addresses from 0x22 to 0x2A in the initial setting sequence after the “WRITE and Monitor START” button is clicked. If check box is unchecked, the button operations on the “LED Driver Abnormality Detection Setting” group are prohibited and serial data of addresses from 0x22 to 0x2A are not transferred.



If checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12: from [2–28] “VLED Short Detection (MSHn)” to [2–31] “LED Short Voltage (VSHnB, VSHnA)”.

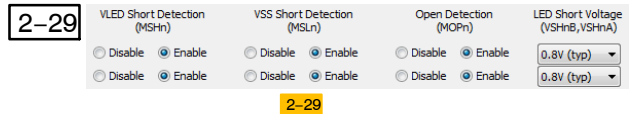
- Uncheck: Specify LD1 to LD12 separately
- Checked: The content of LD1 is reflected (set all) in the data from LD2 to LD12



Specify the VLED short detection circuit mask of each LED driver output. If the [2–26] “LED Driver Abnormality Detection Enable” check box is unchecked, the button operation is prohibited. And, if the [2–27] “LED Driver Abnormality Detection Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x12 and 0x13 >

- Disable: The VLED short detection on the specified output is disabled. (MSHn = 0)
- Enable: The VLED short detection on the specified output is enabled. (MSHn = 1)



Specify the VSS short detection circuit mask of each LED driver output. If the [2–26] “LED Driver Abnormality Detection Enable” check box is unchecked, the button operation is prohibited. And, if the [2–27] “LED Driver Abnormality Detection Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x14 and 0x15 >

- Disable: The VSS short detection on the specified output is disabled. (MSLn = 0)
- Enable: The VSS short detection on the specified output is enabled. (MSLn = 1)

**2-30**

VLED Short Detection (MSHn)

☐ Disable ☒ Enable

☐ Disable ☒ Enable

VSS Short Detection (MSLn)

☐ Disable ☒ Enable

☐ Disable ☒ Enable

Open Detection (MOPn)

☐ Disable ☒ Enable

☐ Disable ☒ Enable

LED Short Voltage (VSHnB, VSHnA)

0.8V (typ)

0.8V (typ)

2-30

Specify the open detection circuit mask of each LED driver output. If the [2-26] “LED Driver Abnormality Detection Enable” check box is unchecked, the button operation is prohibited. And, if the [2-27] “LED Driver Abnormality Detection Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x16 and 0x17 >

- Disable: The open detection on the specified output is disabled. (MOPn = 0)
- Enable: The open detection on the specified output is enabled. (MOPn = 1)

**2-31**

VLED Short Detection (MSHn)

☐ Disable ☒ Enable

☐ Disable ☒ Enable

VSS Short Detection (MSLn)

☐ Disable ☒ Enable

☐ Disable ☒ Enable

Open Detection (MOPn)

☐ Disable ☒ Enable

☐ Disable ☒ Enable

LED Short Voltage (VSHnB, VSHnA)

0.8V (typ)

0.8V (typ)

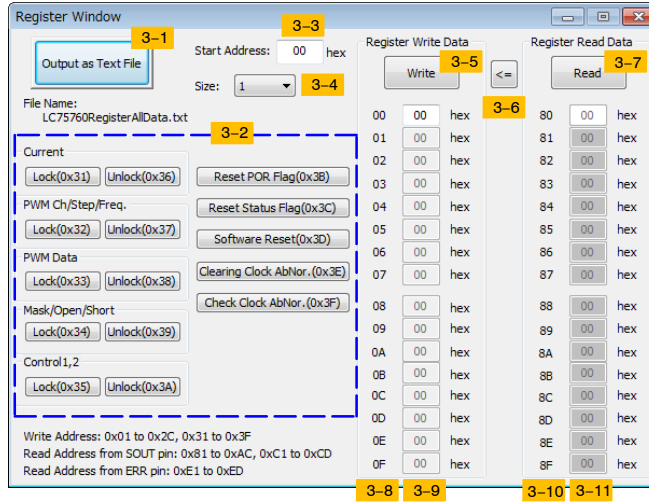
2-31

Specify the VLED short detection voltage of each LED driver output. The setting values that can be specified are “0.8 V (typ)”, “1.8 V (typ)”, “2.8 V (typ)” and “3.8 V (typ)”. If the [2-26] “LED Driver Abnormality Detection Enable” check box is unchecked, the selection operation is prohibited. And, if the [2-27] “LED Driver Abnormality Detection Setting =LD1” check box is checked, the content of LD1 is reflected (set all) in the data from LD2 to LD12.

< Serial data addresses: 0x18 to 0x1A >

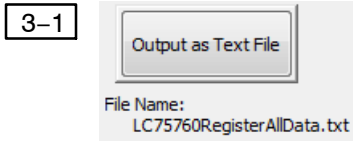
LED Short Voltage (VSHnB, VSHnA) Selection	VSHnB	VSHnA
0.8 V (typ)	0	0
1.8 V (typ)	0	1
2.8 V (typ)	1	0
3.8 V (typ)	1	1

# REGISTER WINDOW

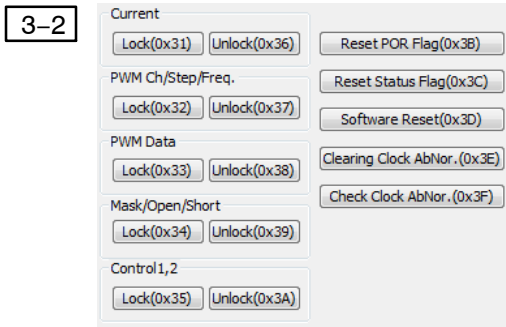


**Table 5. EXPLANATION OF THE CONTROL OPERATION OF THE REGISTER WINDOW**

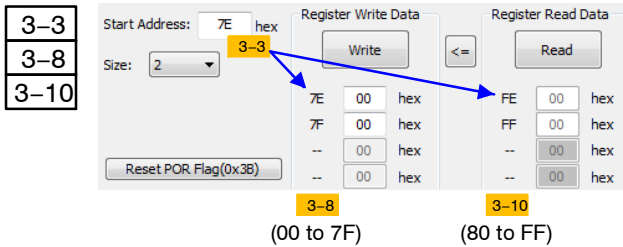
No.	Control Name	Operation Explanations
3-1	Output as Text File	The reading contents of addresses from 0x81 to 0xAC, from 0xC1 to 0xCD and from 0xE1 to 0xED are saved
3-2	0x31 to 0x3F	Write the corresponding serial data of addresses from 0x31 to 0x3F
3-3	Start Address	Specify the start address
3-4	Size	Specify the serial data transfer size (unit: byte)
3-5	Write	Write the serial data specified by the [3-9] "Write Data"
3-6	<=	Copy the contents of the [3-11] "Read Data" to the [3-9] "Write Data"
3-7	Read	The contents of the read serial data are displayed in the [3-11] "Read Data"
3-8	Write Address	The write address is displayed by the specified [3-3] "Start Address" input
3-9	Write Data	Specify write serial data
3-10	Read Address	The read address is displayed by the specified [3-3] "Start Address" input
3-11	Read Data	Specify read serial data



