

# SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-640480G2TNQW-TW0H
APPROVED BY	
DATE	

□Approved For Specifications

☑ Approved For Specifications & Sample

# AMPIRE CO., LTD.

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APPROVED BY	CHECKED BY	ORGANIZED BY

# **RECORD OF REVISION**

Revision Date	Page	Contents	Editor
2009/0703	-	New Release	Emil
2009/08/18	6	Correct the pin definition of touch panel	Emil
2009/10/20	7	Correct the LCM brightness to 400nit.	Emil

# 1 Features

5.7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 5".7 TFT-LCD panel, LCD controller, power driver circuit, Touch panel, LED driver circuit and backlight unit.

- 1.1 TFT Panel Feature :
  - (1) Construction: 5.7" a-Si color TFT-LCD, White LED Backlight and PCB.
  - (2) Resolution (pixel): 640(R.G.B) X480
  - (3) Number of the Colors : Real 262K colors (R, G, B 6 bit digital each)
  - (4) LCD type : 12'clock Transmissive Color TFT LCD (normally White)
  - (5) Interface: 40 pin pitch 0.5 FFC
  - (6) Power Supply Voltage: 3.3V . Built-in power supply circuit.
  - (7) Backlight supply voltage : 5.0V
- 1.2 LCD Controller Feature:
  - (1) MCU interface: i80/M68 series MCU interface (default: i80 series).
  - (2) Pixel data format: 8, 9, 16 and 18 bit.
  - (3) Display RAM size: Built-in 1215K bytes frame buffer. Support up to 864 x 480 at 24bpp display.
  - (4) Arbitrary display memory starts position selection.
  - (5) 16 bit interface support 65K (R5 G6 B5) Color.

# 2 Physical specifications

Item	Specifications	Unit
Display resolution(dot)	640×(RGB)(W) x 480(H)	dot
Active area	115.2(W) x 86.4(H)	mm
Screen size	5.7(Diagonal)	inch
Pixel size	60.5 (W) x 181.5 (H)	um
Color configuration	R.G.B stripe	
Overall dimension	127.0(W)x98.43(H) x 9.9(D)Max	mm
Weight	105	g
Backlight unit	LED	

# 3 Electrical specification

## 3.1 Absolute max. ratings

## 3.1.1 Electrical Absolute max. ratings

ltem	Symbol	Condition	Min.	Max.	Unit	Remark
Power voltage	VDD	VSS=0	-0.3	4.6	V	
Input voltege	V <sub>in</sub>		-0.3	VDD+0.3	V	Note 1

Note1: /CS,/WR,/RD,RS,DB0~DB17

#### 3.1.2 Environmental Absolute max. ratings

	OPER	OPERATING		RAGE	
Item	MIN	MAX	MIN	MAX	Remark
Temperature	-20	70	-30	80	Note2,3,4,5,6,7
Humidity	Note1		Note1		
Corrosive Gas	Not Acceptable		Not Acc	eptable	

Note1 : Ta <= 40°C : 85% RH max

Ta >  $40^{\circ}$ C : Absolute humidity must be lower than the humidity of

85%RH at 40°C

Note2 : For storage condition Ta at -30°C < 48h , at 80°C < 100h

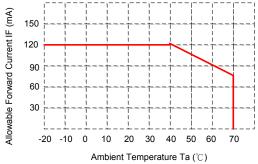
For operating condition Ta at -20°C < 100h

- Note3 : Background color changes slightly depending on ambient temperature. This phenomenon is reversible.
- Note4 : The response time will be slower at low temperature.
- Note5 : Only operation is guarantied at operating temperature. Contrast,

response time, another display quality are evaluated at +25°C

Note6 :

 LED BL : When LCM is operated over 40°C ambient temperature, the I<sub>LED</sub> of the LED back-light should be follow :



Note7 : This is panel surface temperature, not ambient temperature. Note8 :

• LED BL: When LCM be operated over than 40°C, the life time of the LED back-light will be reduced.

# 3.2 Electrical characteristics

# 3.2.1 DC Electrical characteristic of the LCD

Item		Symbol	Min.	Тур.	Max.	Unit	Remark
Power supply		VDD	3.0	3.3	4	V	
Input Voltage for	H Level	V <sub>IH</sub>	0.7 VDD		VDD	V	Note 1
logic	L Level	VIL	VSS		0.3 VDD	V	NOLE I
Power Supply current		IDD	-	80	-	mA	Note 2

Typical operting conditions (VSS=0V)

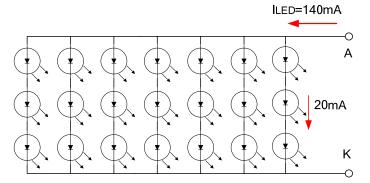
Note 1: /CS,/WR,/RD,RS,DB0~DB17

Note 2: fV =60Hz , Ta=25°C , Display pattern : All Black

\*:Will be reference only

## 3.2.2 Electrical characteristic of LED Back-light

Paramenter	Symbol	Min.	Тур.	Max.	Unit	Condiction
	V	0.0		10 E	V	I <sub>LED</sub>
LED voltage	Vak	9.0		10.5	V	=120mA,Ta=25°C
LED forward current	I <sub>LED</sub>		120	140	mA	Ta=25°C
LED DRIVER current	IDLED		220		mA	VLED=5V



■ The constant current source is needed for white LED back-light driving.

When LCM is operated over 60°C ambient temperature, the  $\mathsf{I}_{\mathsf{LED}}$  of the LED

back-light should be adjusted to 15mA max(For one dice LED).

Parameter	Condition	Standard Value				
Terminal Resistance	X Axis	340 ~ 1090 Ω				
Terminar Resistance	Y Axis	180 ~ 470 Ω				
Insulating Resistance	DC 25 V	More than $20M\Omega$				
Linearity		±1.5 %				
Pen writing Durability	Note a	100,000 times(min)				
Input life by finger	Note b	1,000,000 times (min)				

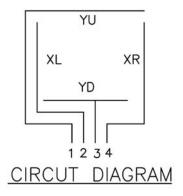
3.2.3 Touch Panel Electrical Specification

#### Note A.

Writing length 35 mm. Writing speed: 300mm/sec. Shape of pen end : R0.8 Load : 250 g **Note B** By Silicon rubber tapping at same point Shape of rubber end : R8 Load : 200g Frequency : 5 Hz

#### Interface

No.	Symbol	Function
1	YU	Touch Panel Top Signal
2	XL	Touch Panel Left Signal
3	YD	Touch Panel Bottom Signal
4	XR	Touch Panel Right Signal



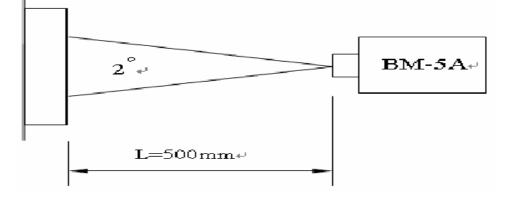
# 4 Optical specification

# 4.1 Optical characteristic:

It	tem		Symbol	Condition	Min.	Тур.	Max.	Unit	Note
Contrast ratio		CR		200	250			(1)(2)(3)	
Luminance		Lw	Point - 5		400	-	cd/m <sup>2</sup>	ILED=140mA (1)(3)	
Luminance	e Unifo	ormity	ΔL	Θ=Φ=0°	70	75	-	%	(1)(3)
Response (White – E		)	T <sub>r</sub> +T <sub>f</sub>			50		ms	(1)(3)(5)
Viewing	Ve	ertical	Θ	CR≧10	80	100	-	Deg	(1)(2)(4)
Angle	Hor	izontal	Φ	Point – 5	120	140	-	Deg. (1)(2)(4	(1)(2)(4)
	Red		Rx		0.566	0.616	0.666		
			Ry		0.302	0.352	0.402		
		Green	Gx		0.308	0.358	0.408		(1)(3)
Color		Green	Gy	Point - 5	0.518	0.568	0.618		
chromaticit	chromaticity	Blue	Bx	Θ=Φ=0°	0.096	0.146	0.196		
		Diue	Ву		0.086	0.136	0.186		
		White	Wx		0.296	0.346	0.396		
		vviille	Wy		0.328	0.378	0.428		

NOTE :

(1) Measure conditions :  $25^{\circ}C \pm 2^{\circ}C$ ,  $60\pm 10\%$ RH under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VCC=3.3V , VDD=3.3V



(2) Definition of Contrast Ratio :

Contrast Ratio (CR) = (White) Luminance of ON ÷ (Black) Luminance of OFF

 (3) Definition of Luminance : Definition of Luminance Uniformity Measure white luminance on the point 5 as figure9-1 Measure white luminance on the point 1 ~ 9 as figure9-1

