128-RGB Data x 128 Scan 65k Color
Controller and Driver

2005. 1

OLED 128x128 65kColor Dot Matrix
Driver with Controller
CMOS LSI Specification

1. Revision History

Rev	CONTETNS	DATE
0.00		2005. 01. 24

2. Submitted Document List

Date	Direction	Contents

3. ORDERING INFORMATION

Ordering Part Number	Package Form
XXXXXXXXXXX	Gold Bump Die

LD50T5128M SPECIFICATION

CONTENTS

LD50T5128M SPECIFICATION

4. FEATURES

Power Supply
VCC 8 - 18V, Vdd 2.4-3.3V

Dot Matrix Display Area
Variable Display Size : Max 128(xRGB) x 128 Line

Graphics RAM
Dot matrix : 128 x 16 Bit x 128 ＝ 262,144 Bit

Dot Matrix Column Driver
Max **384 Outputs** (128xRGB)
64Gray Scale (G), **32**Gray Scale (R,B)
Maximum Output Current = **255 uA (1 uA Step)**
Next Pin to Pin Current Deviation ±**0.5%**   (Iout = 200uA)
Current Deviation at 1Chip Max-Min **4.0%**   (Iout = 200uA)
Average Current Deviation against absolute level ±**5.0%**   (Iout = 50,200uA)
10 Times Peak boot Current Driving

Dot Matrix Row Driver
Max **128** Outputs
Variable duty ratio (1 to 128)
ON resistance typical **10**ohm

CPU Interface
16 Bit or 8Bit or 6Bit Write and Read with address **A0**
Address A0 is used to select command and parameters
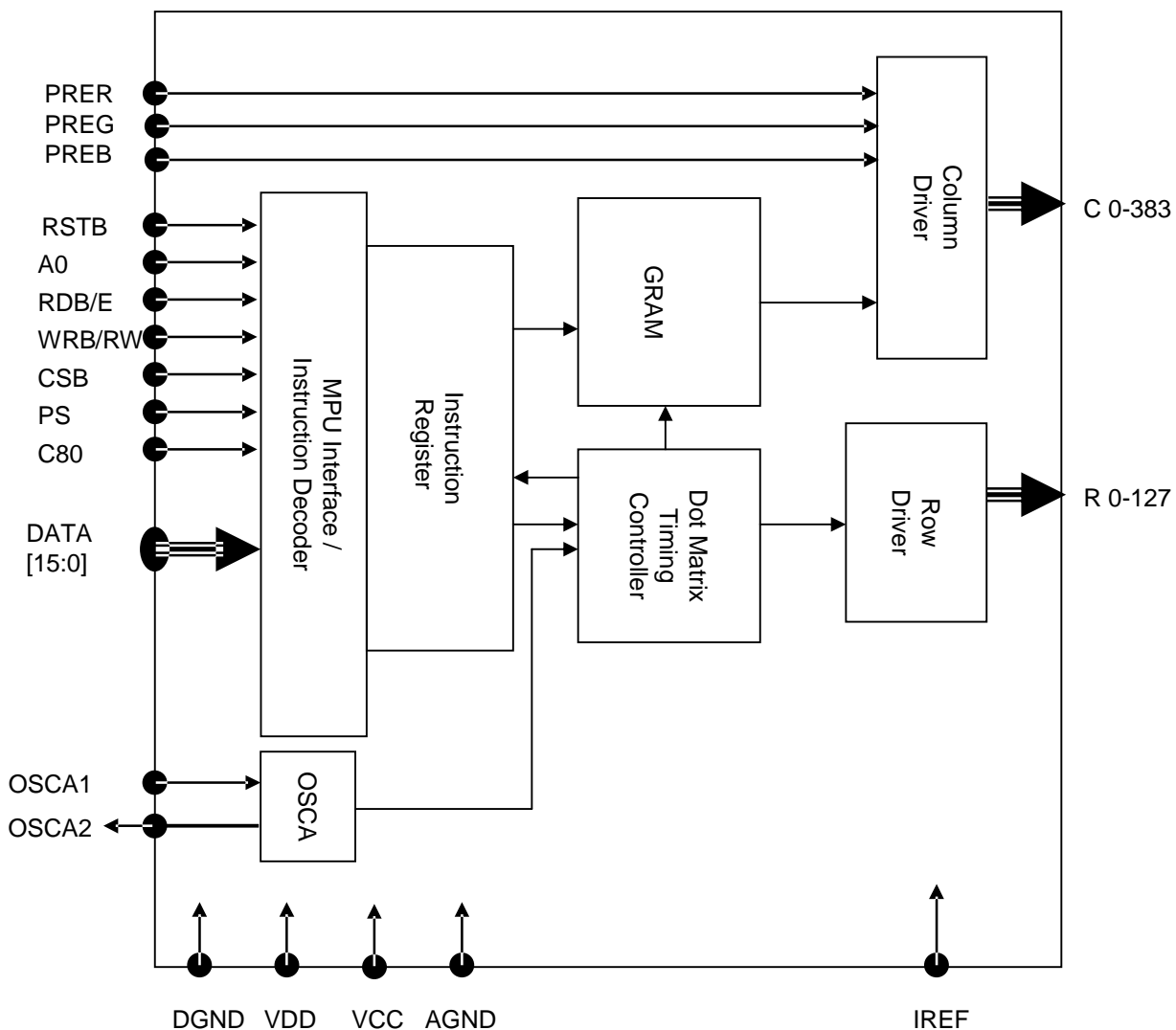
OSCRATOR
OSCA (**3.0** MHz) for Dot Matrix

Screen Saver
Variety of Screen Saver.

Frame Rate
Variable Flame Rate (**60,75,90,105,120,135,150**)Hz

LD50T5128M SPECIFICATION

5. BLOCK   DIAGRAM

6. PIN DESCRIPTION

6. 1. Power Supply Pins

Signal	Pin No.	Pad No.	TYPE	Function
VCC	TBD	TBD	POWER	OELD Dot Matrix Power Supply
VDD	TBD	TBD		Logic Power Supply
AGND	TBD	TBD		Analog (Driver) GND
DGND	TBD	TBD		Logic GND

6.2. System Control Pins

Signal	Pin No.	Pad No.	TYPE	Function
OSCA1	1	TBD	I	Oscillator for Dot Matrix
OSCA2	1	TBD	O	External R = 39 kΩ
PRER	1	TBD	I/O	Pre-Charge Voltage for Red
PREG	1	TBD	I/O	Pre-Charge Voltage for Green
PREB	1	TBD	I/O	Pre-Charge Voltage for Blue
IREF	1	TBD	O	**Current Setting. Typ Resistance = 39 kΩ (Current adjustable range ±30%)**
C80	1	TBD	I	**H: 68CPU L:80CPU**
PS	1	TBD	I	**H: Parallel L: Serial**

6.3. MPU Interface Pins

Signal	Pin No.	Pad No.	TYPE	Function
CSB	1	TBD	I	Chip Select (Active Low)
RDB/E	1	TBD	I	Read (Active Low, 80 Interface) Enable (68 Interface)
WRB/RW	1	TBD	I	Write (Active Low, 80 Interface) H:Read L:Write (68 Interface)
RSTB	1	TBD	I	Reset (Active Low)
A0	1	TBD	I	Address (L: command, H: Parameter)
D[15:2]	14	TBD	I/O	Data Bus
D[1]	1	TBD	I/O	Data Bus or Serial Data
D[0]	1	TBD	I/O	Data Bus or Serial Clock

6.4. OLED Driver Pins

Signal	Quantity	Pad No.	TYPE	Function
R0 to R127	128	TBD	O	OELD Dot Matrix Row Output
C0 to C383	384	TBD	O	OELD Dot Matrix Column Output

LD50T5128M SPECIFICATION

7. FUNCTIONAL DESCRIPTION

7.1 MPU Interface
- •All command inputs have priority over previous command's parameter.
- • 8Bit Bus uses the lower side D7-D0.
     6Bit Bus uses the lower side D5-D0
- • To changing Bus type uses "CPU Interface Select" command.
- • In 8 Bit Bus mode, always execute 2 steps in command and parameter.
     In 6 Bit Bus mode, always execute 3 steps in parameter.
- • Command and command parameters use D7-D0 in 8Bit and 16Bit both mode.
- • Data Memory Read and Write use D15-D0 in 16Bit mode and D7-D0 in 8Bit mode.
- • NOTE : See Memory read and write command part.