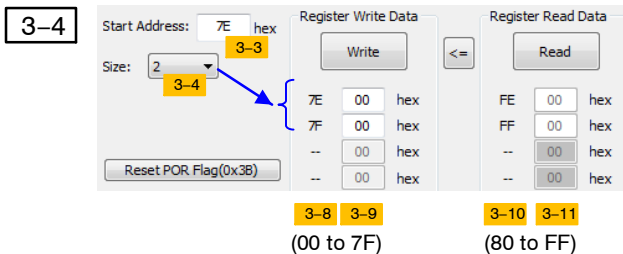
The reading contents of addresses from 0x81 to 0xAC, from 0xC1 to 0xCD and from 0xE1 to 0xED are saved to a file. The filename is “LC75760RegisterAllData.txt”. The button operation is prohibited during monitoring.



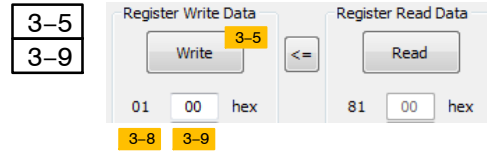
If the button from “Current Lock (0x31)” to “Check Clock Abnor. (0x3F)” are clicked, the corresponding serial data of addresses from 0x31 to 0x3F is written. The button operation is prohibited during monitoring.



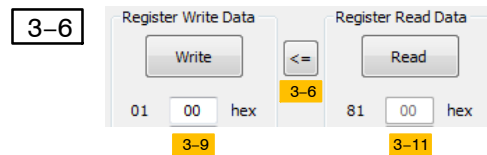
Specify the start address for write and read serial data. The start address can be input from 00 hex to FF hex. However, [3-8] write address is valid from 00 hex to 7F hex, and when it exceeds 80 hex, the display becomes “--”. [3-10] read address is valid from 80 hex to FF hex, and when it exceeds FF hex, the display becomes “--”.



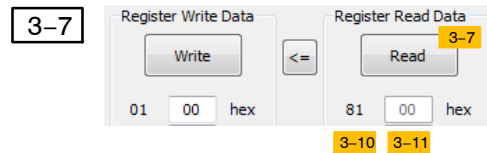
Specify the serial data transfer size (unit: byte) for write and read serial data. The serial data transfer size can be selected from 1 to 16. The [3-9] “Write Data” up to the serial data transfer number selected from the start address specified by [3-3] “Start Address” becomes active display, and [3-11] “Read Data” becomes bright display.



When the “Write” button is clicked after inputting the write data to [3-9] “Write Data”, write serial data of the address displayed in “Write Address” by for the serial data transfer size specified by “Size” to [3-9] “Write Data”. The write data can be input from 00 hex to FF hex. The button operation is prohibited during monitoring.



Copy the contents of the [3-11] “Read Data” to the [3-9] “Write Data”. The button operation is prohibited during monitoring.



Read out serial data of the address displayed in “Read Address” for the serial data transfer size specified by “Size” and display it in [3-11] “Read Data”. The button operation is prohibited during monitoring.