#### $\Delta L = [L(MIN) / L(MAX)] X 100\%$

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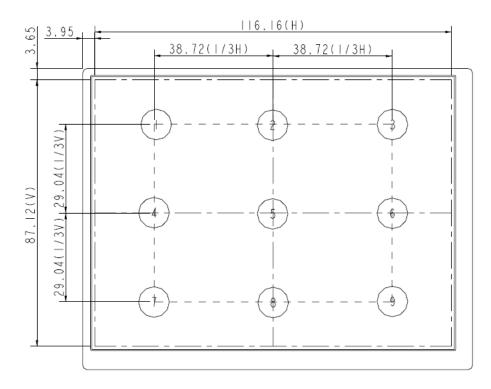
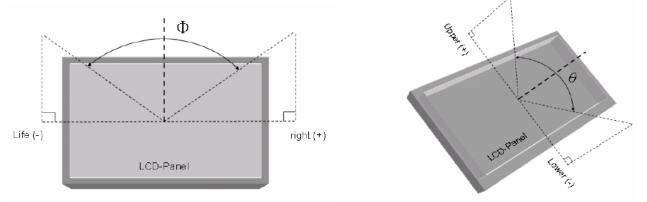
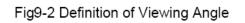


Fig9-1 Measuring point

(4) Definition of Viewing Angle( $\Theta$ , $\Phi$ ), refer to Fig9-2 as below :





(5) Definition of Response Time.(White - Black)

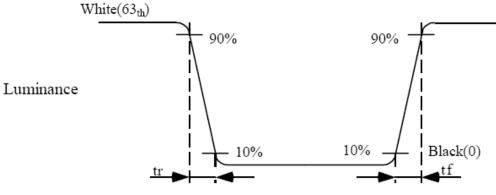
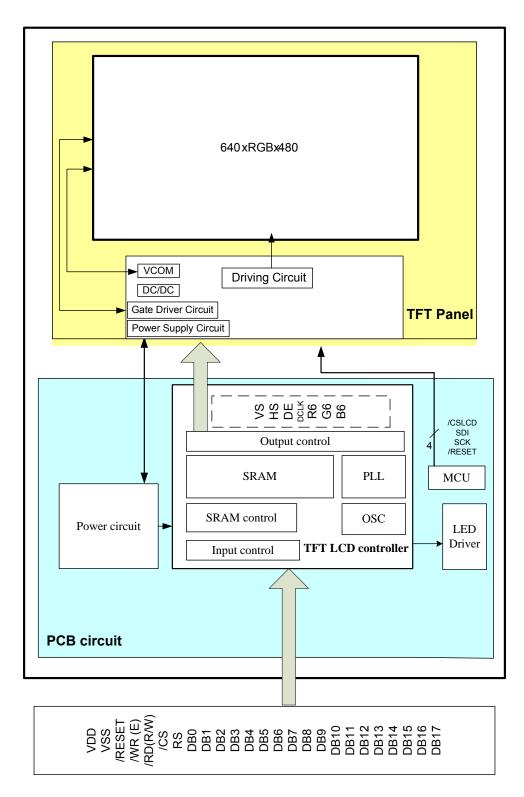


Fig9-3 Definition of Response Time(White-Black)

# **5** Interface specifications

Pin no	Symbol	I/O	Description	Remark
1	DGND	_	GND	
2	DGIND	-	GND	
3	VLED	Ι	LED Power input (5V)	
4	NC	-	No connection	
5	/RESET		Reset signal for TFT LCD controller.	
6	RS		Register and Data select for TFT LCD controller.	
7	/CS	Ι	Chip select low active signal for TFT LCD controller.	
8	/WR		80mode: /WR low active signal for TFT LCD controller.	
0		I	68mode: E signal latch on rising edge.	
9	/RD		80mode: /RD low active signal for TFT LCD controller.	
9			68mode: R/W signal Hi: read, Lo: write.	
10	DB0	Ι		
11	DB1			
12	DB2			
13	DB3			
14	DB4			
15	DB5			
16	DB6			
17	DB7			
18	DB8		Data bus.	
19	DB9			
20	DB10			
21	DB11			
22	DB12			
23	DB13			
24	DB14			
25	DB15	Ι		
26	DB16	Ι		
27	DB17	Ι		
28	NC	-	No connection.	
29	DGND	_	GND	
30	NC	-	No connection.	
31	NC	-	No connection.	
32	NC	-	No connection.	
33	NC	-	No connection.	
34	NC	-	No connection.	
35-37	VDD	-	Power supply for the logic (3.3V).	
38-40	DGND	-	GND.	

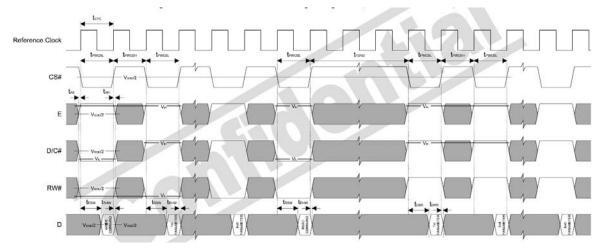
# 6 NBLOCK DIAGRAM



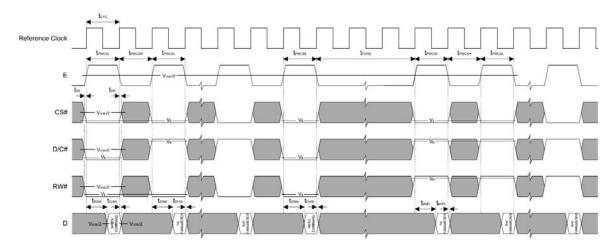
# 7 Interface Protocol

## 7.1 M68 Series

Symbol	Parameter	Min	Тур	Max	Unit	
t <sub>eve</sub>	Reference Clock Cycle Time	9	-	-	ns	
t <sub>PWCSL</sub>	Pulse width CS# or E low	1	-	) <b>-</b>	t <sub>CYC</sub>	
t <sub>PWCSH</sub>	Pulse width CS# or E high	1	-	). <del></del>	t <sub>CYC</sub>	
t <sub>FDRD</sub>	First Data Read Delay	5	-	,	t <sub>CYC</sub>	
t <sub>AS</sub>	Address Setup Time	1	-	. <del>.</del> .	ns	
t <sub>AH</sub>	Address Hold Time	1	-		ns	
t <sub>DSW</sub>	Data Setup Time	4	-		ns	
t <sub>DHW</sub>	Data Hold Time	1	-	-	ns	
t <sub>DSR</sub>	Data Access Time	-	-	5	ns	
t <sub>DHR</sub>	Output Hold time	1	-		ns	



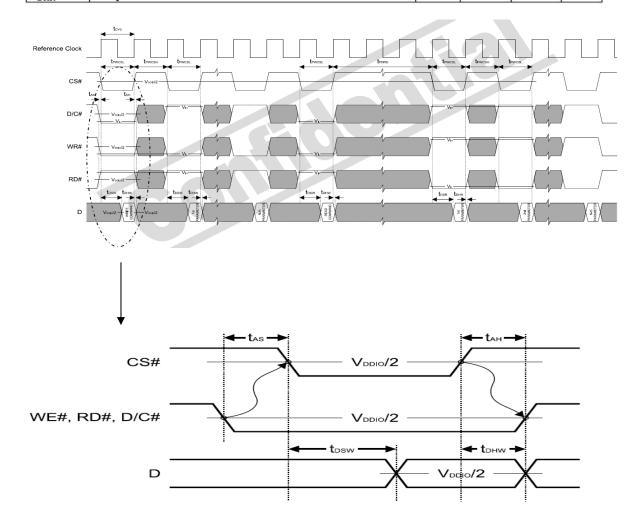
6800 Mode Timing Diagram (Use CS# as Clock)



6800 Mode Timing Diagram (Use E as Clock)

# 7.2 i80 Series

Symbol	Parameter	Min	Тур	Max	Unit
teve	Reference Clock Cycle Time	9	-	-	ns
t <sub>PWCSL</sub>	Pulse width CS# low	1		-	t <sub>CYC</sub>
t <sub>PWCSH</sub>	Pulse width CS# high	1	-	-	t <sub>CYC</sub>
t <sub>FDRD</sub>	First Read Data Delay	5		-	t <sub>CYC</sub>
t <sub>AS</sub>	Address Setup Time	1	-	-	ns
t <sub>AH</sub>	Address Hold Time	1		-	ns
t <sub>DSW</sub>	Data Setup Time	4	-	-	ns
t <sub>DHW</sub>	Data Hold Time	1	-	-	ns
t <sub>DSR</sub>	Data Access Time	2. <del></del>	-	5	ns
t <sub>DHR</sub>	Output Hold time	1	-	-	ns



# 7.3 Data transfer order Setting

Interface	Cycle	D[23]	D[22]	D[21]	D[20]	D[19]	D[18]	D[17]	D[16]	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
24 bits	1 <sup>st</sup>	R7	R6	R5	R4	R3	R2	R1	RO	G7	Gß	G5	G4	G3	G2	G1	GO	B7	B6	B5	B4	B3	B2	81	B0
18 bits	1 <sup>st</sup>							R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	GO	B5	B4	B3	B2	81	BO
16 bits (565 format)	1 <sup>st</sup>									R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	GO	B5	B4	B3	B2	B1
	1 <sup>st</sup>									R5	R4	R3	R2	R1	R0	х	X	G5	G4	G3	G2	G1	GO	x	Х
16 bits	2 <sup>nd</sup>									B5	B4	B3	B2	B1	B0	х	x	R5	R4	R3	R2	R1	R0	х	x
	3 <sup>rd</sup>		1							G5	G4	G3	G2	G1	G0	x	x	B5	B4	B3	B2	B1	B0	x	х
9 bits	1st																R5	R4	R3	R2	R1	R0	G5	G4	G3
6.6000	2 <sup>nd</sup>																G2	G1	GO	B5	B4	B3	B2	B1	B0
	1st										1							R5	R4	R3	R2	R1	R0	X	Х
8 bits	2 <sup>nd</sup>																	G5	G4	G3	G2	G1	GO	x	X
	3 <sup>rd</sup>										6 3							B5	B4	B3	B2	B1	B0	X	Х