- • 80 Series CPU

Function	CSB	WRB	RDB	A0	D[15:0]
Write Command	L	#	H	L	Command
Write Parameter or Data	L	#	H	H	Parameter or Data
Read Parameter or Data	L	H	#	H	Parameter or Data
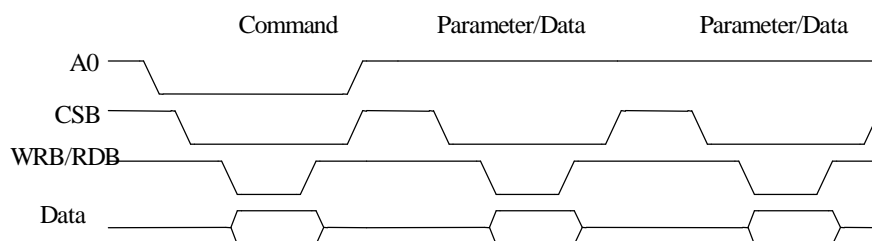
- • 68 Series CPU

Function	CSB	RW	E	A0	D[15:0]
Write Command	L	L	$	L	Command
Write Parameter or Data	L	L	$	H	Parameter or Data
Read Parameter or Data	L	H	$	H	Parameter or Data

LD50T5128M SPECIFICATION
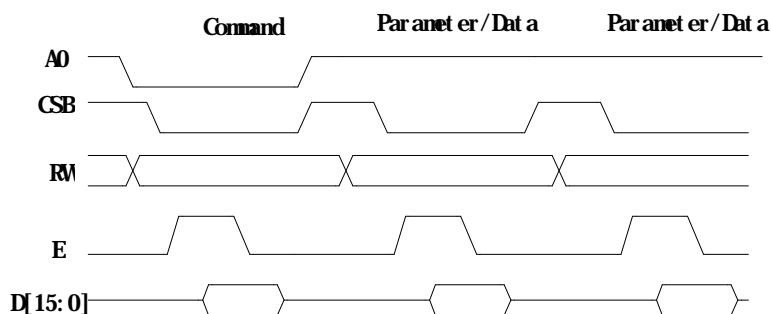
- **Serial Interface**

Function	CSB	Clock	A0	Data
Write Command	L	D0	L	D1
Write Parameter or Data	L	D0	H	D1
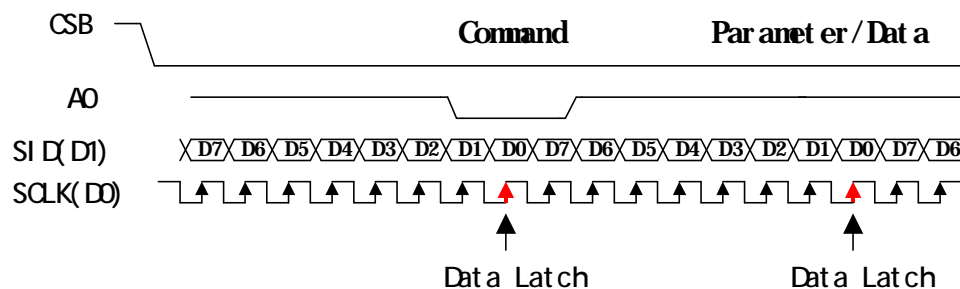
- Notice
- All command inputs have priority over previous command's parameter
- To select Parallel/Serial Interface uses PS Input. (H: Parallel L: Serial)
- Serial Interface use always 8Bit access mode.

7.2. Dot Memory Map
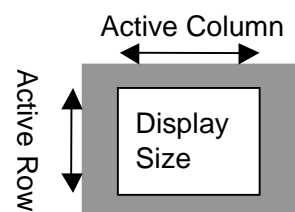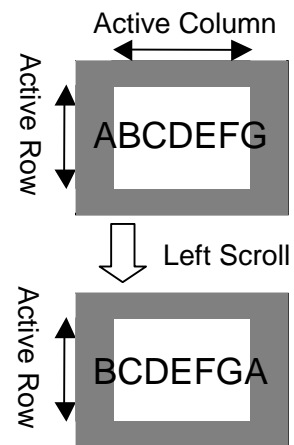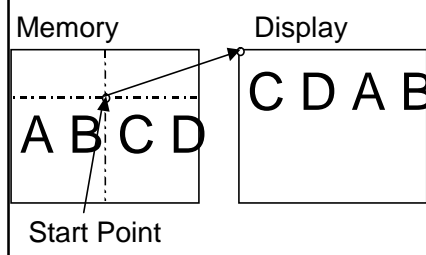
DISPLAY DATA RAM MAP

- Memory Size = 128 x 16Bit x 128

7.3. Correspondence Memory and Display

Memory Data Write	• "Data Writing Box" command indicate memory writing area. • "Writing direction" command indicate writing direction(auto address increment or decrement)	
Display Direction	• "DispDirection" command indicate Row scan direction. • Row R0⇔Rmax Memory	

LD50T5128M SPECIFICATION

Display Size	• "DispSize" command indicate active outputs. • The column outputs out of active area always **Hi-z.** • The row outputs out of active area always **Vcc** excluding display off. • Scan is repeated within active area. • Frame frequency is set for maximum display area. • Rows out of active row are **Vcc.**	Active Column Active Row Display Size
Scroll Area	• In scroll mode, display all memory area regardless display size.	Active Column Active Row ABCDEFG Left Scroll Active Row BCDEFGA
Memory Reading Start Address	• "DispStart" Command fix the relation of memory and display coordinates.	Memory Display A B C D C D A B Start Point

7.4. Output Arrange
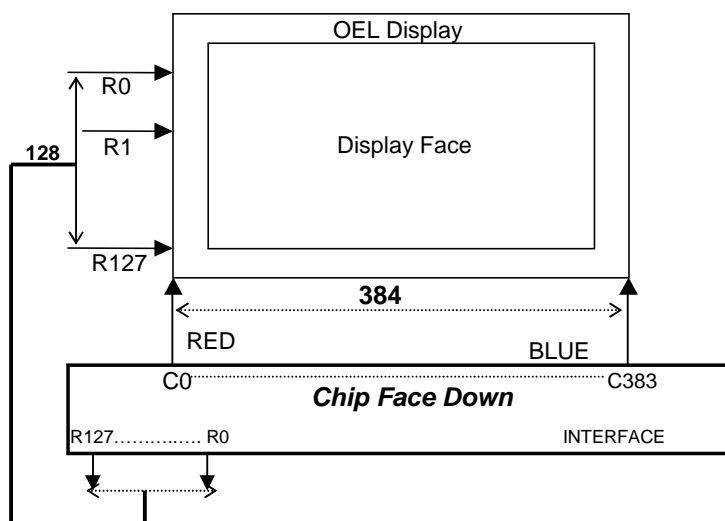
NOTICE *IC Bumped surface is on bottom.

7.5. Dot Matrix Output Wave Form
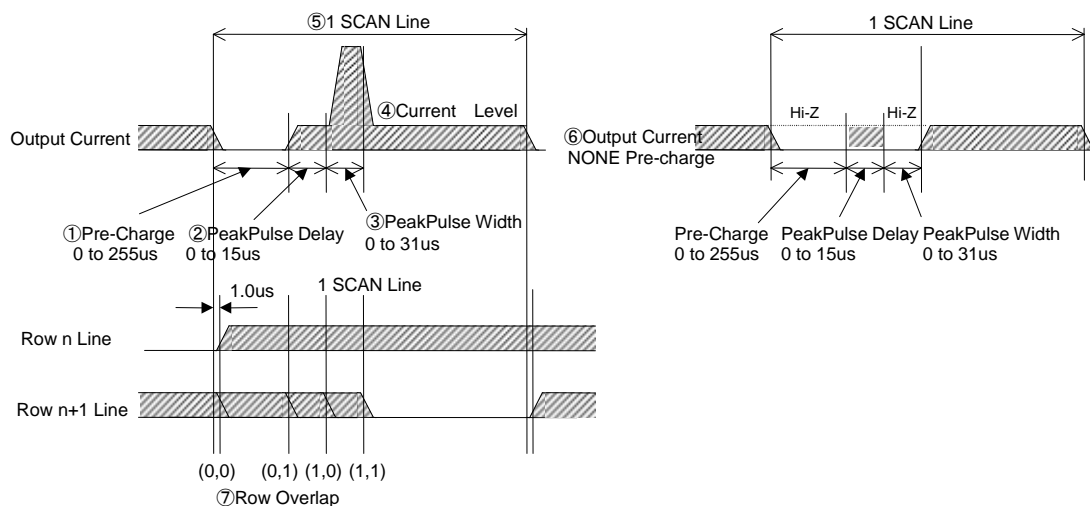
Related Command
1. PreC_Width(RGB), PreC_Select
2. PeakDelay
3. PeakWidth(RGB), PreC_Select
4. DotCurrent(RGB)
5. DFRAME
6. PreC_Select
7. RowOverlap

LD50T5128M SPECIFICATION

7.6. Pre-charge

When Pre-Charge, each column output is connected the each color pre-charge pin in the IC. Therefore all
    dot matrix column outputs have the switch between driver and pre-charge pin.
External pre-charge pins are tied with Zener Diode.
External pre-charge pins have outer circuit for every colors.