## DIAGNOSIS VIEW WINDOW FROM SOUT

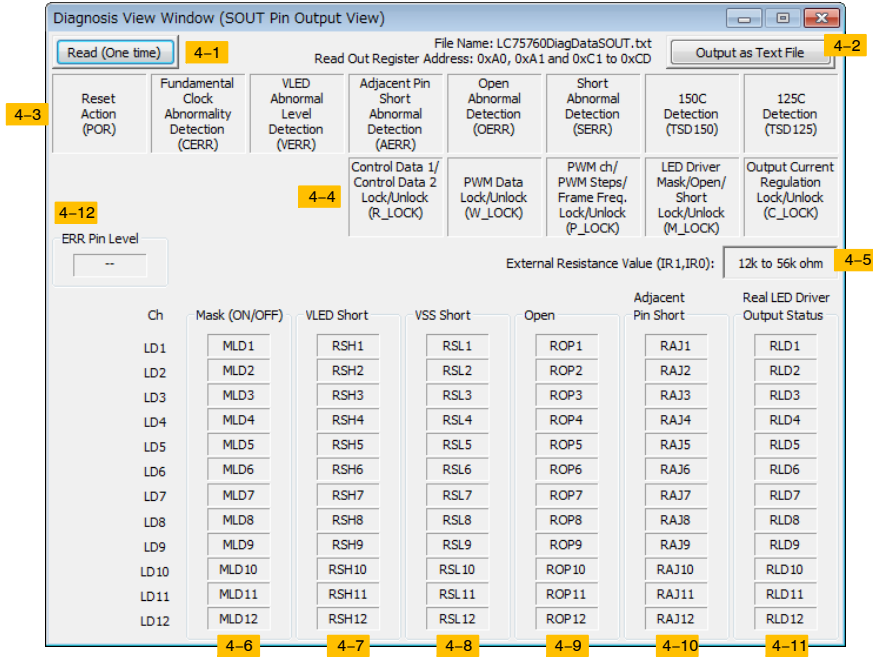


Table 6. EXPLANATION OF THE CONTROL OPERATION OF THE DIAGNOSIS VIEW WINDOW FROM SOUT

No.	Control Name	Operation Explanations
4-1	Read (One time)	Read serial data of addresses 0xA0, 0xA1 and from 0xC1 to 0xCD only once
4-2	Output as Text File	The reading contents of addresses 0xA0, 0xA1 and from 0xC1 to 0xCD are saved
4-3	Read Status Flag 1	The button display and the button color change according to the serial data at address 0xC1 read out
4-4	Read Status Flag 2	The button display and the button color change according to the serial data at address 0xC2 read out
4-5	Read External Resistance Diagnosis Result	The button display and the button color change according to the serial data at address 0xC3 read out
4-6	Mask (ON / OFF)	The button display and the button color change according to the serial data at addresses 0xA0 and 0xA1 read out
4-7	VLED Short	The button display and the button color change according to the serial data at addresses 0xC4 and 0xC5 read out
4-8	VSS Short	The button display and the button color change according to the serial data at addresses 0xC6 and 0xC7 read out
4-9	Open	The button display and the button color change according to the serial data at addresses 0xC8 and 0xC9 read out
4-10	Adjacent Pin Short	The button display and the button color change according to the serial data at addresses 0xCA and 0xCB read out
4-11	Real LED Driver Output Status	The button display and the button color change according to the serial data at addresses 0xCC and 0xCD read out
4-12	ERR Pin Level	The button display and the button color change according to the output level of the ERR pin

4-1

Read (One time)

Read serial data of addresses 0xA0, 0xA1 and from 0xC1 to 0xCD only once, and display the contents of the corresponding serial data. The button operation is prohibited during monitoring.

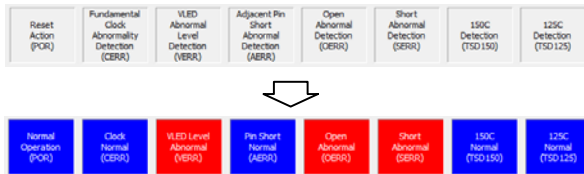
4-2

File Name: LC75760DiagDataSOUT.txt  
Read Out Register Address: 0xA0, 0xA1 and 0xC1 to 0xCD

Output as Text File

The reading contents of addresses 0xA0, 0xA1 and from 0xC1 to 0xCD are saved to a file. The filename is "LC75760DiagDataSOUT.txt". The button operation is prohibited during monitoring.

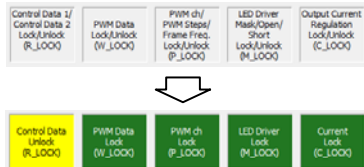
4-3



The button display and the button color change according to the serial data at address 0xC1 read out.

- Blue: Normal operation (= 0)
- Red: Abnormal operation detection (= 1)

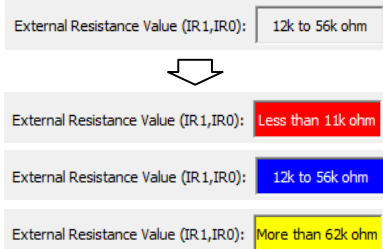
4-4



The button display and the button color change according to the serial data at address 0xC2 read out.

- Yellow: Unlock (= 0)
- Green: Lock (= 1)

4-5



The button display and the button color change according to the serial data at address 0xC3 read out.

- Red: Resistance value of IREF pin is 11 kΩ or less (IR1 = 0, IR0 = 0)
- Blue: Resistance value of IREF pin is 12 kΩ to 56 kΩ (IR1 = 0, IR0 = 1)
- Yellow: Resistance value of IREF pin is 62 kΩ or more (IR1 = 1, IR0 = 1)
- Red: Error (IR1 = 1, IR0 = 0)

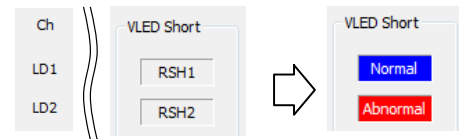
4-6



The button display and the button color change according to the serial data at addresses 0xA0 and 0xA1 read out.

- Red: LED turned off (OFF: Mask state) (= 0)
- Blue: LED lighting (ON) (= 1)

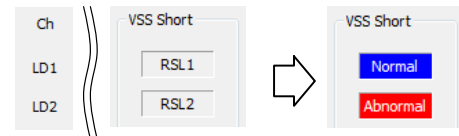
4-7



The button display and the button color change according to the serial data at addresses 0xC4 and 0xC5 read out.

- Blue: Normal operation (= 0)
- Red: VLED short abnormal detection (= 1)

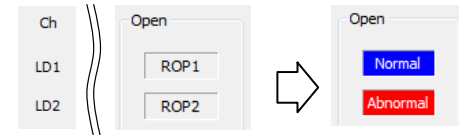
4-8



The button display and the button color change according to the serial data at addresses 0xC6 and 0xC7 read out.

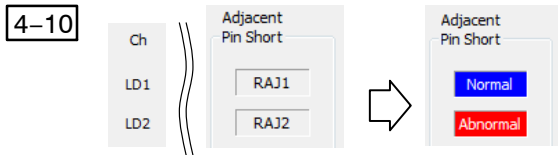
- Blue: Normal operation (= 0)
- Red: VSS short abnormal detection (= 1)

4-9



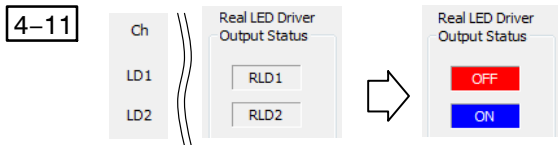
The button display and the button color change according to the serial data at addresses 0xC8 and 0xC9 read out.

- Blue: Normal operation (= 0)
- Red: Open abnormal detection (= 1)



The button display and the button color change according to the serial data at addresses 0xCA and 0xCB read out.

- Blue: Normal operation (= 0)
- Red: Adjacent pin short abnormal detection (= 1)



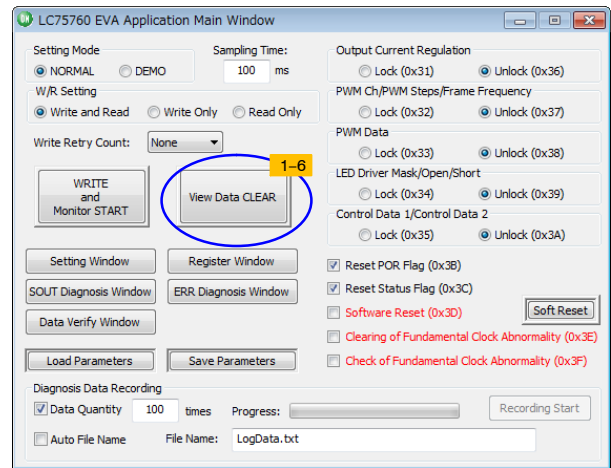
The button display and the button color change according to the serial data at addresses 0xCC and 0xCD read out. In the case of PWM output, this button display changes frequently.