X: Don't Care

# 8 Command Table

0.00         nop         No operation           0x 01         software Reset         Software Reset           0x 00         get_address_mode         Get the carrent power mode           0x 00         get_address_mode         Get the carrent pixel format           0x 00         get_address_mode         Get the carrent pixel format           0x 00         get_apixel format         Get the carrent pixel format           0x 01         get_asynat_mode         The display mode form the peripheral           0x 01         get_asynat_mode         The display mode form the peripheral           0x 01         enter_steep_mode         Thin command will publ low the GPIO0.           0x 10         enter_steep_mode         Thum on the panel.           Thin command will publ log the GPIO0.         FGPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_gpio_cont, fix command will be ignored.           0x 11         exit_steep_mode         Data the display area is used for image display.           0x 12         enter_normal mode         Displayed image colors are inverted.           0x 20         esit_invert_mode         Displayed image colors are inverted.           0x 21         enter_normal mode         Displayed image colors are inverted.           0x 22         set display off         Blanks the display device.	Hex Code	Command	Description
0.6 01         soft_reset         Software Reset           05 0A         get_power_mode         Get the current power mode           05 0B         get_pixel_format         Get the current power mode           06 0D         get_signlay_mode         The display modue treams the Display Signal Mode.           08 0D         get_signlay_mode         The display modue from the peripheral           08 0D         get_signlay_mode         The inf the panel.           08 0D         get_signlay_mode         The inf off the panel.           08 0D         get_signlay_mode         The inf off the panel.           08 0D         get_signlay_mode         The inf the panel.           08 0D         rest_sizep_mode         Turn on the panel.           08 11         exit_sizep_mode         Turn on the panel.           08 12         enter_partial_mode         Part of the display area is used for image display.           08 12         enter_invert_mode         Displayed image colors are not inverted.           08 21         enter_invert_mode         Displayed image colors are inverted.           08 23         set_display of         Blanks the display device.           08 24         set_gating averted.         Stot the page address.           08 25         set_display_display.         Stot the page addre			
0x 0A         get_power_mode         Get the current power mode           0x 0B         get_address_mode         Get the frame memory to the display panel read order           0x 0D         get_display mode         The display module returns the Display Signal Mode.           0x 0D         get_signal_mode         Get the current ipskal ym mode from the peripheral           0x 0D         egt_signal_mode         The the current display mode from the peripheral           0x 1D         enter_skeep_mode         Turn off the panel.           This cornnal will pull how the GPIO.         This cornnal will pull high the GPIO.           11         exit_sleep_mode         Turn on the panel.           This cornnal will pull high the GPIO.         This cornnal will pull high the GPIO.           12         enter_parmal_mode         The whole display area is used for image display.           0x 11         exit_invert_mode         Displayed image colors are not inverted.           0x 12         exit_invert_mode         Displayed image colors are not inverted.           0x 12         exit_invert_mode         Displayed image colors are not inverted.           0x 20         exit_display_off         Blanks the display device.           0x 23         set_display_off         Blanks the display device.           0x 24         set_gamal_curues         Set the page		1	
0.5 0B         gct_address_mode         Get the frame memory to the display panel read order           0x 0C         get_signal_mode         The display module returns the Display Signal Mode.           0x 0D         get_signal_mode         The display module returns the Display Signal Mode.           0x 0D         get_signal_mode         The display module returns the Display Signal Mode.           0x 0D         get_signal_mode         The display module returns the Display Signal Mode.           0x 0D         enter_skeep_mode         Turn off the panel.           This command will pull high the GPIO0.         If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command will pull high the GPIO0.           0x 11         exit_sleep_mode         Part of the display area is used for image display.           0x 12         enter_partial_mode         Displayed image colors are inverted.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 22         set_display_mode         Set column_aths the display device.           0x 23         set_gonum_address         Set the column eutres.           0x 24         set_gonum_address         Set the column eutres.           0x 25         set_gonum_address         Set the column eutres.	0x 0A		Get the current power mode
0x 0D         get_pixel_format         Get the current pixel format         Get display_mode           0x 0D         get_signal_mode         Get the current display mode from the peripheral           0x 10         enter_sleep_mode         Turn off the panel.           Turn off the panel.         Turn off the panel.           0x 11         exit_sleep_mode         Turn on the panel.           0x 11         exit_sleep_mode         Turn on the panel.           0x 12         enter_partial_mode         Part of the display area is used for image display.           0x 12         enter_partial_mode         The whole display area is used for image display.           0x 12         enter_partial_mode         The whole display area is used for image display.           0x 20         exit_invert_mode         Displayed image colors are not inverted.           0x 21         enter_partial_mode         The whole display device.           0x 23         set_display_off         Blanks the display device.           0x 24         set_gaman_curve         Seletts the gaman curve used by the display device.           0x 25         set_display_off         Blanks the display device.           0x 24         set_gaman_curve         Seletthe cultum reverted.           0x 25         set_display_off         Transfer image information from the host processor			
0x 0D         get_display_mode         The display module returns the Display Signal Mode.           0x 10         enter_sleep_mode         Get the current display mode from the peripheral           0x 10         enter_sleep_mode         Tum off the panel.           This command will pull low the GPIO0.         If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command will pull high the GPIO0.           0x 11         exit_sleep_mode         Tum on the panel.           This command will pull high the GPIO0.         If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set. gpio_conf. this command will be ignored.           0x 12         enter_partial_mode         Part of the display area is used for image display.           0x 12         enter_normal_mode         The whole display area is used for image display.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 22         set_display_off         Blanks the display device.           0x 23         set_display_off         Blanks the display device.           0x 24         set_gage_address         Set the page entert.           0x 25         set_gage_address         Set the page entert.           0x 26         write_memory_start         Transfer image data from the peripheral to the host processor interface to the peripheral starting at the location provided by set_column_address and set_	0x 0C	0	
0x 0E         get_signal_mode         Get the current display mode from the peripheral           0x 10         enter_sleep_mode         Tum off the panel.           This command will pull low the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_group conf. this command will be ignored.           0x 11         exit_sleep_mode         Tum on the panel.           This command will pull high the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_group conf. this command will be ignored.           0x 12         enter_partial_mode         Part of the display area is used for image display.           0x 13         enter_normal_mode         Displayed image colors are not inverted.           0x 26         set_group.         Displayed image colors are inverted.           0x 27         set_display_off         Blanks the display device.           0x 28         set_display_off         Blanks the display device.           0x 20         set_set_page_address         Set the page extent.           0x 28         set_page_address.         Set the page extent.           0x 28         set_page_address.         Transfer image liformation from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the partial display area on the display module to the host processor	0x 0D		
0x 10         enter_sleep_mode         Tum off the panel. This command well pull low the GPI00. If GPI00 is configured as normal GPI0 or LCD miscellaneous signal with command set_ppio_conf, this command will be ignored.           0x 11         exit_sleep_mode         Tum on the panel. This command will pull loy the GPI00. If GPI00 is configured as normal GPI0 or LCD miscellaneous signal with command set_ppio_conf, this command will be ignored.           0x 11         enter_partial_mode         Part of the display area is used for image display.           0x 12         enter_normal_mode         The whole display area is used for image display.           0x 21         enter_invert_mode         Displayed image colors are nor inverted.           0x 22         set_display.off         Blanks the display device.           0x 23         set_display.off         Blanks the display device.           0x 24         set_column_address         Set the page extent.           0x 25         set_display.off         Blanks the display device.           0x 26         set_ppa_address         Set the page extent.           0x 27         write_memory_start         Transfer image information from the host processor interface starting at the location provided by set_column_address and set_page address.           0x 33         set_parc11 area         Defines the vertial scrolling and fixed area on display rea.           0x 34         set_coff_area         Defines the vertial scro	0x 0E	* * *	