7.7. Dot Matrix Power Save

Function	Display ON/OFF	Stand-by	Soft Reset
Command	DISPON/OFF(02 h)	STBON/OFF(04h)	SOFTRES(01h)
execute	• Display ON/Off	• Display OFF • OSC Start/Stop	• Register Clear • Display OFF • Stand-by ON

7.8. Reset
When RSTB Input becomes 'L', all Register is set Default.
When SOFTRES command is inputted, all Register is set Default except status/data register

7.9. OSC
OSCs are separated between Dot Matrix and ICONs.

Clock System
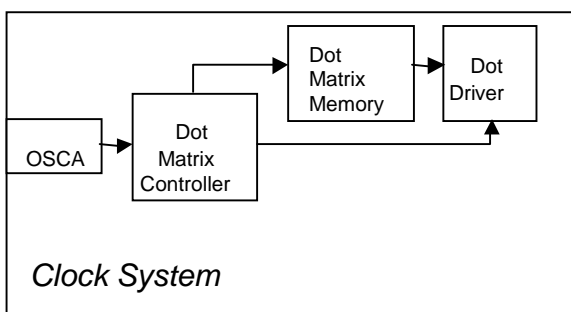
• On-chip oscillator A with external resistor
• On-chip oscillator B for ICON with internal resistor.
• In stand-by mode, oscillator is stopped
• Frame frequency is adjusted by "DFRAME" command.

8. Referential Set-up Flow
8.1 Initializing
8.2. Power ON-OFF

LD50T5128M SPECIFICATION
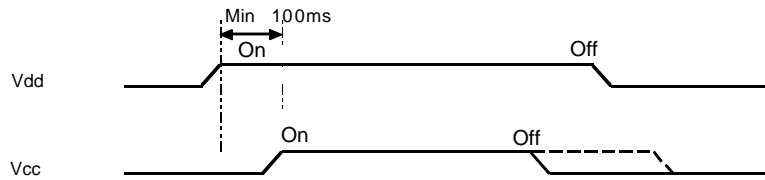
Power ON Sequence : Vdd ⟩ Vcc
Power OFF Sequence : Vcc ⟩ Vdd

9. ELECTRICAL CHARACTERISTICS
9.1. MAXIMUM RATINGS

(Ta = -40~85℃)

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	**−0.3 ~ +4.0**	V
Vcc		**−0.3 ~ +20**	
V_{IN}	Input Voltage Range	**−0.3 ~ V_{DD}+0.3**	
V_{OUT}	Output Voltage Range	**−0.3 ~ V_{DD}+0.3**	
T_{OPR}	Operating Temperature Range	**−40 ~ +85**	℃
T_{STG}	Storage temperature Range	**−50 ~ +125**	℃

9.2. DC CHARACTERISTICS

(V_{DD}= 2.4 ~ 3.3V, Vcc=18V, Ta = -40 ~ 85℃)

Symbol	Parameter Operating Voltage	Conditions	Related Pins	MIN	TYP	MAX	UNIT
Vcc	Operating Voltage	-	Vcc	8 *1)	-	18	V
V_{DD}	Operating Voltage	-	V_{DD}	2.4	2.8	3.3	
V_{IH}	High Logic Input Level	Iout = 100uA	Logical Input	$0.7*V_{DD}$	-	V_{DD}	
V_{IL}	Low Logic Input Level	Iout = 100uA	Logical Input	0	-	**$0.3*V_{DD}$**	
V_{OH}	High Logic Output Level	Iout = 100uA	Logical Output	$0.9*V_{DD}$	-	**V_{DD}**	
V_{OL}	Low Logic Output Level	Iout = 100uA	Logical Output	0	-	**$0.1*V_{DD}$**	
IIL	Input Leakage Current			−1.0	-	**+1.0**	µA
FOSC1	Oscillator Frequency For Dot Matrix			2.7	3.0	3.3	MHz

LD50T5128M SPECIFICATION

Cptp1	Output Current Pin to Pin Evenness *2)	Iout=50uA	C0-383	-1.0	-	+1.0	%
Cptp2	Output Current Pin to Pin Evenness *2)	Iout=200uA	C0-383	-0.5	-	+0.5	%
Calp1	Output Current Evenness *3)	Iout=50uA	C0-383	-	-	+6	%
Calp2	Output Current Evenness *3)	Iout=200uA	C0-383	-	-	+4	%
Cchip1	Output Current Absolute Correctness *4)	Iout=50uA	C0-383	-5.0	-	+5.0	%
Cptp3	Peak boot Pin to Pin Evenness *2)	Ioutpeak = 500uA	C0-383	-0.5	-	+0.5	%
Calp3	Peak boot Evenness *3)	Ioutpeak = 500uA	C0-383	0	-	+4	%
Cchip3	Peak boot Absolute Correctness *4)	Ioutpeak = 500uA	C0-383	-5.0	-	+5.0	%
Calp4	Peak boot **relative** Evenness *5)	Iout=200uA	C0-383	0	-	+4	%
Rrg	ROW‐Vss ON Resistance	**IOL=50mA**	R0-R127	-	10	20	Ω
Rr	ROW‐VH ON Resistance	**IOL=1mA**	R0-R127	-	1	3	kΩ
Rp	Pre-Charge SW ON Resistance	**Each Pin**	C0-383	-	200	500	Ω
		Column All Pin Short	C0-383	-	-	7	Ω
$I_{DD}1$	Stand-by Current		I_{DD}	-	1.0	5.0	µA
$I_{CC}1$			I_{CC}	-	1.0	5.0	µA
$I_{DD}2$	Normal Operation	***6)**	I_{DD}	-	1.0	2.0	mA
$I_{CC}2$		***6)**	I_{CC}		-	TBD	mA

NOTICE :

*1) Min Vcc : 8V on spec but workable to 5V

*2) DOT ： $(I_k - I_{k+3})$/ Iavg ： （k = 0 to 124), Iavg = $\sum$ (I3k, I3k+1, I3k+2) : (k = 0 to 127)

*3) （Imax − Iavg）/ Iavg, (Imin – Iavg) / Iavg , Iavg = $\sum$ (Ik) / 383 : (k = 0 to 383)
*4) (Iavg - I_{REF}(SPEC))/I_{REF}(SPEC)
*5) Max{(Ik − Iavg)/ Iavg} : (k = 0 to 383) , Iavg = $\sum$ (Ik) / 383 : (k = 0 to 383)
*6）Iout =10μA All Data on, Frame Frequency 120Hz, Vcc=15V, Vdd=2.8V,
    Output all Open, Display Size full, Others Default

LD50T5128M SPECIFICATION

9.3. AC Characteristics
9.3.1. Write Timing
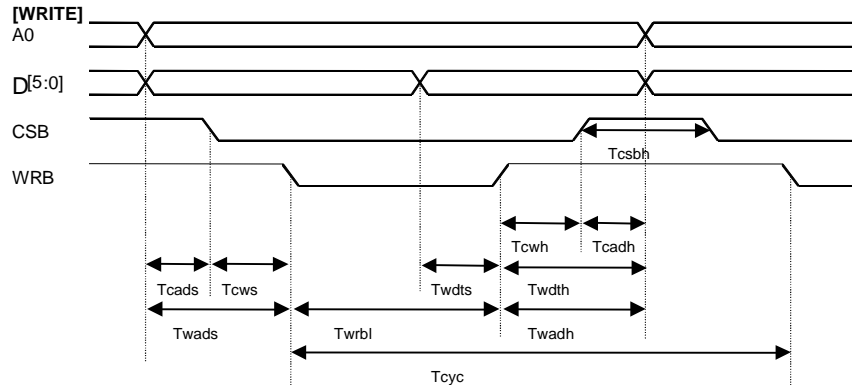
$(V_{DD}= 2.4 \sim 3.3V, Ta = -40 \sim 85℃)$

Items	Signal	Symbol	Min	Typ	Max	Unit
Write cycle time	WRB	Tcyc	100	-	-	횟
Address and Select setup time Address and Select hold time	CSB,A0	Tcads Tcadh	0 0	-	-	횟
Address setup time Address hold time	A0	Twads Twadh	50 20	-	-	횟
Select setup time Select hold time	CSB	Tcws Tcwh	10 10	-	-	횟
Write Low pulse width	WRB	Twrbl	30	-	-	횟
Select High pulse width	CSB	Tcsbh	10	-	-	횟
Data setup time（CL=100헷） Data hold time （CL=100 헷）	D7 to D0	Twrts Twrth	10 20	-	-	횟