- Red: LED driver output OFF (= 0)
- Blue: LED driver output ON (= 1)



The button display and the button color change according to the output level of the ERR pin.

- Red: Low level
- Blue: High level



The screen display contents are cleared by clicking the [1-6] “View Data CLEAR” button on the main window.

## DIAGNOSIS VIEW WINDOW FROM ERR

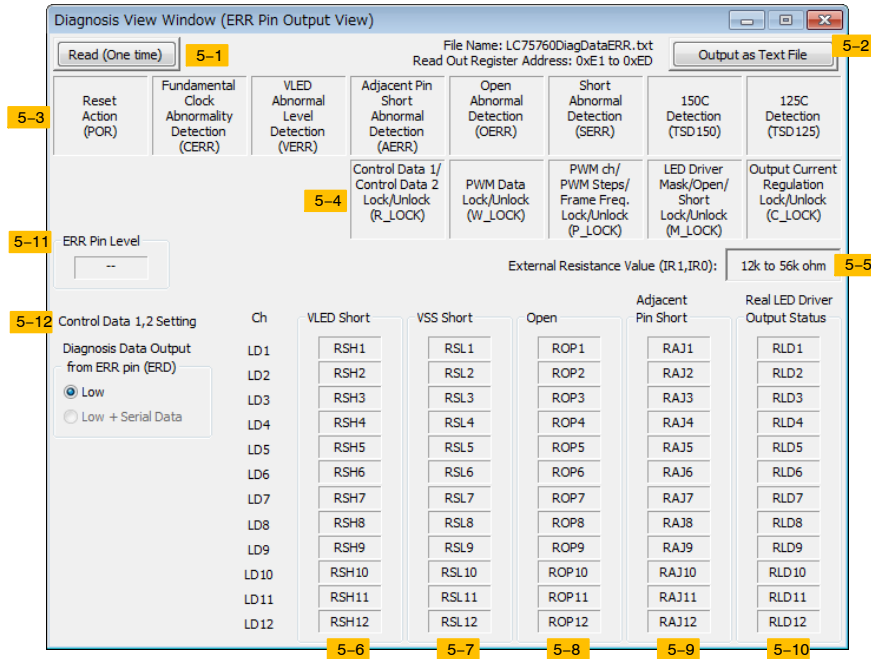


Table 7. EXPLANATION OF THE CONTROL OPERATION OF THE DIAGNOSIS VIEW WINDOW FROM ERR

No.	Control Name	Operation Explanations
5-1	Read (One time)	Read serial data of addresses from 0xE1 to 0xED only once
5-2	Output as Text File	The reading contents of addresses from 0xE1 to 0xED are saved
5-3	Read Status Flag 1	The button display and the button color change according to the serial data at address 0xE1 read out
5-4	Read Status Flag 2	The button display and the button color change according to the serial data at address 0xE2 read out
5-5	Read External Resistance Diagnosis Result	The button display and the button color change according to the serial data at address 0xE3 read out
5-6	VLED Short	The button display and the button color change according to the serial data at addresses 0xE4 and 0xE5 read out
5-7	VSS Short	The button display and the button color change according to the serial data at addresses 0xE6 and 0xE7 read out
5-8	Open	The button display and the button color change according to the serial data at addresses 0xE8 and 0xE9 read out
5-9	Adjacent Pin Short	The button display and the button color change according to the serial data at addresses 0xEA and 0xEB read out
5-10	Real LED Driver Output Status	The button display and the button color change according to the serial data at addresses 0xEC and 0xED read out
5-11	ERR Pin Level	The button display and the button color change according to the output level of the ERR pin
5-12	Diagnosis Data Output from ERR Pin (ERD)	The ERD control state specified on the setting window is displayed

5-1

Read (One time)

Read serial data of addresses from 0xE1 to 0xED only once, and display the contents of the corresponding serial data. The button operation is prohibited during monitoring.

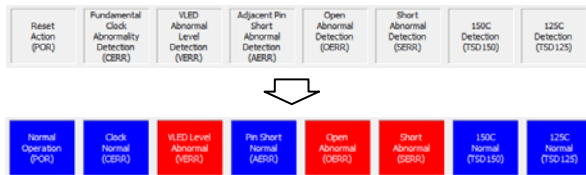
5-2

File Name: LC75760DiagDataERR.txt  
Read Out Register Address: 0xE1 to 0xED

Output as Text File

The reading contents of addresses from 0xE1 to 0xED are saved to a file. The filename is "LC75760DiagDataERR.txt" file. The button operation is prohibited during monitoring.

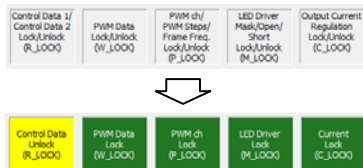
5-3



The button display and the button color change according to the serial data at address 0xE1 read out.

- Blue: Normal operation (= 0)
- Red: Abnormal operation detection (= 1)

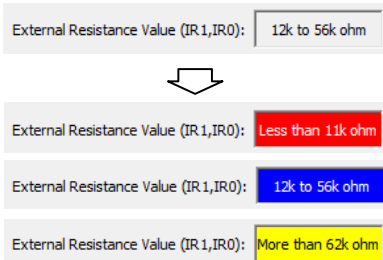
5-4



The button display and the button color change according to the serial data at address 0xE2 read out.

- Yellow: Unlock (= 0)
- Green: Lock (= 1)

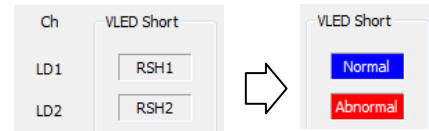
5-5



The button display and the button color change according to the serial data at address 0xE3 read out.