If GPIO0 is configured a normal GPIO or LCD miscellaneous signal with command set_gpio_conf, this command will be ignored.           0x 11         exit_sleep_mode         Turn on the panel. This command will pull high the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_gpio_conf, this command will be ignored.           0x 12         enter_partial_mode         Part of the display area is used for image display.           0x 13         enter_invert_mode         Displayed image colors are inverted.           0x 20         exit_invert_mode         Displayed image colors are inverted.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 22         set_display_on         Bhow the image on the display device.           0x 23         set_comma_curve         Selects the gamma curve used by the display device.           0x 24         set_comma_devices         Set the column extent.           0x 25         set_column_address         Set the column extent.           0x 26         read_memory_start         Transfer image data from the peripheral to the host processor interface staring at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the vertial scrolling and fixed area on display area.           0x 33         set_coroll_area         Defines the vertial scrolling and fixed area on display module to the host processor. <td>0x 10</td> <td>enter_sleep_mode</td> <td></td>	0x 10	enter_sleep_mode	
This command will pull high the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with command set_spio_conf, this command will be ignored.           0x 12         enter_normal_mode         Part of the display area is used for image display.           0x 13         enter_normal_mode         Displayed image colors are not inverted.           0x 20         exit_invert_mode         Displayed image colors are inverted.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 24         set_gamma_curve         Selects the gamma curve used by the display device.           0x 24         set_column_address         Set the column extent.           0x 26         set_column_address         Set the column extent.           0x 27         write_memory_start         Transfer image data from the peripheral to the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the partial display area on the display module to the host processor.           0x 33         set_tear_on         Synchronization information is not sent from the display module to the host processor.           0x 34         set_tear_on         Synchronization information is sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization inform frame buffer to the display panel. <td></td> <td></td> <td>If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with</td>			If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with
0x 13         enter_normal_mode         The whole display area is used for image display.           0x 20         exit_invert_mode         Displayed image colors are not inverted.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 26         set_gamma_curve         Selects the gamma curve used by the display device.           0x 28         set_display_off         Blanks the display device.           0x 24         set_cloplay_on         Show the image on the display device.           0x 25         set_display_on         Show the image on the display device.           0x 26         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 30         set_page_address.         Set the page address.           0x 33         set_set_off         Synchronization information is not sent from the display area.           0x 34         set_set_ar_off         Synchronization information is sent from the display module to the host processor interface.           0x 35         set_address_mode         Set the read order from frame buffer to the display panel.           0x 35         set_setol_start         Defines the vertical scrolling starting point.           0x 36         set_setol_start         Defines the vertical scrolling starting poi	0x 11	exit_sleep_mode	This command will pull high the GPIO0. If GPIO0 is configured as normal GPIO or LCD miscellaneous signal with
0x 20         exit_invert_mode         Displayed image colors are not inverted.           0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 28         set_display_off         Blanks the display device.           0x 29         set_display_on         Show the image on the display device.           0x 20         set_column_address         Set the column extent.           0x 20         set_column_address         Set the page extent.           0x 22         write_memory_start         Transfer image data from the port porcessor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 20         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_scroll_arca         Defines the partial display area on the display module to the host processor.           0x 33         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 34         set_tear_off         Synchronization information is sent from the display panel.           0x 37         set_address_mode         Full color depth is used for the display panel.           0x 33         set_tear_off         Synchronization information from the host processor interface to the peripheral from the parpheral	0x 12	enter_partial_mode	
0x 21         enter_invert_mode         Displayed image colors are inverted.           0x 26         set_gamma_curve         Selects the gamma curve used by the display device.           0x 28         set_display_off         Blanks the display device.           0x 24         set_column_address         Set the column extent.           0x 24         set_page_address         Set the column extent.           0x 26         set_page_address         Set the column extent.           0x 27         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 27         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 33         set_cear_on         Synchronization information is not sent from the display module to the host processor at the start of VFP.           0x 36         set_scroll_area         Defines the vertical scrolling starting point.           0x 37         set_scroll_area         Synchronization information is not sent from the display panel.           0x 38         set_collarea         Synchronization information the display panel.           0x	0x 13	enter_normal_mode	The whole display area is used for image display.
0x 26         set_gamma_curve         Selects the gamma curve used by the display device.           0x 28         set_display_off         Blanks the display device.           0x 2A         set_column_address         Set the column extent.           0x 2B         set_column_address         Set the page extent.           0x 2B         set_page_address         Set the page extent.           0x 2C         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 2E         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_start         Defines the vertical scrolling starting point.           0x 34         set_ide_mode         Reduce color depth is used on the display panel.           0x 34         set_address.         Set the read order from frame buffer to the display panel.           0x 36 </td <td>0x 20</td> <td>exit_invert_mode</td> <td>Displayed image colors are not inverted.</td>	0x 20	exit_invert_mode	Displayed image colors are not inverted.
0x 28         set_display_off         Blanks the display device.           0x 29         set_display_on         Show the image on the display device.           0x 2A         set_obum_address         Set the column extent.           0x 2B         set_page_address         Set the page extent.           0x 2C         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 2E         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the vertial scrolling and fixed area on display area.           0x 33         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization information is sent from the display panel.           0x 36         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_start         Defines the vertial scrolling and finag point.           0x 38         exit_idle_mode         Full color depth is used or the display panel.           0x 34         set_memory_continue         Transfer image information from the host processor interface to the peripheral f	0x 21	enter_invert_mode	Displayed image colors are inverted.
0x 29       set_display_on       Show the image on the display device.         0x 2A       set_column_address       Set the column extent.         0x 2B       set_page_address       Set the page extent.         0x 2C       write_memory_start       Transfer image information from the host processor interface to the preipheral starting at the location provided by set_column_address and set_page_address.         0x 2E       read_memory_start       Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.         0x 30       set_partial_area       Defines the partial display area on the display device.         0x 33       set_scroll_area       Defines the vertical scrolling and fixed area on display area.         0x 34       set_tear_off       Synchronization information is not sent from the display module to the host processor.         0x 35       set_tear_off       Synchronization information is sent from the display panel.         0x 37       set_scroll_start       Defines the vertical scrolling starting point.         0x 38       exit_idle_mode       Full color depth is used for the display panel.         0x 34       set_pixel_format       Defines how many bits per pixel are used in the interface.         0x 36       set_address_mode       Full color depth is used for the display panel.         0x 37       set_scroll_sta	0x 26	set_gamma_curve	Selects the gamma curve used by the display device.
0x 2A         set_column_address         Set the column extent.           0x 2B         set_page_address         Set the page extent.           0x 2C         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 2E         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the partial display area on the display device.           0x 33         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_start         Defines the vertical scrolling starting point.           0x 38         exit_idle_mode         Full color depth is used for the display panel.           0x 36         set_pige_format         Defines the vertical scrolling starting point.           0x 37         set_scroll_start         Defines how many bis per pixel are used in the interface.           0x 38         exit_idle_mode         Reduce color depth is used for the disp	0x 28	set_display_off	Blanks the display device.
0x 2B         set_page_address         Set the page extent.           0x 2C         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 2E         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the partial display area on the display device.           0x 33         set_scroll_area         Defines the vertical scrolling and fixed area on display module to the host processor.           0x 35         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 36         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_start         Defines the vertical scrolling starting point.           0x 38         exit_idle_mode         Full color depth is used on the display panel.           0x 34         set_pixel_format         Defines how many bits per pixel are used in the interface.           0x 37         set_tear_scanline         Reduce color depth is used on the display panel.           0x 38         exit_idle_mode         Full color depth is used for the display panel.           0x 34         set_pixel_format	0x 29	set_display_on	Show the image on the display device.