9.3.2. Read Timing
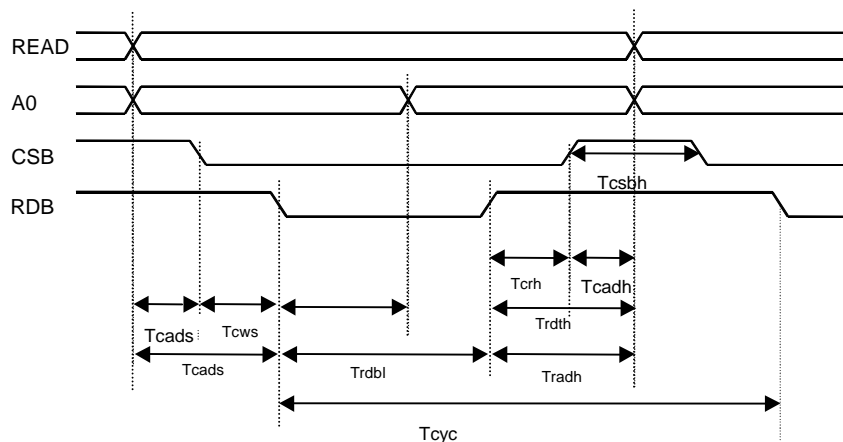
$(V_{DD}= 2.4 \sim 3.3V, Ta = -40 \sim 85℃)$

Items	Signal	Symbol	Min.	Typ	Max	Unit
Read cycle time	RDB	Trcyc	500	-	-	㎱
Address and Select setup time Address and Select hold time	CSB,A0	Tcads Tcadh	0 0	-	-	㎱
Address setup time Address hold time	A0	Trads Tradh	50 20	-	-	㎱
Select setup time Select hold time	CSB	Tcrs Tcrh	10 10	-	-	㎱
Read Low pulse width	RDB	Trdbl	250	-	-	㎱
Select High pulse width	CSB	Tcsbh	10	-	-	㎱
Read data delay time (CL=100㎊) Read data hold time (CL=100 ㎊)	D7 toD0	Trdtd Trdth	- 5	- -	200 -	㎱

9.3.3. Driver OUTPUT
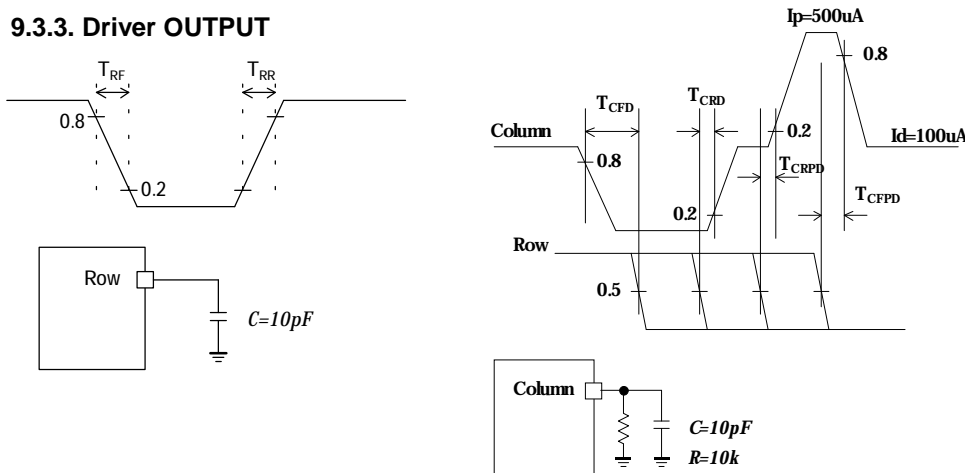
• RowOverlap command changes Row falling timing.

$(IOUT=100\ uA,\ V_{DD}= 2.4 \sim 3.3V\ ,\quad Vcc = 15V,\ Ta = 25℃)$

Item	Signal	Symbol	Min	Typ	Max	Unit
Row Falling Time	R0-R127	T_{RF}	-	-	10	ns
Row Rising Time	R0-R127	T_{RR}	-	-	100	ns
Column falling time until Row falling	C0-C383 (to R)	T_{CFD}	0.8	-	1.2	us
Column Drive Start Delay Time	C0-C383 (to R)	T_{CRD}	0	-	200	ns
Column Peak Delay Time	C0-C383 (to R)	T_{CRPD}	0	-	200	ns
Column Peak Falling Delay Time	C0-C383 (to R)	T_{CFPD}	0	-	200	ns

LD50T5128M SPECIFICATION

9.3.4. Reset
Reset low pulse width must be longer than 1 us.
Reset complete time is smaller than 1 us.

9.3.5. ƒ OSC
39kΩ Resister need between OSCA1 and OSCA2.

10. RELIABILITY TESTITEMS

ITEM	Conditions	Sample	

12.3. Marking

13. Packing Information
13.1. Label
13.2. Packing Form
13.3. Real
13.4. Desiccant
13.5. Lead Tape

LD50T5128M SPECIFICATION

OLED 128x128 65kColor Dot Matrix
Driver with Controller
CMOS LSI   Command Specification

PART 2 CONTENTS

INSTRUCTION DESCRIPTION

1. Display   System   Command
1.1 Software Reset

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
SOFTRES	W	L	**01h**	W	L	-	-	-	-	-	-	-	-		-

Software reset command
All registers are cleared default (except for ICON Area and Data Register).
Dot matrix and All ICON are OFF.
OSCA , OSCB and internal DC-DC are stopped
*NOTE Don't clear Graphics memory.

1.2. Dot Matrix Display ON/OFF

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
DDISPON/OFF	W	L	**02h**	W	H	-	-	-	-	-	-	-	P0		00h

Dot matrix display ON / OFF command.
When D="0" :
   † Turns the dot matrix Display OFF (Default).
Display OFF means
   † *All Column Output become Hi-Z*
   † *All Row Output become GND*
   † *Stop Data transfer from memory to Dot Matrix Driver.*

When D="1" :
   † Turns the dot matrix Display ON.
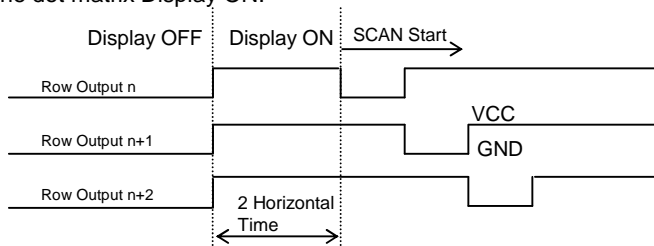
1.3. Dot Matrix Display Stand-by ON/OFF

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
DSTBYON/OFF	W	L	**14h**	W	H	-	-	-	-	-	-	-	P0		01h

Dot matrix display Standby ON / OFF command.
When P0=0
   † OSCA Start. (Don't turn the dot matrix display on)
   † OSCA Stop. (Default)
When P0=1
   † Execute DDISPOFF command
   † OSCA Stop. (Default).

*NOTE 1 : Don't clear Graphics memory and Register.
*NOTE 2 : After software and hardware Reset, stay "DSTBYON" Mode.
*NOTE 3 : Column Driver latched data are reset.

LD50T5128M SPECIFICATION

1.4. Dot Matrix Frame Rate

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
DFRAME	W	L	**1Ah**	W	H	-	-	-	-	-	F2	F1	F0		02h

Dot Matrix frame rate control command

Parameter Definition

F[2:0]	Frame Frequency
0	60㎐
1	75㎐
2	90Hz(Default)
3	105Hz
4	120Hz
5	135Hz
6	150Hz
7	150㎐

1.5. Graphics Memory Display Direction

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
ScanDirection	W	L	**09h**	W	H	-	-	-	-	-	-	P1	P0		00h

Row Scan Direction Set command.
This command change data shift direction of Rows.

P1	P0	Column	Row
0	0	0h ⇒ Max X	0h ⇒ Max Y
1	0	0h ⇒ Max X	Max Y ⇒ 0h

*） P0 Don't used.
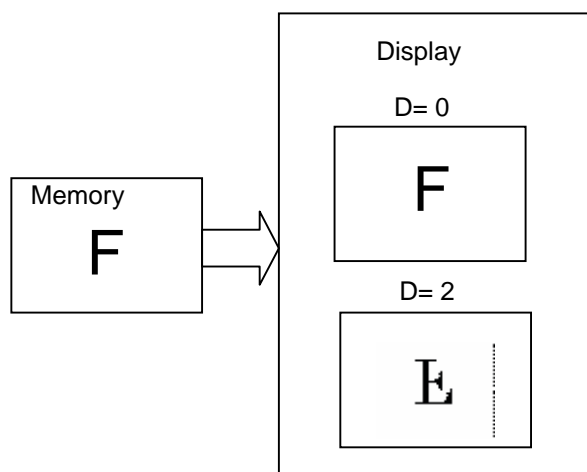
1.6. Display Size

INSTRUCTION	Command			Parameter											Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0			
DispSizeX	W	L	30h	W	H	-	FX6	FX5	FX4	FX3	FX2	FX1	FX0	Start Column Output	00h
				W	H	-	TX6	TX5	TX4	TX3	TX2	TX1	TX0	End column Output	7Fh
DispSizeY	W	L	32h	W	H	-	FY6	FY5	FY4	FY3	FY2	FY1	FY0	Start Row Output	00h
				W	H	-	TY6	TY5	TY4	TY3	TY2	TY1	TY0	End Row Output	7Fh

Setting Row and Column Outputs Range (= Active area).
  From FX to TX : The range of active Column Outputs (Range：00h-7Fh)
    Setting Value = Pixel number –1
      "XE＜XS" is inhibited.

  From FY to TY : The range of active Row Outputs setting(Range：00h-7Fh)
  Setting Value = Pixel number –1
Ø   **"YE＜YS" is inhibited.**

*Notice1: The outputs that are out of setting range are set **Hi-Z(Column)** and **VCC(Row)**.
*Notice2: In screen saver mode, display area is same with this active area but whole memory data are scrolled.
*Notice3: Line scan frequency is same under any display size. Frame frequency is changed by DispSize command.