- Red: Resistance value of IREF pin is 11 kΩ or less (IR1 = 0, IR0 = 0)
- Blue: Resistance value of IREF pin is 12 kΩ to 56 kΩ (IR1 = 0, IR0 = 1)
- Yellow: Resistance value of IREF pin is 62 kΩ or more (IR1 = 1, IR0 = 1)
- Red: Error (IR1 = 1, IR0 = 0)

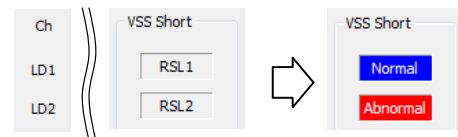
5-6



The button display and the button color change according to the serial data at addresses 0xE4 and 0xE5 read out.

- Blue: Normal operation (= 0)
- Red: VLED short abnormal detection (= 1)

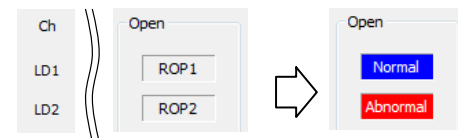
5-7



The button display and the button color change according to the serial data at addresses 0xE6 and 0xE7 read out.

- Blue: Normal operation (= 0)
- Red: VSS short abnormal detection (= 1)

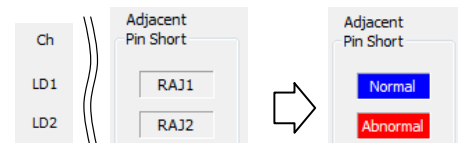
5-8



The button display and the button color change according to the serial data at addresses 0xE8 and 0xE9 read out.

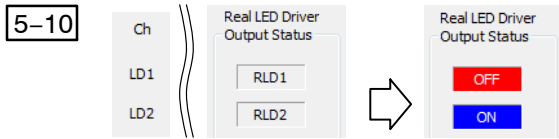
- Blue: Normal operation (= 0)
- Red: Open abnormal detection (= 1)

5-9



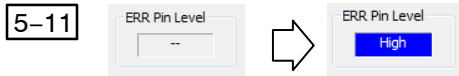
The button display and the button color change according to the serial data at addresses 0xEA and 0xEB read out.

- Blue: Normal operation (= 0)
- Red: Adjacent pin short abnormal detection (= 1)



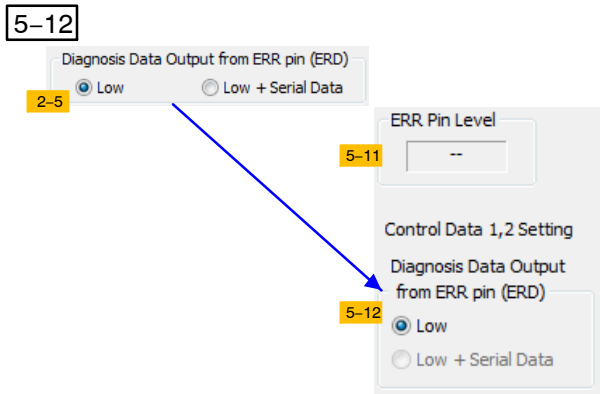
The button display and the button color change according to the serial data at addresses 0xEC and 0xED read out. In the case of PWM output, this button display changes frequently.

- Red: LED driver output OFF (= 0)
- Blue: LED driver output ON (= 1)



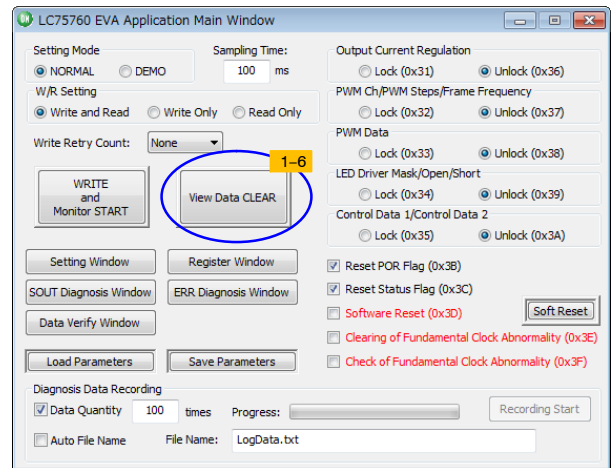
The button display and the button color change according to the output level of the ERR pin.

- Red: Low level
- Blue: High level



The control status of [2-5] “Diagnosis Data Output from ERR pin (ERD)” specified on the setting window is displayed.

- Low: Only [5-11] is displayed
- Low + Serial Data: [5-3] to [5-11] are all displayed



The screen display contents are cleared by clicking the [1-6] “View Data CLEAR” button on the main window.



## DATA VERIFY WINDOW

Data Verify Window

Real Retry Count:

0

6-4

Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result	Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result
Output Current Regulation (LD1)	01	--	81	--	--	PWM Data (LD2:W29-W23)	16	--	96	--	--
Output Current Regulation (LD2)	02	--	82	--	--	PWM Data (LD2:W22-W20)	17	--	97	--	--
Output Current Regulation (LD3)	03	--	83	--	--	PWM Data (LD3:W39-W33)	18	--	98	--	--
Output Current Regulation (LD4)	04	--	84	--	--	PWM Data (LD3:W32-W30)	19	--	99	--	--
Output Current Regulation (LD5)	05	--	85	--	--	PWM Data (LD4:W49-W43)	1A	--	9A	--	--
Output Current Regulation (LD6)	06	--	86	--	--	PWM Data (LD4:W42-W40)	1B	--	9B	--	--
Output Current Regulation (LD7)	07	--	87	--	--	PWM Data (LD5:W59-W53)	1C	--	9C	--	--
Output Current Regulation (LD8)	08	--	88	--	--	PWM Data (LD5:W52-W50)	1D	--	9D	--	--
Output Current Regulation (LD9)	09	--	89	--	--	PWM Data (LD6:W69-W63)	1E	--	9E	--	--
Output Current Regulation (LD10)	0A	--	8A	--	--	PWM Data (LD6:W62-W60)	1F	--	9F	--	--
Output Current Regulation (LD11)	0B	--	8B	--	--	LED Driver Output Mask (ON/OFF) 1	20	--	A0	--	--
Output Current Regulation (LD12)	0C	--	8C	--	--	LED Driver Output Mask (ON/OFF) 2	21	--	A1	--	--
PWM Ch (LD1/LD2)	0D	--	8D	--	--	VLED Short Detection Circuit Mask 1	22	--	A2	--	--
PWM Ch (LD3/LD4)	0E	--	8E	--	--	VLED Short Detection Circuit Mask 2	23	--	A3	--	--
PWM Ch (LD5/LD6)	0F	--	8F	--	--	VSS Short Detection Circuit Mask 1	24	--	A4	--	--
PWM Ch (LD7/LD8)	10	--	90	--	--	VSS Short Detection Circuit Mask 2	25	--	A5	--	--
PWM Ch (LD9/LD10)	11	--	91	--	--	Open Detection Circuit Mask 1	26	--	A6	--	--
PWM Ch (LD11/LD12)	12	--	92	--	--	Open Detection Circuit Mask 2	27	--	A7	--	--
PWM Steps/PWM Frame Frequency	13	--	93	--	--	VLED Short Detection Voltage 1	28	--	A8	--	--
PWM Data (LD1:W19-W13)	14	--	94	--	--	VLED Short Detection Voltage 2	29	--	A9	--	--
PWM Data (LD1:W12-W10)	15	--	95	--	--	VLED Short Detection Voltage 3	2A	--	AA	--	--
						Control Data 1	2B	--	AB	--	--
						Control Data 2	2C	--	AC	--	--