0x 2C         write_memory_start         Transfer image information from the host processor interface to the peripheral starting at the location provided by set_column_address and set_page_address.           0x 2E         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the partial display area on the display device.           0x 33         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization informate scrolling panel.           0x 37         set_address_mode         Set the read order from frame buffer to the display panel.           0x 38         exit_idle_mode         Full color depth is used on the display panel.           0x 37         set_pixel format         Defines how many bits per pixel are used in the interface.           0x 36         set_pixel format         Defines how many bits per pixel are used in the last metrace.           0x 38         exit_idle_mode         Reduce color depth is used on the display panel.           0x 37         set_pixel format         Defines how many bits per pixel are used in the interface.           0x 36         set_	0x 2A	set_column_address	Set the column extent.
overlap         peripheral starting at the location provided by set_column_address and set_page_address.           0x 2E         read_memory_start         Transfer image data from the peripheral to the host processor interface starting at the location provided by set_column_address and set_page_address.           0x 30         set_partial_area         Defines the partial display area on the display device.           0x 33         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization information is sent from the display module to the host processor.           0x 36         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_armade         Full color depth is used for the display panel.           0x 38         exit_idle_mode         Full color depth is used on the display panel.           0x 37         set_pixel_format         Defines how many bits per pixel are used in the interface.           0x 37         set_dameory_continue         Transfer image information from the host processor interface to the peripheral from the last written location.           0x 38         read_memory_continue         Transfer image information is sent from the display module to the host processor when the display device refresh reaches the	0x 2B	set_page_address	Set the page extent.
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0x 30         set_partial_area         Defines the partial display area on the display device.           0x 33         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization information is sent from the display module to the host processor at the start of VFP.           0x 36         set_scroll_start         Defines the vertical scrolling starting point.           0x 38         exit_idle_mode         Full color depth is used for the display panel.           0x 37         set_scroll_start         Defines how many bits per pixel are used in the interface.           0x 38         exit_idle_mode         Full color depth is used on the display panel.           0x 37         set_pixel_format         Defines how many bits per pixel are used in the interface.           0x 37         set_pixel_format         Defines how many bits per pixel are used in the last riterace.           0x 38         read_memory_continue         Read inmage data from the peripheral continuing after the last read_memory_continue or read_memory_start.           0x 44         set_tear_scanline         Synchronization information is sent from TTL).           0x A1         read_db         Read the DDB from the provided location.           0x B0<	0x 2E	read_memory_start	starting at the location provided by set_column_address and
0x 33         set_scroll_area         Defines the vertical scrolling and fixed area on display area.           0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization information is sent from the display module to the host processor at the start of VFP.           0x 36         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_start         Defines the vertical scrolling starting point.           0x 38         exit_idle_mode         Full color depth is used for the display panel.           0x 38         exit_idle_mode         Reduce color depth is used on the display panel.           0x 37         set_pixel_format         Defines how many bits per pixel are used in the interface.           0x 38         exit_idle_mode         Reduce color depth is used on the display panel.           0x 34         set_pixel_format         Defines how many bits per pixel are used in the interface.           0x 34         set_pixel_format         Read image data from the peripheral continuing after the last read_memory_continue           read_memory_continue         Read image data from the peripheral continuing after the last processor when the display device refresh reaches the provided scan line.           0x 44         set_tear_scanline         Get the current scan line.	0x 30	set partial area	
0x 34         set_tear_off         Synchronization information is not sent from the display module to the host processor.           0x 35         set_tear_on         Synchronization information is sent from the display module to the host processor at the start of VFP.           0x 36         set_address_mode         Set the read order from frame buffer to the display panel.           0x 37         set_scroll_start         Defines the vertical scrolling starting point.           0x 38         exit_idle_mode         Full color depth is used for the display panel.           0x 34         set_pixel_format         Defines how many bits per pixel are used in the interface.           0x 37         write_memory_continue         Transfer image information from the host processor interface to the peripheral from the last written location.           0x 38         read_memory_continue         Read image data from the peripheral continuing after the last read_memory_continue or read_memory_start.           0x 44         set_tear_scanline         Synchronization information is sent from the display module to the host processor when the display device refresh reaches the provided scan line.           0x A1         read_ddb         Read the DDB from the provided location.           0x A1         read_ddb         Read the DDB from the provided location.           0x B1         get_lcd_mode_pad_size         Get the current LCD panel mode, pad strength and resolution.           0x B4			
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Image: construct of the set_tear_scanlineread_memory_continue or read_memory_start.0x 44set_tear_scanlineSynchronization information is sent from the display module to the host processor when the display device refresh reaches the provided scan line.0x 45get_scanlineGet the current scan line.0x A1read_ddbRead the DDB from the provided location.0x B0set_lcd_mode_pad_sizeSet the LCD panel mode (RGB TFT or TTL).0x B1get_lcd_mode_pad_sizeGet the current LCD panel mode, pad strength and resolution.0x B4set_hori_periodSet front porch.0x B5get_hori_periodGet current front porch settings.0x B6set_vert_periodSet the vertical blanking interval between last scan line and next LFRAME pulse.0x B7get_vert_periodSet the vertical blanking interval between last scan line and next LFRAME pulse.		-	peripheral from the last written location.
ox 45get_scanlineGet the current scan line.0x 45get_scanlineGet the current scan line.0x A1read_ddbRead the DDB from the provided location.0x B0set_lcd_mode_pad_sizeSet the LCD panel mode (RGB TFT or TTL).0x B1get_lcd_mode_pad_sizeGet the current LCD panel mode, pad strength and resolution.0x B4set_hori_periodSet front porch.0x B5get_hori_periodGet current front porch settings.0x B6set_vert_periodSet the vertical blanking interval between last scan line and next LFRAME pulse.0x B7get_vert_periodSet the vertical blanking interval between last scan line and next LFRAME pulse.			read_memory_continue or read_memory_start.
0x A1read_ddbRead the DDB from the provided location.0x B0set_lcd_mode_pad_sizeSet the LCD panel mode (RGB TFT or TTL).0x B1get_lcd_mode_pad_sizeGet the current LCD panel mode, pad strength and resolution.0x B4set_hori_periodSet front porch.0x B5get_hori_periodGet current front porch settings.0x B6set_vert_periodSet the vertical blanking interval between last scan line and next LFRAME pulse.0x B7get_vert_periodSet the vertical blanking interval between last scan line and next LFRAME pulse.	0x 44		
Ox B0       set_lcd_mode_pad_size       Set the LCD panel mode (RGB TFT or TTL).         0x B1       get_lcd_mode_pad_size       Get the current LCD panel mode, pad strength and resolution.         0x B4       set_hori_period       Set front porch.         0x B5       get_hori_period       Get current front porch settings.         0x B6       set_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.         0x B7       get_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.			
Ox B1       get_lcd_mode_pad_size       Get the current LCD panel mode, pad strength and resolution.         0x B4       set_hori_period       Set front porch.         0x B5       get_hori_period       Get current front porch settings.         0x B6       set_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.         0x B7       get_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.			*
0x B4       set_hori_period       Set front porch.         0x B5       get_hori_period       Get current front porch settings.         0x B6       set_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.         0x B7       get_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.		*	
0x B5       get_hori_period       Get current front porch settings.         0x B6       set_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.         0x B7       get_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.         0x B7       get_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.			
0x B6       set_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.         0x B7       get_vert_period       Set the vertical blanking interval between last scan line and next LFRAME pulse.			*
Ox B7     get_vert_period     Set the vertical blanking interval between last scan line and next LFRAME pulse.		* *	
pulse.	0x B6	set_vert_period	pulse.
0x B8 set_gpio_conf Set the GPIO configuration.	0x B7	get_vert_period	
	0x B8	set_gpio_conf	Set the GPIO configuration.