**Driver Active Range
against Display Size**
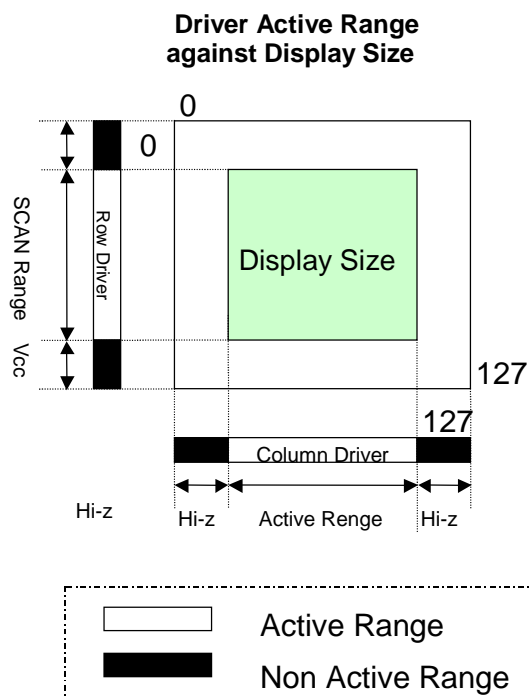
1.7. Memory Reading Start Address Set(38h, 39h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
XDispStart	W	L	**38h**	W	H	-	DX6	DX5	DX4	DX3	DX2	DX1	DX0	Column Display Start Address	00h
YDispStart	W	L	**39h**	W	H	-	DY6	DY5	DY4	DY3	DY2	DY1	DY0	Row Display Start Address	00h

This command shift the memory reading address.
DX6-DX0 : X axis Reading Start address (Range: 00h~7Fh)
DY6-DY0 : Y axis Reading Start address （Range：00h~7Fh)

1.8. CPU Interface select(0Dh)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
Interface6/8/16	W	L	**0Dh**	W	H	-	-	-	-	-	-	P1	P0	0:8Bit interface 1:16Bit interface 2:6Bit interface (RGB) 3:6Bit interface (BGR)	00h

When P="0" use 8Bit Interface bus.
When P="1" use 16Bit Interface bus in data writing and reading mode, but another command use 8 Bit Mode.
When P="2" use 6Bit Interface bus in data writing and reading mode, but another command use 8 Bit Mode. (RGB)
When P="3" use 6Bit Interface bus in data writing, but another command use 8 Bit Mode. (BGR)

	A0	P = "0"	P = "1"	P = "2"	P = "3"
COMMAND	L	D7~D0	D7~D0	D7~D0	D7~D0
PARAMETER	H	D7~D0	D7~D0	D7~D0	D7~D0
Data Read/Write	L	D7~D0	D7~D0	D7~D0	D7~D0
Parameter	H	D7~D0 R4R3R2R1R0G5G4G3	D15~D0 R4-R0G5-G0B4-B0	D5~D1 R4R3R2R1R0	D5~D1 B4B3B2B1B0
	H	D7~D0 G2G1G0B4B3B2B1B0		D5~D0 G5G4G3G2G1G0	D5~D0 G5G4G3G2G1G0
	H			D5~D1 B4B3B2B1B0	D5~D1 R4R3R2R1R0

1.9. Data Masking(1Eh)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
Data_Masking	W	L	**IEh**	W	H	-	-	-	RV	-	R	G	B	RV=0 : Data 0:Data Mask RV=1: Data Reverse 1:Data Output	07h

When RV ="1" : (Data EXOR FFFFh) AND Pallet(RGB) ⇒ Output Data
When RV ="0" : Data AND Pallet(RGB) ⇒ Output Data
If pallet is (0,1,1) then R data is 00h.

2. Read / Write command
2.1. Data Reading/Writing Box(34h, 35h, 36h, 37h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D7	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
XBoxAdrrSTART	W	L	**34h**	W	H	-	XS6	XS5	XS4	XS3	XS2	XS1	XS0	Writes Box Column Start Address	00h

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
XBoxAdrrEND	W	L	**35h**	W	H	-	XE6	XE5	XE4	XE3	XE2	XE1	XE0	Writes Box Column End Address	7Fh

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
YBoxAdrrSTART	W	L	**36h**	W	H	-	YS6	YS5	YS4	YS3	YS2	YS1	YS0	Writes Box Row Start Address	00h

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
YBoxAdrrEND	W	L	**37h**	W	H	-	YE6	YE5	YE4	YE3	YE2	YE1	YE0	Writes Box Row End Address	7Fh

XS6-XS0 ： X axis Reading/Writing Start Point (Range:00h~7Fh).
XE6-XE0 ： X axis Reading/Writing End Point (Range : 00h~7Fh).
"XE<XS"is inhibited.

YS6-YS0 ： Y axis Reading/Writing Start Point (Range : 00h~7Fh).
YE6-YE0 ： Y axis Reading/Writing Start Point (Range : 00h~7Fh).
"YE<YS"is inhibited.

After this command executes, writing address is set like under table.

Writing Direction Mode	X address	Y address
00	XS	YS
01	XE	YS
10	XS	YE
11	XE	YE

*NOTE : See Writing Direction Set Command

2.2. Graphics Memory Writing Direction(1Dh)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D7	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
WriteDirection	W	L	**1Dh**	W	H	-	-	-	-	-	VH	D1	D0	Graphics Memory Writing Direction	00h

Graphics Memory Writing Direction Set Command
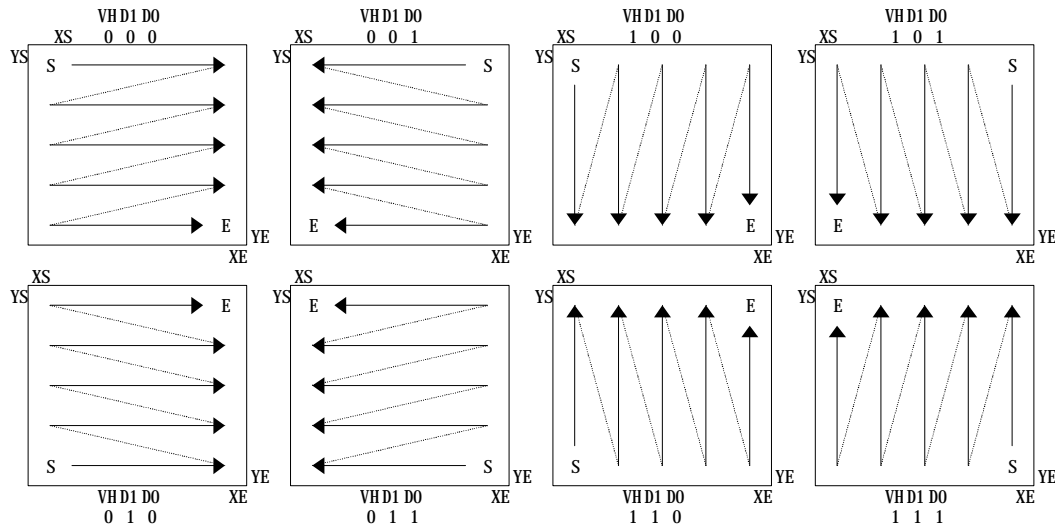
2.3. Dot matrix Display Data Read/Write(**08h**)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
Data Write/Read	W	L	**08h**	W	H	-	-	-	-	-	-	-	-		-

Parameter Mode	WR	A0	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
16 Bit Data Write	W	H	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B4	B3	B2	B1	B0
16 Bit Data Read	R	H	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B4	B3	B2	B1	B0

Parameter Mode	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0
8 Bit Data Write	W	H	R4	R3	R2	R1	R0	G5	G4	G3
8 Bit Data Write	W	H	G2	G1	G0	B4	B3	B2	B1	B0
8 Bit Data Read	R	H	R4	R3	R2	R1	R0	G5	G4	G3
8 Bit Data Read	R	H	G2	G1	G0	B4	B3	B2	B1	B0

Parameter Mode	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0
5 Bit Data Write	W	H	-	-	R4	R3	R2	R1	R0	-
6 Bit Data Write	W	H	-	-	G5	G4	G3	G2	G1	G0
5 Bit Data Write	W	H	-	-	B4	B3	B2	B1	B0	-

When P="0" use 8Bit Interface bus in graphics memory data writing and reading mode.
When P="1" use 16Bit Interface bus in graphics memory data writing and reading mode.
When P="2" use 6Bit Interface bus in graphics memory data writing mode. (RGB)
When P="3" use 6Bit Interface bus in graphics memory data writing mode. (BGR)

LD50T5128M SPECIFICATION

This command can't write data in the out of reading / writing-box.
Address is auto increment acceding to WriteDirection setting direction.
When memory address increment/decrement is reached at the end of reading /writing-box
 memory write finish.
If you read / write again, re-inter "Data Write/Read" command.