6-1

6-2

6-3

6-1

6-2

6-3

Table 8. EXPLANATION OF THE CONTROL OPERATION OF THE VERIFY WINDOW

No.	Control Name	Operation Explanations
6-1	Write Data	Displays the contents of the write data
6-2	Read Data	Displays the contents of the read data
6-3	Verify Result	Displays the verified result
6-4	Real Retry Count	Displays the number of retry write times actually

6-1

W/R Setting 1-2  
☒ Write and Read ☐ Write Only ☐ Read Only

6-1

Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result
Output Current Regulation (LD1)	01	FF	81	FF	Match
Output Current Regulation (LD2)	02	7F	82	7F	Match

When the [1-2] “Write and Read” button of “W / R Setting” is checked, if the [1-5] “WRITE and Monitor START” is clicked, the GUI reads after writing and verifies both data. Display the contents of the write data.

W/R Setting 1-2  
☐ Write and Read ☒ Write Only ☐ Read Only

6-1

Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result
Output Current Regulation (LD1)	01	FF	81	--	--
Output Current Regulation (LD2)	02	7F	82	--	--

Or, when the “Write Only” is checked, display the contents of the write data.

6-2

W/R Setting 1-2  
☐ Write and Read ☒ Write Only ☐ Read Only

6-2

Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result
Output Current Regulation (LD1)	01	FF	81	FF	Match
Output Current Regulation (LD2)	02	7F	82	7F	Match

When the [1-2] “Write and Read” button of “W/R Setting” is checked, if the [1-5] “WRITE and Monitor START” is clicked, the GUI reads after writing and verifies both data. Display the contents of the read data.

W/R Setting 1-2  
☐ Write and Read ☐ Write Only ☒ Read Only

6-2

Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result
Output Current Regulation (LD1)	01	--	81	FF	--
Output Current Regulation (LD2)	02	--	82	7F	--

Or, when the “Read Only” is checked, display the contents of the read data.

6-3

W/R Setting 1-2  
☒ Write and Read ☐ Write Only ☐ Read Only

6-3

Command Name	Write Address	Write Data	Read Address	Read Data	Verify Result
Output Current Regulation (LD1)	01	FF	81	FF	Match
Output Current Regulation (LD2)	02	1F	82	7F	Unmatch

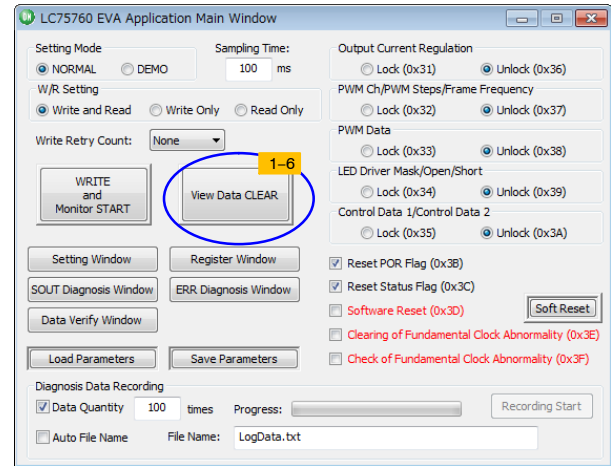
When the [1-2] “Write and Read” button of “W / R Setting” is checked, if the [1-5] “WRITE and Monitor START” is clicked, the GUI reads after writing and verifies both data. Display the contents of the verify result data.

- Blue: The write and read data match (Match)
- Red: The write and read data don’t match (Unmatch)

6-4

Write Retry Count: 5 times 1-4  
 Real Retry Count: 5 6-1

Displays the number of retries actually performed for the maximum number of retries specified in [1-4] “Write Retry Count”. When “0” is displayed, it means that writing was done only once without retrying.