Otherwise, they are togeled with LCD signals.           0x B9         get_gpio_value         Set GPIO value for GPIO configured as output.           0x BA         set_gpio_value         Set GPIO value for GPIO configured as output.           0x BB         get_gpio_status         Read current GPIO status. If the individual GPIO was configured as input, the value is the status of the corresponding pin.           0x BC         set_post_proc         Set the image post processor.           0x BF         get_post_proc         Set the image post processor.           0x BF         get_pwm_conf         Set the image post processor.           0x C1         get_led_gen0         Set the image post processor.           0x C2         set_led_gen1         Get the current settings of LCD signal generator 0           0x C3         get_led_gen1         Get the current settings of LCD signal generator 1.           0x C4         set_led_gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C5         get_led_gen3         Get the current settings of LCD signal generator 3.           0x C4         set_led_gen3         Get the current settings of LCD signal generator 3.           0x C4         set_led_gen3         Get the Current settings of LCD signal generator 3.           0x C7         get_gpio_rop         Get the GPIO ovith respect to the LCD signal gene			If the CDIO is not used for LCD set the direction
0x B9         get_gpio_conf         Get the current GPIO configuration.           0x BA         set_gpio_value         Set GPIO value for GPIO configured as output.           0x BB         get_gpio_status         Read current GPIO status. If the individual GPIO was configured as input, the value is the status of the corresponding pin.           0x BC         set_post_proc         Set the image post processor.           0x BE         set_post_proc         Set the image post processor.           0x RC         set_legen0         Set the image post processor.           0x RC         set_led_gen0         Set the inse, fall, period and toggling properties of LCD signal generator 0           0x C1         get_led_gen1         Set the rise, fall, period and toggling properties of LCD signal generator 1.           0x C2         set_led gen1         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C3         get_led_gen2         Get the current settings of LCD signal generator 3.           0x C4         set_led gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C5         get_led_gen3         Get the current settings of LCD signal generator 3.           0x C6         set_led gen3         Get the current settings of LCD signal generator 3.           0x C4         set_gpio_rop         Set the GPIO0 with respect to the LCD signal			If the GPIO is not used for LCD, set the direction.
0x BA         set_gpio_value         Set GPIO value for GPIO configured as output.           0x BB         get_gpio_status         Read current GPIO status.           If the individual GPIO was configured as input, the value is the status of the corresponding pin.         Otherwise, it is the programmed value.           0x BC         set_post_proc         Set the image post processor.         0x BD           0x BD         get_post_proc         Set the image post processor.         0x BE           0x BE         set_pom_conf         Set the image post processor.         0x CD           0x C1         get_led_gen0         Get the current settings of LCD signal generator 0         0x C1           0x C2         set_led gen1         Get the current settings of LCD signal generator 1.         0x C3         get_led_gen2         Get the current settings of LCD signal generator 2.           0x C3         get_led_gen3         Get the current settings of LCD signal generator 3.         0x C7         get_led_gen3         Get the current settings of LCD signal generator 3.           0x C4         set_gpio_rop         Set the GPIO0 with respect to the LCD signal generators.         0x C4         set_gpio_rop         Get the Current settings of LCD signal generators.         0x C7           0x C4         set_led_gen3         Get the current settings of LCD signal generators.         0x C7         get_get_gpio_rop	Ov DO	gat gnia conf	
0x BB         get_gpio_status         Read current GPIO status. If the individual GPIO was configured as input, the value is the status of the corresponding pin. Otherwise, it is the programmed value.           0x BC         set_post_proc         Set the image post processor.           0x BD         get_post_proc         Set the image post processor.           0x BE         set_post_proc         Set the image post processor.           0x CO         set_lcd_gen0         Set the image post processor.           0x CI         get_pwn_conf         Set the irage post processor.           0x C2         set_lcd_gen1         Set the irage post processor.           0x C3         get_lcd_gen1         Set the rise, fall, period and toggling properties of LCD signal generator 1.           0x C4         set_lcd_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C5         get_lcd_gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C6         set_geio0_rop         Set the GPIO0 with respect to the LCD signal generators.           0x C7         get_geio1_rop         Set the GPIO1 with respect to the LCD signal generators.           0x C7         get_gpio1_rop         Set the GPIO1 with respect to the LCD signal generators.           0x C6         set_gpio1_rop         Set the GPIO1 with respect to the LCD signal generators			
If the individual GPIO was configured as input, the value is the status of the corresponding pin.           Otherwise, it is the programmed value.           0x BC         set_post_proc         Set the image post processor.           0x BB         get_post_proc         Set the image post processor.           0x BF         get_pown_conf         Set the image post processor.           0x C0         set_led_gen0         Set the image post processor.           0x C1         get_led_gen0         Get the current settings of LCD signal generator 0           0x C2         set_led_gen1         Get the current settings of LCD signal generator 1.           0x C3         get_led_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C4         set_led_gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C6         set_led_gen3         Set the current settings of LCD signal generator 3.           0x C7         get_geto_prop         Set the GPIO0 with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Set the GPIO0 with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the Current settings of LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           <			
otherwise, it is the programmed value.           0x BC         set_post_proc         Set the image post processor.           0x BD         get_post_proc         Set the image post processor.           0x BE         set_pwm_conf         Set the image post processor.           0x CB         get_pwm_conf         Set the image post processor.           0x C1         get_pwm_conf         Set the image post processor.           0x C2         set_led_gen0         Get the current settings of LCD signal generator 0           0x C3         get_led_gen1         Get the current settings of LCD signal generator 1.           0x C4         set_led_gen2         Get the current settings of LCD signal generator 2.           0x C5         get_led_gen3         Get the current settings of LCD signal generator 3.           0x C6         set_led_gen3         Get the current settings of LCD signal generator suing ROP3 operations.           0x C7         get_giol_rop         Get the GPIO0 with respect to the LCD signal generators.           0x C8         set_gpiol_rop         Get the GPIO1 seconfigured as general GPIO.           0x C4         set_gpiol_rop         Get the GPIO1 seconfigured as general GPIO.           0x C5         get_gpiol_rop         Get the GPIO2 with respect to the LCD signal generators.           0x C6         set_gpiol_rop         Get the GPIO	OX BB	get_gpio_status	
Otherwise, it is the programmed value.           0x BC         set_porc         Set the image post processor.           0x BE         set_post_proc         Set the image post processor.           0x BF         get_post_proc         Set the image post processor.           0x BF         get_post_proc         Set the image post processor.           0x BF         get_lcd_gen0         Set the irse, fall, period and toggling properties of LCD signal generator 0           0x C1         get_lcd_gen1         Set the rise, fall, period and toggling properties of LCD signal generator 1.           0x C3         get_lcd_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C4         set_lcd_gen2         Get the current settings of LCD signal generator 3.           0x C5         get_lcd_gen3         Get the current settings of LCD signal generator 3.           0x C6         set_gpio0_rop         Get the GPIO0 with respect to the LCD signal generators.           0x C7         get_gpio1_rop         Get the GPIO with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x C7         get_gpio1_rop         Get the GPIO2 with respect to the LCD signal generators.           0x C7         get_gpio1_rop         Get the GPIO2 with respect to the LCD signal gener			
0x BC       set_post_proc       Set the image post processor.         0x BD       get_post_proc       Set the image post processor.         0x BF       get_pym_conf       Set the image post processor.         0x C0       set_lcd_gen0       Set the image post processor.         0x C1       get_lcd_gen0       Set the rise, fall, period and toggling properties of LCD signal generator 0         0x C2       set_lcd_gen1       Set the rise, fall, period and toggling properties of LCD signal generator 1.         0x C3       get_lcd_gen2       Set the rise, fall, period and toggling properties of LCD signal generator 2.         0x C4       set_lcd_gen2       Set the rise, fall, period and toggling properties of LCD signal generator 3.         0x C5       get_lcd_gen3       Set the rise, fall, period and toggling properties of LCD signal generator 3.         0x C6       set_gpio0_rop       Set the GPIO0 with respect to the LCD signal generator 3.         0x C8       set_gpio1_rop       Set the GPIO1 with respect to the LCD signal generators.         0x C4       set_gpio1_rop       Get the GPIO1 with respect to the LCD signal generators.         0x C4       set_gpio2_rop       Get the GPIO1 properties with respect to the LCD signal generators.         0x C4       set_gpio2_rop       Get the GPIO2 properties with respect to the LCD signal generators.         0x C4       set_gpio			
0x BD         get_post_proc         Set the image post processor.           0x BE         set_pwm_conf         Set the image post processor.           0x CO         set_lcd_gen0         Set the ringe post processor.           0x CO         set_lcd_gen0         Set the ringe post processor.           0x C1         get_lcd_gen0         Set the rise, fall, period and toggling properties of LCD signal generator 0           0x C2         set_lcd_gen1         Set the rise, fall, period and toggling properties of LCD signal generator 1.           0x C3         get_lcd_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C4         set_lcd_gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C6         set_gpio0_rop         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C6         set_gpio0_rop         Set the GPIO0 with respect to the LCD signal generator suing ROP3           0x C7         get_gpio0_rop         Get the GPIO properies with respect to the LCD signal generators.           0x C8         set_gpio1_rop         Set the GPIO1 with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Set the GPIO2 properies with respect to the LCD signal generators.           0x C2         set_gpio2_rop         Get the GPIO2 with respect to the LCD sig	Ov BC	sat post proc	
0x BE         set_pwm_conf         Set the image post processor.           0x BF         get_pwm_conf         Set the image post processor.           0x C0         set_lcd_gen0         Set the rise, fall, period and toggling properties of LCD signal generator 0           0x C1         get_lcd_gen1         Get the current settings of LCD signal generator 1.           0x C2         set_lcd_gen1         Get the current settings of LCD signal generator 1.           0x C3         get_lcd_gen2         Get the current settings of LCD signal generator 2.           0x C4         set_lcd_gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C7         get_lcd_gen3         Get the current settings of LCD signal generators.           0x C8         set_gpio0_rop         Set the GPIO0 with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x C5         set_gpio2_rop         Get the GPIO2 with respect to the LCD signal generators.           0x C6         set_gpio2_rop         Get the GPIO2 with respect to the LCD signal generators.           0x C7 </td <td></td> <td> <b>^ ^</b></td> <td></td>		<b>^ ^</b>	