Data Write Sequence

Seq.	RW	A0	16 Bit Mode Data Bus	8 Bit Mode Data Bus	6 Bit Mode Data Bus
1	W	L	Data Write Command		
2	W	H	Write 1st Parameter	Write 1st Upper Parameter	Write 1st Upper Parameter
3	W	H	Write 2nd Parameter	Write 1st Lower Parameter	Write 1st Middle Parameter
4	W	H	:	Write 2nd Upper Parameter	Write 1st Lower Parameter
:	:	:	:	:	:
N+1	W	H	Write Nth Parameter	:	:
			-	:	:
2N	W	H	-	Write Nth Upper Parameter	:
2N+1	W	H	-	Write Nth Lower Parameter	:
:	:	:	-	-	:
3N-1	W	H	-	-	Write Nth Upper Parameter
3N	W	H	-	-	Write Nth Middle Parameter
3N+1	W	H	-	-	Write Nth Lower Parameter

Data Read Sequence

Seq.	RW	A0	16 Bit Mode Data Bus	8 Bit Mode Data Bus
1	W	L	Data Read Command	
2	R	H	Dummy Read	Dummy Read
3	R	H	Read 1st Parameter	Dummy Read
4	R	H	Read 2nd Parameter	Read 1st Upper Parameter
5	R	H	Read 3rd Parameter	Read 1st Lower Parameter
6	R	H	Read 4th Parameter	Read 2nd Upper Parameter
7	R	H	Read 5th Parameter	Read 2nd Lower Parameter
:	:	:	:	:
N+2	R	H	Read Nth Parameter	:
			-	:
2N+2	R	H	-	Write Nth Upper Parameter
2N+3	R	H	-	Write Nth Lower Parameter
:	:	:	-	-
3N+2	R	H	-	-
3N+3	R	H	-	-
3N+4	R	H	-	-

LD50T5128M SPECIFICATION

2.4. Register Read(20h)

INSTRUCTION	Command			Parameter											Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0			
READREG	W	L	20h	R	H	D7	D6	D5	D4	D3	D2	D1	D0	1st parameter	-
				:	:	:	:	:	:	:	:	:	:	:	-
				R	H	D7	D6	D5	D4	D3	D2	D1	D0	Nth parameter	-

Read out all register

Order	Register
1	DDISP_ON/OFF
2	DSTBY_ON/OFF
3	DispSize XS
4	DispSize XE
5	DispSize YS
6	DispSize YE
7	Row Overlap
8	ICON ON/OFF
9	ICON_DDCNT
10	SleepStart
11	S_Start/Stop
12	Screen Saver Select

3. Driver Setting command
3.1. Peak Pulse Width Set (3Ah, 3Bh, 3Ch)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
PeakWidthR	W	L	**3Ah**	W	H	-	-	-	W4	W3	W2	W1	W0	Peak Pulse Width Set D=Width (0-31 힘)	05h
PeakWidthG	W	L	**3Bh**	W	H	-	-	-	W4	W3	W2	W1	W0	Peak Pulse Width Set D=Width (0-31 힘)	05h
PeakWidthB	W	L	**3Ch**	W	H	-	-	-	W4	W3	W2	W1	W0	Peak Pulse Width Set D=Width (0-31 힘)	05h

Parameter Definition

D[4:0]	Peak Pulse Width
0	0 us
1	1 us
:	:
1Eh	30 us
1Fh	31us

3.2. Peak Pulse Delay Set (16h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
PeakWidthB	W	L	**16h**	W	H	-	-	-	-	P3	P2	P1	P0	Sets Peak Pulse Delay (0~15칸)	05h

Parameter Definition (1.0 us Step)

D[3:0]	Peak Pulse Delay
0	0 us
1	1 us
:	:
Eh	14 us
Fh	15 us

3.3. Dot Matrix Current Level Set(40h,41h,42h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
DotCurrentR	W	L	**40h**	W	H	I7	I6	I5	I4	I3	I2	I1	I0	Dot Matrix Current 0 – 255μA	00h
DotCurrentG	W	L	**41h**	W	H	I7	I6	I5	I4	I3	I2	I1	I0	Dot Matrix Current 0 - 255μA	00h
DotCurrentB	W	L	**42h**	W	H	I7	I6	I5	I4	I3	I2	I1	I0	Dot Matrix Current 0 - 255μA	00h

Parameter Definition (1.0칸 Step)

I[7:0]	Output Current (Default 0uA)
00h	0 칸
01h	1 칸
:	:
FEh	254 칸
FFh	255 칸

LD50T5128M SPECIFICATION

Current Value Table

Gray Scale	Normal Current	Peak Current
	Green	Green
0	0	0
1	1/63⌐ IG	1/63⌐ IG⌐ 10
2	2/63⌐ IG	2/63⌐ IG⌐ 10
3	3/63⌐ IG	3/63⌐ IG⌐ 10
60	60/63⌐ IG	60/63⌐ IG⌐ 10
61	61/63⌐ IG	61/63⌐ IG⌐ 10
62	62/63⌐ IG	62/63⌐ IG⌐ 10
63	IG	IG⌐ 10

Gray Scale	Normal Current	Peak Current
	Red	Red
0	0	0
1	1/31⌐ IG	1/31⌐ IG⌐ 10
2	2/31⌐ IG	2/31⌐ IG⌐ 10
3	3/31⌐ IG	3/31⌐ IG⌐ 10
28	28/63⌐ IG	28/31⌐ IG⌐ 10
29	29/63⌐ IG	29/31⌐ IG⌐ 10
30	30/63⌐ IG	30/31⌐ IG⌐ 10
31	IG	IG⌐ 10

Gray Scale	Normal Current	Peak Current
	Blue	Blue
0	0	0
1	1/31⌐ IG	1/31⌐ IG⌐ 10
2	2/31⌐ IG	2/31⌐ IG⌐ 10
3	3/31⌐ IG	3/31⌐ IG⌐ 10
28	28/63⌐ IG	28/31⌐ IG⌐ 10
29	29/63⌐ IG	29/31⌐ IG⌐ 10
30	30/63⌐ IG	30/31⌐ IG⌐ 10
31	IG	IG⌐ 10

*1) 10 Times is guaranteed until 500 μ A but over 500 μ A , peak current deviation is lower 4.0%.
　　See DC Characteristics SPEC.

3.4. Pre-Charge Width Set (18h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
PreC_Width	W	L	**18h**	W	H	T7	T6	T5	T4	T3	T2	T1	T0	Pre-Charge Width 0-255횟	08h

T[7:0]	Pre-Charge Pulse Width (Default 8횟)
0h	0 횟
1h	1 횟
:	:
FEh	254 횟
FFh	255횟

If Pre-Charge Pulse Width is longer then one line scan period, column driving is in all time pre-charge.

3.5. Pre-Charge Mode Select(44h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
PreC_Select	W	L	**44h**	W	H	-	-	-	-	-	-	S1	S0	D=0 None D=1 Selection (All Data) D=2 All-Pre-Charge D=3 Selection (Max Data)	02h

S1 and S0 used for Pre-Charge and Peak boot Selection Mode.

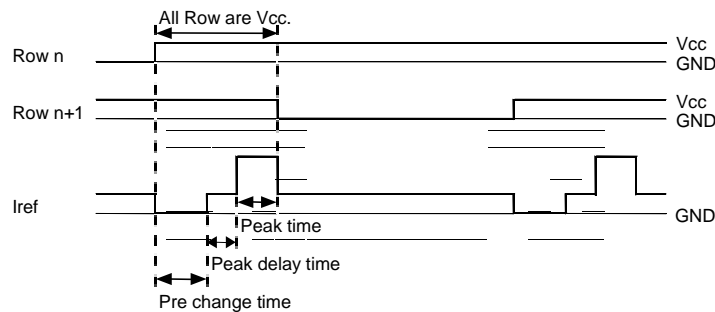| S1	S0	Pre-Charge	Peak Boot
0	0	None	None
0	1	Every Time	Every Time
1	0	Every Time	Every Time
1	1	Selective (Data≠Max)	Selective (Data≠Max)

In case of PreC_Select S1S0 = "11"

If(dataR(n) ≠ "1fh" or dataR(n-1) ≠"1fh") then **do** pre-charge and peak boot at that pixel.
If(dataG(n) ≠ "3fh" or dataG(n-1) ≠"3fh") then **do** pre-charge and peak boot at that pixel.
If(dataB(n) ≠ "1fh" or dataB(n-1) ≠"1fh") then **do** pre-charge and peak boot at that pixel.

If(dataR(n) = "1fh" and dataR(n-1)="1fh") then **Hi-z** pre-charge and peak boot at that pixel.
If(dataG(n) = "3fh" and dataG(n-1)="3fh") then **Hi-z** pre-charge and peak boot at that pixel.
If(dataB(n) = "1fh" and dataB(n-1)="1fh") then **Hi-z** pre-charge and peak boot at that pixel.

3.6. Row overlap set(48h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
Row_Overlap	W	L	**48h**	W	H	-	-	-	-	-	-	R1	R0	Row overlap Timing	00h

Raw Vcc timing setting Table.