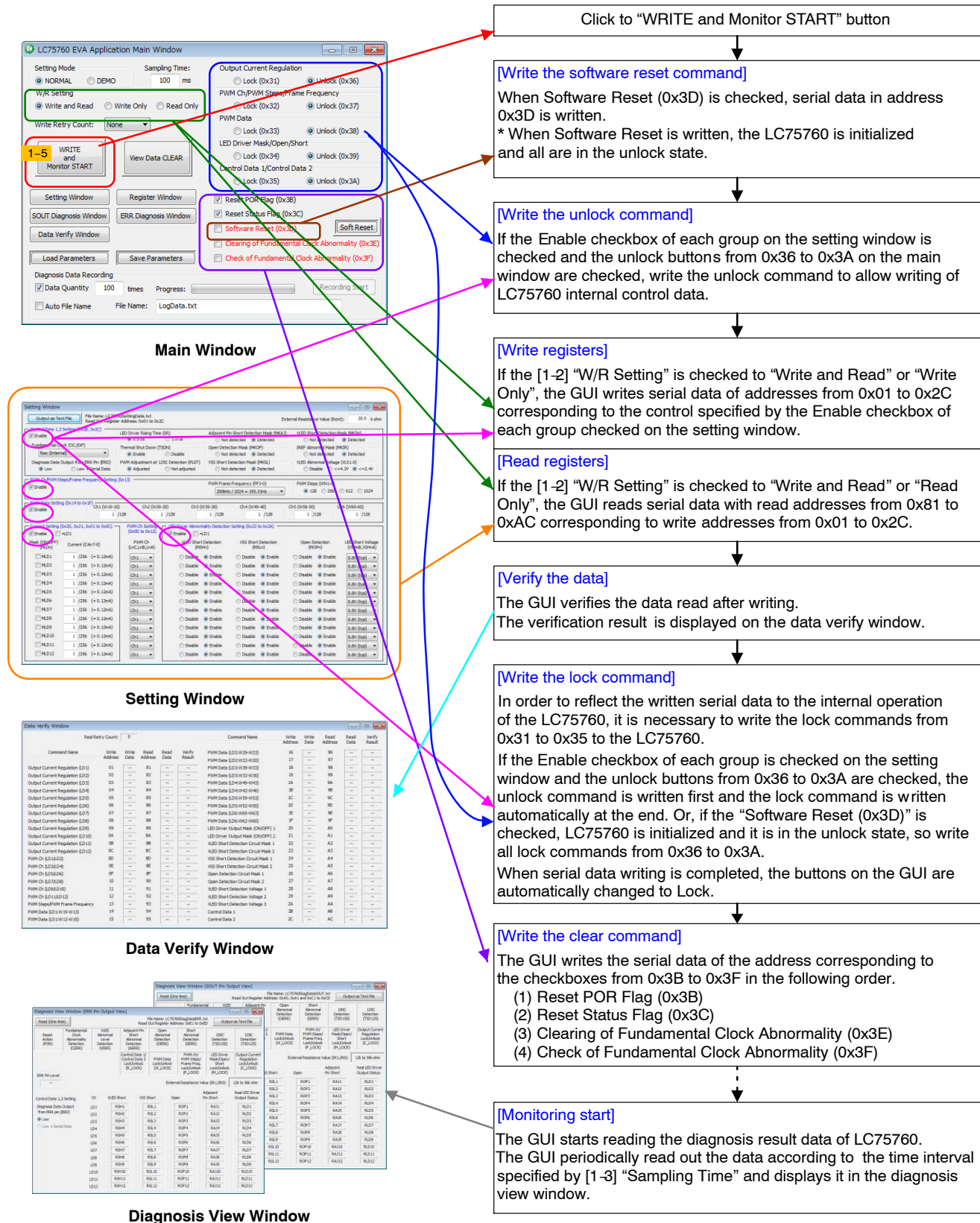


The screen display contents are cleared by clicking the [1-6] “View Data CLEAR” button on the main window.

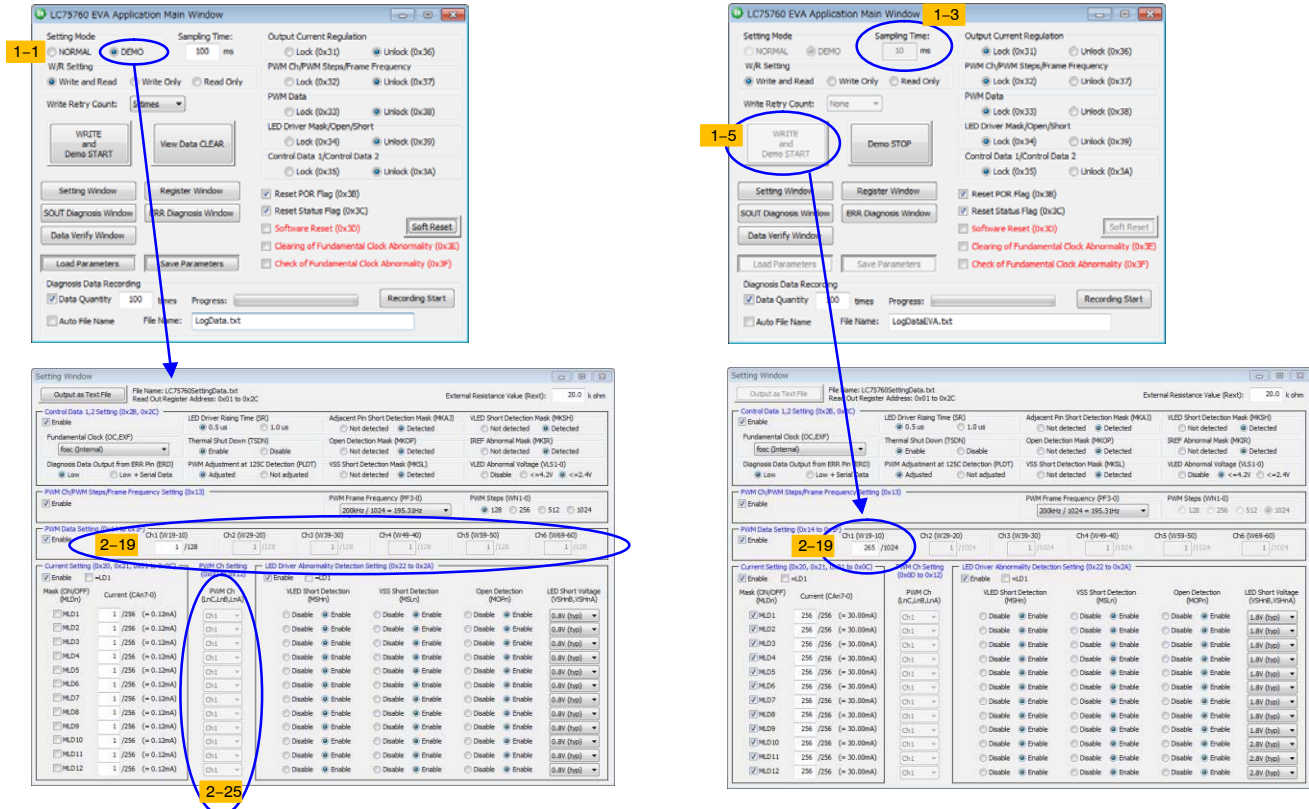
For the sequence when the “WRITE and Monitor START” button is clicked, refer to [Appendix.1].