0x BF         get_pwm_conf         Set the image post processor.           0x C0         set_lcd_gen0         Set the rise, fall, period and toggling properties of LCD signal generator 0           0x C1         get_lcd_gen1         Set the current settings of LCD signal generator 1.           0x C2         set_lcd_gen1         Get the current settings of LCD signal generator 1.           0x C3         get_lcd_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C4         set_lcd_gen3         Set the current settings of LCD signal generator 3.           0x C6         set_lcd_gen3         Get the current settings of LCD signal generator 3.           0x C6         set_gpio0_rop         Set the GPIO0 with respect to the LCD signal generators using ROP3 operation. No effect if the GPIO0 is configured as general GPIO.           0x C4         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x C5         get_gpio1_rop         Get the GPIO1 properties with respect to the LCD signal generators.           0x C6         set_gpio2_rop         Get the GPIO2 properties with respect to the LCD signal generators.           0x C7         get_gpio2_rop         Get the GPIO2 with respect to the LCD signal generators.           0x C8         set_gpio2_rop         Get the GPIO2 properties with respect to the LCD signal generators.           0x CD			
0x C0         set_lcd_gen0         Set the rise, fall, period and toggling properties of LCD signal generator 0           0x C1         get_lcd_gen1         Get the current settings of LCD signal generator 1.           0x C3         get_lcd_gen1         Get the current settings of LCD signal generator 1.           0x C4         set_lcd_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C5         get_lcd_gen3         Get the current settings of LCD signal generator 3.           0x C6         set_lcd_gen3         Get the current settings of LCD signal generator 3.           0x C7         get_lcd_gen3         Get the GPIO0 vint respect to the LCD signal generator 3.           0x C8         set_gpio0_rop         Get the GPIO0 vint respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO0 vint respect to the LCD signal generators.           0x C8         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x C8         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO2 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO2 properties with respect to the LCD signal generators.           0x CD         get_gpio3_rop         Get the GPIO2 properties with re		· · · · · · · · · · · · · · · · · · ·	
generator 00x C1get_lcd_gen0Get the current settings of LCD signal generator 00x C2set_lcd_gen1Set the rise, fall, period and toggling properties of LCD signal generator 1.0x C3get_lcd_gen2Set the rise, fall, period and toggling properties of LCD signal generator 2.0x C4set_lcd_gen3Get the current settings of LCD signal generator 2.0x C5get_lcd_gen3Get the current settings of LCD signal generator 3.0x C7get_lcd_gen3Get the current settings of LCD signal generator 3.0x C8set_gpi0_ropSet the GPI00 with respect to the LCD signal generators using ROP3 operation. No effect if the GPI00 is configured as general GPI0.0x C4set_gpi0_ropGet the GPI01 properties with respect to the LCD signal generators.0x CAset_gpi0_ropSet the GPI01 with respect to the LCD signal generators.0x CCset_gpi0_ropSet the GPI02 properties with respect to the LCD signal generators.0x CCset_gpi0_ropSet the GPI02 properties with respect to the LCD signal generators.0x CCset_gpi0_ropGet the GPI02 properties with respect to the LCD signal generators.0x CCset_gpi0_ropGet the GPI02 properties with respect to the LCD signal generators.0x CCset_gpi0_ropGet the GPI03 properties with respect to the LCD signal generators.0x CCset_gpi0_ropGet the GPI03 properties with respect to the LCD signal generators.0x CCset_gpi0_ropGet the GPI03 properties with respect to the LCD signal generators.0x CCset_gpi0_ropGet the GPI03 properties with resp		* *	
0x C1       get_lcd_gen0       Get the current settings of LCD signal generator 0         0x C2       set_lcd_gen1       Set the rise, fall, period and toggling properties of LCD signal generator 1.         0x C3       get_lcd_gen2       Get the current settings of LCD signal generator 2.         0x C4       set_lcd_gen2       Get the current settings of LCD signal generator 2.         0x C5       get_lcd_gen3       Get the current settings of LCD signal generator 3.         0x C6       set_lcd_gen3       Get the current settings of LCD signal generator 3.         0x C7       get_lcd_gen3       Get the GPIO0 with respect to the LCD signal generators.         0x C8       set_gpio0_rop       Get the GPIO0 properties with respect to the LCD signal generators.         0x CA       set_gpio1_rop       Get the GPIO1 with respect to the LCD signal generators.         0x CB       get_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO3 with respect to the LCD signal generators.         0x CC       set_gpio3_rop       Set the GPIO3 with respect to the LCD signal generators.         0x CC       set_gpio3_rop       Set the GPIO3 properties with respect to the LCD signal generators.         0x D1       get_gpio3_	UX CU	set_icd_geno	
0x C2         set_lcd_gen1         Set the rise, fall, period and toggling properties of LCD signal generator 1.           0x C3         get_lcd_gen1         Get the current settings of LCD signal generator 1.           0x C4         set_lcd_gen2         Set the rise, fall, period and toggling properties of LCD signal generator 2.           0x C5         get_lcd_gen3         Set the current settings of LCD signal generator 2.           0x C6         set_lcd_gen3         Get the current settings of LCD signal generator 3.           0x C7         get_lcd_gen3         Get the GPIO0 with respect to the LCD signal generator susing ROP3           0x C8         set_gpio0_rop         Get the GPIO0 properties with respect to the LCD signal generators.           0x C4         set_gpio1_rop         Get the GPIO1 properties with respect to the LCD signal generators.           0x CA         set_gpio1_rop         Get the GPIO2 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO2 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Set the GPIO2 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO3 with respect to the LCD signal generators.           0x CC         set_gpio3_rop         Set the GPIO3 with respect to the LCD signal generators.           0x CE         set_gpio3_rop         Set t	$0 \times C1$	get lcd gen0	
0x C3       get_lcd_gen1       Get the current settings of LCD signal generator 1.         0x C4       set_lcd_gen2       Set the rise, fall, period and toggling properties of LCD signal generator 2.         0x C5       get_lcd_gen3       Get the current settings of LCD signal generator 2.         0x C6       set_lcd_gen3       Get the rise, fall, period and toggling properties of LCD signal generator 3.         0x C7       get_lcd_gen3       Get the current settings of LCD signal generator 3.         0x C8       set_gpio0_rop       Set the GPIO0 with respect to the LCD signal generators.         0x CA       set_gpio0_rop       Get the GPIO1 with respect to the LCD signal generators.         0x CA       set_gpio1_rop       Get the GPIO1 with respect to the LCD signal generators.         0x CB       get_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x CC       get_gpio2_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x CD       get_gpio3_rop       Get the GPIO3 properties with respect to the LCD signal generators.      <			
0x C4       set_lcd_gen2       Set the rise, fall, period and toggling properties of LCD signal generator 2.         0x C5       get_lcd_gen3       Get the current settings of LCD signal generator 2.         0x C6       set_lcd_gen3       Set the rise, fall, period and toggling properties of LCD signal generator 3.         0x C7       get_lcd_gen3       Get the current settings of LCD signal generator 3.         0x C8       set_gpio0_rop       Set the GPIO0 with respect to the LCD signal generators using ROP3 operation. No effect if the GPIO1 is configured as general GPIO.         0x CA       set_gpio1_rop       Get the GPIO1 properties with respect to the LCD signal generators.         0x CA       set_gpio1_rop       Get the GPIO1 properties with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Set the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio3_rop       Get the GPIO3 with respect to the LCD signal generators.         0x CF       get_gpio3_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x CF       get_gpio3_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x CF       get_gpio3_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x CF       get			
0x C5         get_lcd_gen2         Get the current settings of LCD signal generator 2.           0x C6         set_lcd_gen3         Set the rise, fall, period and toggling properties of LCD signal generator 3.           0x C7         get_lcd_gen3         Get the current settings of LCD signal generator 3.           0x C8         set_gpio0_rop         Set the GPIO0 with respect to the LCD signal generators using ROP3 operation. No effect if the GPIO1 is configured as general GPIO.           0x CA         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x CA         set_gpio1_rop         Get the GPIO1 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO2 with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO2 properties with respect to the LCD signal generators.           0x CC         set_gpio2_rop         Get the GPIO2 properties with respect to the LCD signal generators.           0x CD         get_gpio3_rop         Get the GPIO3 properties with respect to the LCD signal generators.           0x CF         get_gpio3_rop         Get the GPIO3 properties with respect to the LCD signal generators.           0x CF         get_gpio3_rop         Get the GPIO3 properties with respect to the LCD signal generators.           0x D0         set_abc_dbc_conf         Set the ambient back light and dynamic back light configuration.			
0x C6       set_lcd_gen3       Set the rise, fall, period and toggling properties of LCD signal generator 3.         0x C7       get_lcd_gen3       Get the current settings of LCD signal generator 3.         0x C8       set_gpio0_rop       Set the GPIO0 with respect to the LCD signal generators using ROP3 operation. No effect if the GPIO0 is configured as general GPIO.         0x CA       set_gpio1_rop       Get the GPIO1 properties with respect to the LCD signal generators.         0x CA       set_gpio1_rop       Get the GPIO1 with respect to the LCD signal generators.         0x CC       set_gpio1_rop       Get the GPIO1 properties with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 properties with respect to the LCD signal generators.         0x CC       set_gpio3_rop       Get the GPIO2 properties with respect to the LCD signal generators.         0x CE       set_gpio3_rop       Set the GPIO3 properties with respect to the LCD signal generators.         0x CF       get_gpio3_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x D1       get_abc_dbc_conf       Get the ambient back light and dynamic back light configuration.         0x D4       set_dbc_th       Set the threshold for each level of power saving.         0x E0       set_p			
0x C7       get_lcd_gen3       Get the current settings of LCD signal generator 3.         0x C8       set_gpio0_rop       Set the GPIO0 with respect to the LCD signal generators using ROP3 operation. No effect if the GPIO0 is configured as general GPIO.         0x C9.       get_gpio0_rop       Get the GPIO0 properties with respect to the LCD signal generators.         0x CA       set_gpio1_rop       Get the GPIO1 with respect to the LCD signal generators using ROP3 operation. No effect if the GPIO1 is configured as general GPIO.         0x CB       get_gpio2_rop       Get the GPIO2 with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 properties with respect to the LCD signal generators.         0x CC       set_gpio2_rop       Get the GPIO2 properties with respect to the LCD signal generators.         0x CC       set_gpio3_rop       Get the GPIO3 properties with respect to the LCD signal generators.         0x CF       get_gpio3_rop       Set the GPIO3 properties with respect to the LCD signal generators.         0x D0       set_abc_dbc_conf       Set the ambient back light and dynamic back light configuration.         0x D4       set_dbc_th       Set the PIL. Before the start, the system was operated with the crystal oscillator or clock input.         0x D5       get_gpl_abc_th       Get the PLL. Before the start, the system was operated with the crystal oscillator or clock input.         0x E2       set_pll_s			
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0x F0 set_pixel_data_interface Set the pixel data format of the parallel host processor interface.			
	0x F0		
	0x F1	get_pixel_data_interface	Get the current pixel data format settings.