RO1	RO0	All Row Vcc Time
0	0	None (Default)
0	1	Pre-Charge Timing
1	0	Pre-Charge + Peak Delay Timing
1	1	Pre-Charge + Peak Delay + Max(RGB)Peak boot Timing

LD50T5128M SPECIFICATION

3.7. Row Scan(17h)

INSTRUCTION	Command			Parameter											Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0			
Row_Scan	W	L	**17h**	W	H	-	-	-	-	-	-	-	P0	0: Normal Row Scan 1: All Row in GND	00h

Parameter Definition
P0="0" normal Scan.
P0="1" All Row are in GND.

4. Others
4.1. IC Test (F0h-FFh)

This command is only used IC test. Don't use this command.

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
TESTCNT	W	L		W	L		F				0-F				

Screen Saver Specification
OLED 128×128 65k color Dot Matrix Driver
With Controller CMOS LSI

CONTENTS

1. Screen Saver LIST & Setting Conditions

1.1 Screen Saver LIST
Screen Saver needs several settings before use.
These conditions are kept until they are changed.

| Command	Function
S_SleepTimer	Set time by sleeping.
S_SleepStart	This command stop screen saver and display off after setting time will gone
S_StepTimer	Set changing time step.
S_ZIGZAG	ZigZag Mode.
S_RANDOM	Display start address randomize.
S_MultiScroll	Up, Down, Light, Left Scroll in display area.
S_BlockMove	Billiard like moving. After moving block in order to step, it cross display border line, the moving direction change.
S_FadeInOut	Fade In means display become from dark to bright gradually. Fade Out means display become from bright to dark gradually.
S_FadeBox	"Fade Box" means display area is changing in box shape gradually.
S_FadeMask	Display cut in or out with black masking.
S_FadeScroll	Display cut in or out with scroll.
S_AutoColor	Automatically color change
S_ColorPallet	Set color pallets for S_AutoColor command.

1.2. Setting Conditions

Command	Time Step	Move Step	Box	LO	U	D	R	L	Stage	Pallet
S_ZIGZAG	O	1 (Fixed)	-	-	O	-	O	-	-	-
S_RANDOM	O	O	-	-	-	-	-	-	-	-
S_MultiScroll	O	1 (Fixed)	-	-	O	O	O	O	-	-
S_BlockMove	O	O	O	-	O	-	O	-	-	-
S_FadeInOut	O	1-4 (Fixed)	-	O	-	-	-	-	-	-
S_FadeBox	O	O	O	O	-	-	-	-	-	-
S_FadeMask	O	1 (Fixed)	-	O	O	O	O	O	-	-
S_FadeScroll	O	1 (Fixed)	-	O	-	-	O	O	-	-
S_AutoColor	O	-	-	-	-	-	-	-	O	O

Command Sequence
1. Time Step set ;uses S_StepTimer
2. Move Step set ;uses S_StepX, S_StepY
3. Box Size set ;uses S_Box_StartX, S_Box_StartY, S_Box_EndX, S_Box_EndY.
4. LO, U, D, R, L set : use S_Condition.
5. If S_ColorPallet Screen Saver, set Stage and Pallet.
6. Select Screen Saver Mode
7. S_Start uses for screen saver start.(Be in Screen Saver mode)
8. S_Stop uses for screen saver Stop.(out of Screen Saver mode)
9. If use auto off timer, set S_SleepTimer.
10. Start S_SleepStart.
11. After setting times is gone, Screen Saver will stop and Display off automatically.

1.3. DATA Reverse Priority
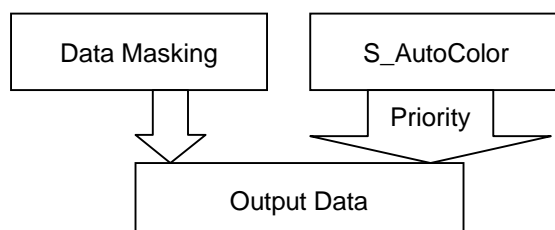
"S_AutoReverse" have priority over "Data_Reverse" command.

LD50T5128M SPECIFICATION

2. Screen Saver Command
2.1. S_SleepTimer(C0h), S_SleepStart(C2h)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_SleepTimer	W	L	**C0h**	W	H	T7	T6	T5	T4	T3	T2	T1	T0	0~255 sec setting	00h
S_SleepStart	W	L	**C2h**	W	H	-	-	-	-	-	-	-	P0	Screen Saver Auto Sleep Timer Start	0h

This command stop screen saver and display off after setting time will gone.
P0 = "0" : Sleep Stop.(Default)
 P0 = "1" : Sleep Start.
S_SleepStart is execute the follows after setting time will gone.
  † S_SaverStop
  † S_SleepStart (P0 = 0h)
  † DDIPS_OFF

2.2. Screen Saver Parameter Set Command
2.2.1. S_StepTimer(C3h), S_Step Timer(C4h)
Screen Saver event timer setting command.

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_stepTimer	W	L	**C3h**	W	H	T7	T6	T5	T4	T3	T2	T1	T0	0 ~ 255 setting	00h
S_stepUnit	W	L	**C4h**	W	H	-	-	-	-	-	-	S1	S0	Screen Saver Step Timer Setting 0: Stop 1: 1 ms Step 2: 0.1 sec Step	00h

S_StepTimer
    S＝0 : Timer Stop (Default)
    S＝1 : 1ms Unit
    S＝2 : 0.1s Unit

2.2.2. S_Box_StartX, S_Box_StartY, S_Box_EndX, S_Box_EndY

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_BoxStartX	W	L	**C6h**	W	H	-	SX6	SX5	SX4	SX3	SX2	SX1	SX0	Box Start X Address for Screen Saver	00h
S_BoxStartY	W	L	**C7h**	W	H	-	SY6	SY5	SY4	SY3	SY2	SY1	SY0	Box Start Y Address for Screen Saver	00h
S_BoxEndX	W	L	**C8h**	W	H	-	EX6	EX5	EX4	EX3	EX2	EX1	EX0	Box End Address for Screen Saver	7Fh
S_BoxEndY	W	L	**C9h**	W	H	-	EY6	EY5	EY4	EY3	EY2	EY1	EY0	Box End Y Address for Screen Saver	7Fh

Box area set for Screen Saver Command.
    † SX : Box Start Column Point 00h~7Fh
    † EX : Box End Column Point 00h~7Fh
        Always SX ≤ EX

    † SY : Box Start Row Point 00h~7Fh
    † EY : Box End Row Point 00h~7Fh
        Always SY ≤ EY

2.2.3. **S_StepX(CAh), S_StepY** (CBh)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_StepX	W	L	**CAh**	W	H	-				SX3	SX2	SX1	SX0	Changing or Moving X Step	01h
S_StepY	W	L	**CBh**	W	H	-				SY3	SY2	SY1	SY0	Changing or Moving Y Step	01h

Step Value(△ x, △ y) set for Screen Saver Command.
   †† SX : Moving Step for Column Point 00h~Fh
   † SY : Moving Step for Row Point 00h~Fh.

2.2.4. **S_Condition (CCh)**

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_Condition	W	L	**CCh**	W	H	-	-	-	L0	U	D	R	L	Changing or Moving Direction	00h

One time or repeat, direction condition setting for screen saver.
See Screen saver command in detail.
   † LO   : "0" : One time (Default)
            "1" : repeat
   † UDRL :   Direction (Default = 0h)

2.3. **S_Saver Start/Stop (CDh)**
This command start/stop Screen Saver in Section 2.4

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_Start/Stop	W	L	**CDh**	W	H	-	-	-	-	-	-	-	SS	Screen Saver Start/Stop	00h

D0 = "0" : Stop (Default)
D0 = "1" : Start

2.4. **Screen Saver Select** (CEh)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_Select	W	L	**CEh**	W	H	-	-	-	-	S3	S2-	S1	S0	Screen Saver Select	00h

S[3:0]	Screen Saver type
0	S_ZIGZAG
1	S_RAMDOM
2	S_MultiScroll
3	S_BlockMove
4	S_FadeInOut
5	S_FadeBox
6	S_FadeMask
7	S_FadeScroll
8	S_AutoColor

This command start each Screen Saver.
  Time Step uses S_StepTimer and S_StepUnit.
  Move Step uses S_StepX, S_StepY.
  Box uses S_Box_StartX, S_Box_StartY, S_Box_EndX, S_Box_EndY.
  LO, U, D, R, L use S_Condition.

LD50T5128M SPECIFICATION

2.4.1. S_ZIGZAG
Zigzag Mode Screen Saver.

Time Step	Move Step	Box	LO
Moving by pixel	1 pixel fixed	No relation	No relation

U	D	R	L	Meaning
1	0	1	0	Right Scroll and 1Line up
1	0	0	0	Left Scroll and 1Line up
0	0	1	0	Right Scroll and 1Line down
0	0	0	0	Left Scroll and 1Line down

2.4.2. S_RANDOM

Random type Screen Saver.
In this mode, memory read address is randomized.