## [APPENDIX.1] ABOUT THE MONITOR START SEQUENCE

The GUI processing after clicking the [1-5] “WRITE and Monitor START” button on the main window is shown below:

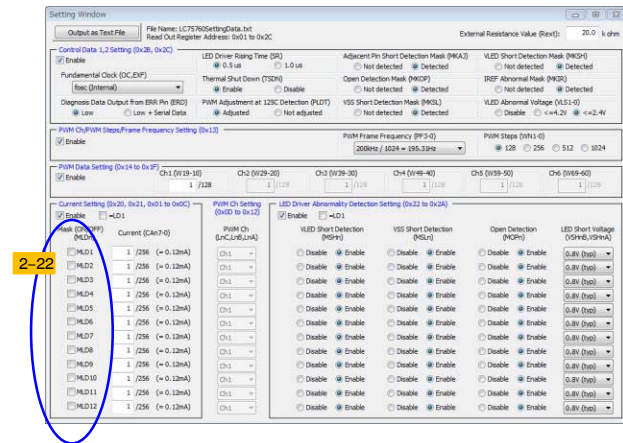


## [APPENDIX.2] ABOUT THE LED BRIGHTNESS SWEEP DEMONSTRATION FUNCTION



When the [1-1] "Setting Mode" button on the main window is checked to "DEMO", PWM channel from LD1 to LD12 are selected to Ch1 and some controls on the setting window are displayed in the non-active state.

When the [1-5] "WRITE and Monitor START" button on the main window is clicked, the "[Appendix 1] ABOUT THE MONITOR START SEQUENCE" is executed and the diagnosis result data is periodically read out at the time interval specified by [1-3] "Sampling Time". And at the same time Ch1 PWM Data is automatically swept. Thereby, "LED brightness sweep demonstration" which repeats the process of changing brightness from dark to light is carried out.



Specify the LED driver output of demonstrating to the [2-22] "Mask (ON / OFF) (MLDn)".

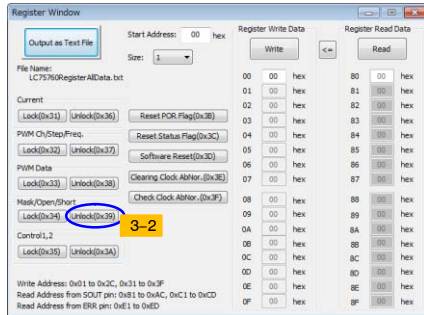


### [APPENDIX.3] HOW TO OPERATE A REGISTER WINDOW

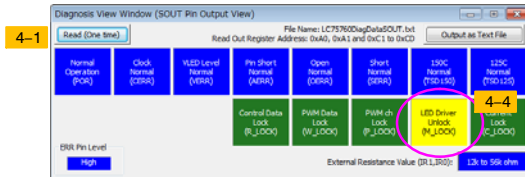
For example, the operation procedure from all lighting states to lighting off the LED of LD7 is shown below:



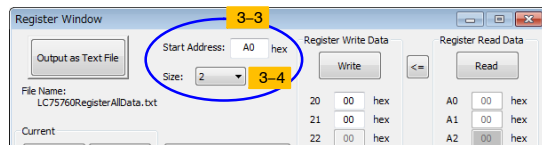
1. Click the [1–6] “Monitor STOP” button on the main window to enable operation on the register window



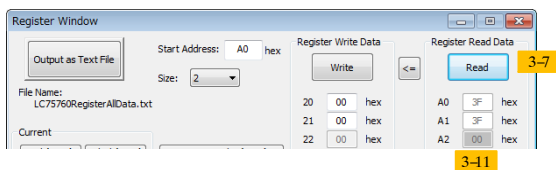
2. Click the “Unlock (0x39)” button of [3–2] “Mask / Open / Short” to unlock it



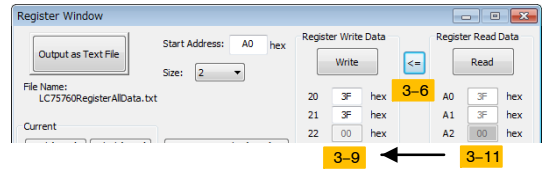
3. The [4–4] “M\_LOCK” is displayed to unlock (yellow) when click the [4–1] “Read(One time)” button on the diagnosis view window from SOUT pin



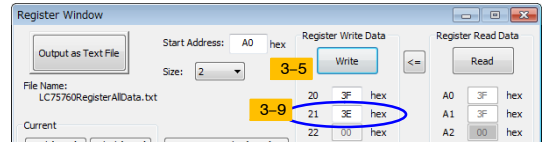
4. Enter “A0” in [3–3] “Start Address”, and choose “2” from [3–4] “Size”



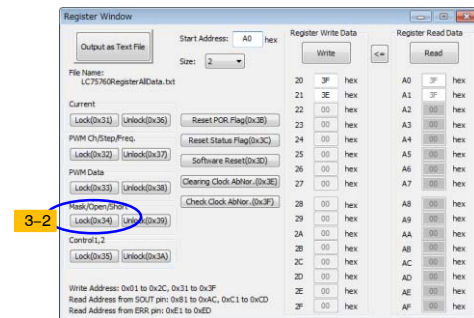
5. The reading data of 0xA0 and 0xA1 are displayed in [3–11] when click the [3–7] “Read” button



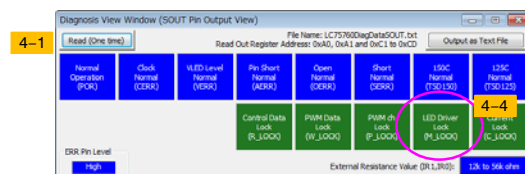
6. The read data is copied to addresses 0x20 and 0x21 when click the [3–6] “<=” button




7. Enter “3E” to [3–9] “Write Data” in address 0x21 to lighting off the LED of LD7. Then, when click the [3–5] “Write” button, this data is written to LC75760. At this time, the LED is not lighted off yet



8. Click the “Lock (0x34)” button of [3–2] “Mask / Open / Short” to lock it. Then, the setting contents are reflected in LC75760 internal operation
9. The LED7 is lighted off



10. The [4–4] “M\_LOCK” is displayed to lock (green) when click the [4–1] “Read(One time)” button on the diagnosis view window from SOUT pin

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