About the further detail, please refer the datasheet of SSD1963.

#### Color & DATA SIGNAL Gray Scale R5 R4 R3 R2 R1 R0 G5 G4 G3 G2 G1 G0 B5 B4 B3 B2 B1 B0 Black Red(63) Green(63) Basic Blue(63) Color Cyan Magenta Yellow White Black Red(1) Red(2) : Red Red(31) : Red(62) Red(63) Black Green(1) Green(2) Green Green(31) Green(62) Green(63) Black Blue(1) Blue(2) Blue Blue(31) Blue(62) Blue(63)

# 9 DISPLAYED COLOR AND INPUT DATA

# **10 QUALITY AND RELIABILITY**

#### **10.1 TEST CONDITIONS**

Tests should be conducted under the following conditions : Ambient temperature :  $25 \pm 5^{\circ}$ C Humidity :  $60 \pm 25\%$  RH.

#### 10.2 SAMPLING PLAN

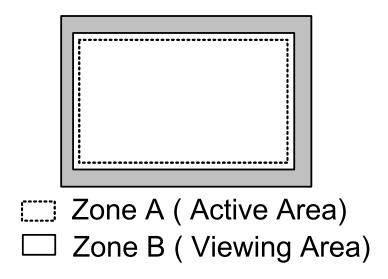
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

#### **10.3 ACCEPTABLE QUALITY LEVEL**

A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

#### **10.4 APPEARANCE**

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under flourescent light. The inspection area of LCD panel shall be within the range of following limits.

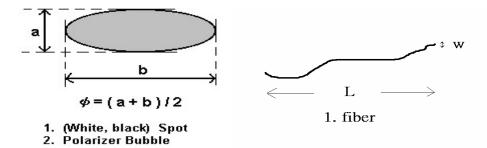


#### **10.5 INSPECTION QUALITY CRITERIA**

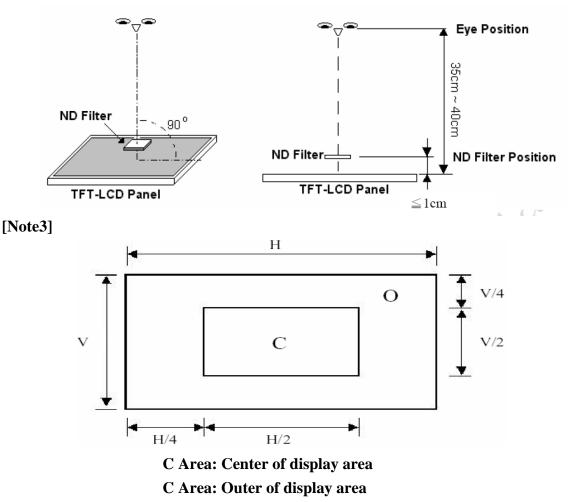
	DEFEC		Note						
		SPOT	0.1	5mm≦	$\leq \varphi \leq 0$	.5mm	N	$l \leq 4$	Note1
				0.5	mm< q	0	1	N=0	
MOLIA		FIBER	0.0	3mm <v< td=""><td>V≦0.1ı 5mm</td><td>nm, L≦</td><td>Ň</td><td>l≦3</td><td>Note1</td></v<>	V≦0.1ı 5mm	nm, L≦	Ň	l≦3	Note1
VISUAL DEFECT	INTERNAL		1.	0mm<			1	N=0	
DEFECT		POLARIZER			0.15mn			gnore	
		BUBBLE	0.	15mm≦				$l \leq 2$	Note1
				0.5	mm < q	0	1	N=0	
		Mura	lť OK						
				A Grade B C					
	E	BRIGHT DOT	C Area	O Area	Total	C Area	O Area	Total	Note3
			N≦0	N≦2	N≦2	N $\leq$ 2	N≦3	N≦5	Note2
		DARK DOT	N $\leq$ 2	N≦3	N≦3	N $\leq$ 3	N≦5	N≦8	
ELECTRICAL DEFECT		TOTAL DOT		N $\leq$ 4		N $\leq$ 5	N≦6	N≦8	Note2
DEFECT	TWO	N≦0	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	Note4	
	THI		NOT ALLOWED						
	AD								
	L	INE DEFECT		Ν	IOT AL	LOWE	D		

(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
(2) LITTLE BRIGHT DOT ACCEPTITABLE UNDER 6 % ND-Filter

**[Note1]** W : Width[mm], L : Length[mm], N : Number,  $\varphi$  : Average Diameter

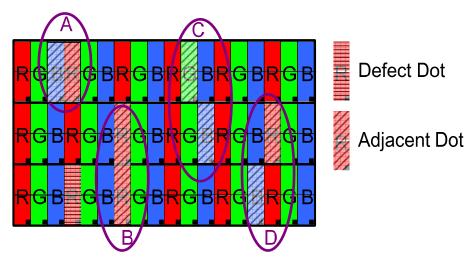


[Note2] Bright dot is defined through 6% transmission ND Filter as following.



#### [Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.



(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

# 11 Reliability test items :

ITEM	CONDITIONS
HIGH TEMPERATURE OPERATION	<b>70</b> ℃,240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	$60^\circ\!\!\mathbb{C}$ , 90%RH , 240Hrs
HIGH TEMPERATURE STORAGE	80°C , 240Hrs
LOW TEMPERATURE OPERATION	-20°C , 240Hrs
LOW TEMPERATURE STORAGE	-30°C , 240Hrs
THERMAL SHOCK	-30°C (0.5Hr) ~80°C (0.5Hr) 200Cycle

# **12 USE PRECAUTIONS**

#### 12.1 Handling precautions

- 1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
- 2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
- 3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
- 4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

## 12.2 Installing precautions

- 1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx.  $1M\Omega$  and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
- 2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
- 3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
- 4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

## **12.3 Storage precautions**

- Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
- Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
- 3) Store the products as they are put in the boxes provided from us or in the

same conditions as we recommend.

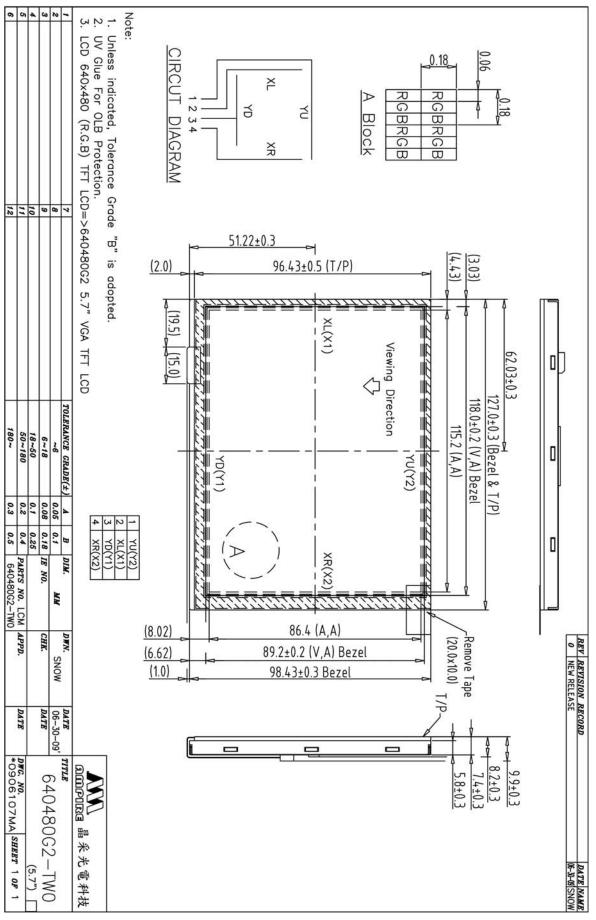
#### 12.4 Operating precautions

- 1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
- 2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
- The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.
- 4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
- 5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
- 6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
- 7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
- 8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

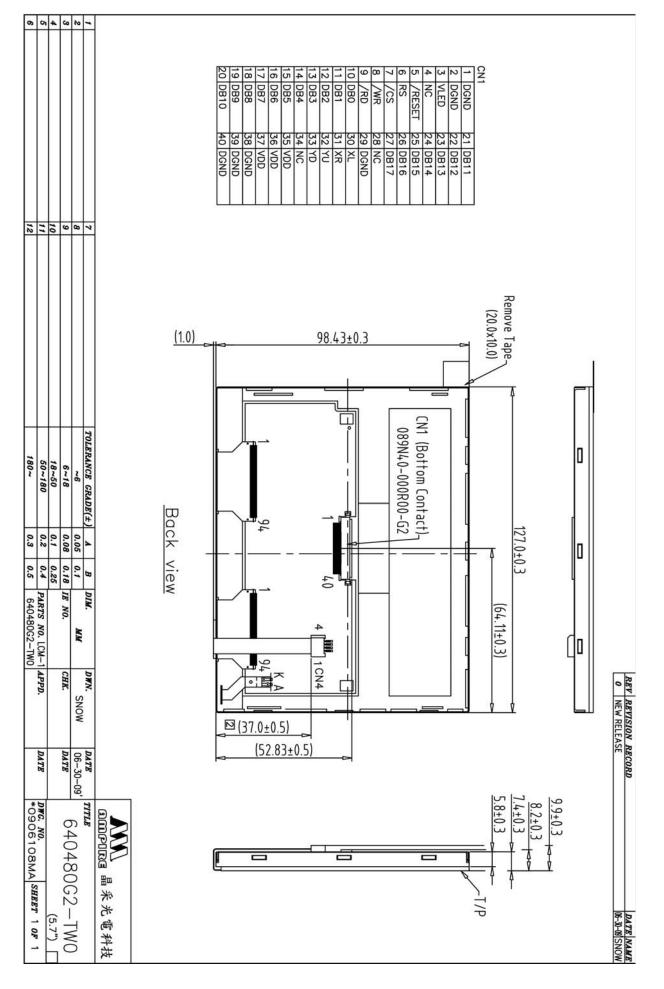
#### 12.5 Other

- 1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
- 2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.
- 3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

13 OUTLINE DIMENSION 13.1OUTLINE DIMENSION



Date : 2009/10/20



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