Time Step	Move Step	Box	LO
Moving by event	No relation	No relation	No relation

U	D	R	L	Meaning
-	-	-	-	-

2.4.3. S_MultiScroll

Up Down Right Left Scroll.

Time Step	Move Step	Box	LO
Moving by One pixel	1 pixel fixed	No relation	No relation

| U	D	R	L	Meaning
1	0	0	0	Up Scroll
0	1	0	0	Down Scroll
0	0	1	0	Right Scroll
0	0	0	1	Left Scroll

S_BlockMove

Block Move like Billiard.
Block is indicated by S_BoxStart (x,y) and S_BoxEnd (x,y).
After moving block in order to step, it cross display border line, the moving direction change.

Time Step	Move Step	Box	LO
Changing Period time	Moving Step	Collision Detecting border	No relation

U	D	R	L	Meaning = Initial moving direction
1	0	1	0	Up + Right
1	0	0	0	Up + Left
0	0	1	0	Down +Right
0	0	0	0	Down +Left

*S_BlockMove Samples
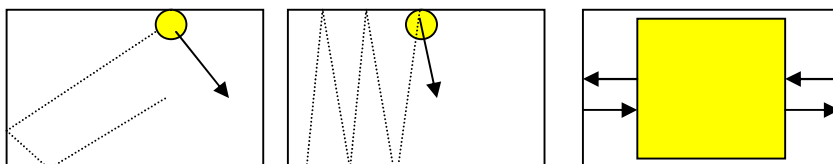

2.4.4. S_FadeInOut

Fade In means display become from dark to bright gradually.
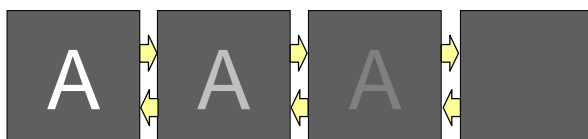Fade Out means display become from bright to dark gradually.

Time Step	Move Step	Box	LO
Changing Event period	$0 \leq$ Iref $\leq$ 3Fh 1 current step $40 \leq$ Iref $\leq$ 7Fh 2 current step $80 \leq$ Iref $\leq$ BFh 3 current step $C0 \leq$ Iref $\leq$ FFh 4 current step	No relation	0: One time 1: Repeat

U	D	R	L	Meaning
No relation				-

ONE TIME

REPEAT

LD50T5128M SPECIFICATION
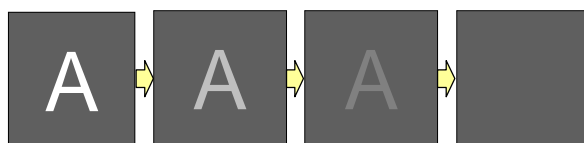
2.4.6. S_FadeBox

"Fade Box" means display area is changing in box shape gradually.

Time Step	Move Step	Box	LO
Changing event	Spreading or Shrinking Step	Starting Area or Point (Outside is black)	0: One time 1: Repeat

U	D	R	L	Meaning
No relation				-

Starting Box

StepY

StepX
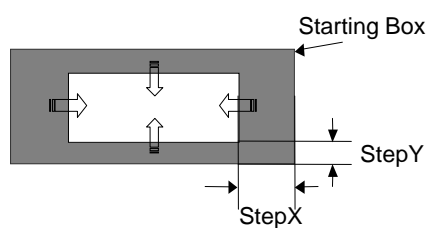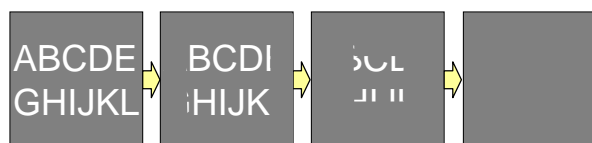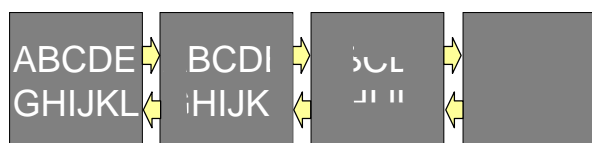
ONE TIME

REPEAT

2.4.7. S_FadeMask

Time Step	Move Step	Box	LO
Changing event	1 pixel fixed	No relation	0: One time 1: Repeat

Box is normally set display size.

U	D	R	L	Meaning
1	0	0	0	Up Scroll
0	1	0	0	Down Scroll
0	0	1	0	Right Scroll
0	0	0	1	Left Scroll

LD50T5128M SPECIFICATION

*) Display Sample [From Left Mask]

ONE TIME from Left

REPEAT from Left
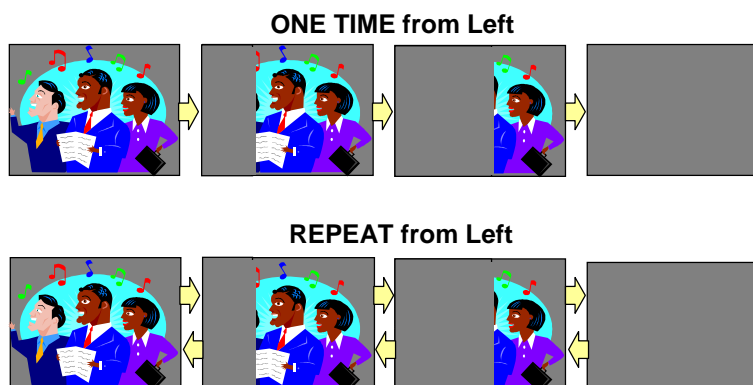
2.4.7. S_FadeScroll

This command is data masking and display scroll.

Time Step	Move Step	Box	LO
Changing event	1 pixel fixed	No relation	0: One time 1: Repeat

U	D	R	L	Meaning
1	0	0	0	Up Scroll
-	-	-	-	-
0	0	1	0	Right Scroll
0	0	0	1	Left Scroll

*) Display Sample [To Right Scroll]

ONE TIME from Left

REPEAT from Left

LD50T5128M SPECIFICATION
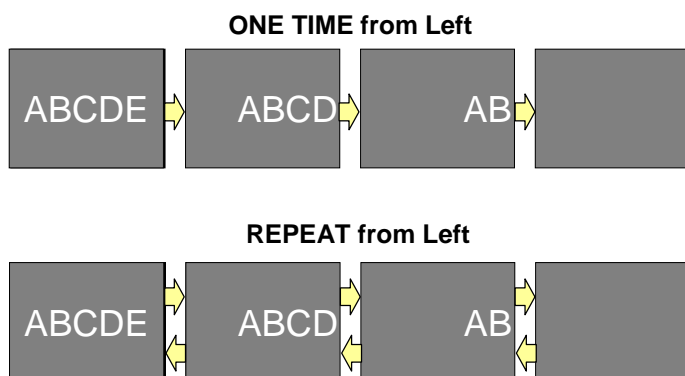
2.4.8. S_AutoColer

Time Step	Move Step	Box	LO
Changing Event Period	No relation	No relation	No relation

U	D	R	L	Meaning
No relation				-

Notice : See 2.5 Color Pallet and Stage Setting

2.5. S_ColorStage(CFh), S_ColorPallet(D0h)
ColorPalet setting command for S_AutoColor.

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_ColorStage	W	L	**CFh**	W	H	-	-	-	-		S2	S1	S0	Screen Saver Select	00h

S : Number of used color pallet, color change loops in this pallet range.
   e.g. If S=2 then **Normal ⇒Palet0⇒Pallet1⇒Pallet2⇒Normal…**
In default mode, use Pallet 0.

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
S_ColorPallet	W	L	**D0h**	W	H	-	-	-	RV0	-	R0	G0	B0	**Pallet0**	07h
				W	H	-	-	-	RV1	-	R1	G1	B1	**Pallet1**	06h
				W	H	-	-	-	RV2	-	R2	G2	B2	**Pallet2**	05h
				W	H	-	-	-	RV3	-	R3	G3	B3	**Pallet3**	04h
				W	H	-	-	-	RV4	-	R4	G4	B4	**Pallet4**	03h
				W	H	-	-	-	RV5	-	R5	G5	B5	**Pallet5**	02h
				W	H	-	-	-	RV6	-	R6	G6	B6	**Pallet6**	01h
				W	H	-	-	-	RV7	-	R7	G7	B7	**Pallet7**	00h

When RV =”1” : (Data **EXOR** FFFFh) **AND** Pallet(RGB) ⇒ Output Data

When RV =”0” : Data **AND** Pallet(RGB) ⇒ Output Data

Notice : This command have priority than **Data Reverse and Color Masking Command**.

Sample:

Original Data (G,R,B)	Pallet (RV,G,R,B)	Output (G,R,B)
(1,1,1)	(0,0,0,1)	(0,0,1)
(1,1,1)	(1,0,0,1)	(0,0,0)
(1,1,0)	(0,1,0,1)	(1,0,0)
(0,0,0)	(1,1,0,1)	(1,0,1)

After data reversed, this command do color Masking.

LD50T5128M SPECIFICATION