



## CUSTOMER APPROVAL SHEET

Company Name	
MODEL	A043FTT03.0
CUSTOMER  APPROVED	Title : Name :

APPROVAL FOR SPECIFICATIONS ONLY (Spec. Ver. 0.2)

APPROVAL FOR SPECIFICATIONS AND ES SAMPLE (Spec. Ver. 0.2)

APPROVAL FOR SPECIFICATIONS AND CS SAMPLE (Spec. Ver. 0.2)

CUSTOMER REMARK :



Doc. version :	0.2
Total pages :	28
Date :	2014/04/29

## **Product Specification**

### **4.3" COLOR TFT-LCD MODULE/PANEL**

#### **MODEL NAME: A043FTT03.0**

<b>Planned Lifetime:</b>	From 2013/Jul To 2015/Dec
<b>Phase-out Control:</b>	From 2015/Jul To 2015/Dec
<b>EOL Schedule:</b>	2015/Dec

< >Preliminary Specification  
< >Final Specification

Note: The content of this specification is subject to change.

© 2014 AU Optronics  
All Rights Reserved,  
Do Not Copy.



Version: 0.2

Page: 1/28

#### Record of Revision

Version	Revise Date	Page	Content
0.0	2013.07.04		First Draft
0.1	2013.07.10	7	Add operation & storage temp.
0.2	2014.04.29	4	Recfity the 2D drawing



## Contents

<b>A. General Information .....</b>	<b>3</b>
<b>B. Outline Dimension (tentative) .....</b>	<b>4</b>
<b>C. Electrical Specifications .....</b>	<b>5</b>
1. TFT LCD Panel Pin Assignment .....	5
2. Absolute Maximum Ratings .....	7
3. Electrical DC Characteristics .....	7
4. Electrical AC Characteristics .....	8
b. Serial port interface AC characteristics .....	9
5. Serial Interface Characteristics .....	11
5. Power On/Off Characteristics .....	18
<b>D. Optical Specification.....</b>	<b>19</b>
<b>E. Touch Screen Panel Specifications .....</b>	<b>20</b>
1. Electrical Characteristics .....	20
2. Mechanical Characteristics .....	21
3. Life Test Condition .....	21
4. Attention.....	22
<b>F. Reliability Test Items.....</b>	<b>24</b>
<b>G. Packing and Marking.....</b>	<b>26</b>
1. Packing Form .....	26
<b>H. Application Note.....</b>	<b>27</b>
<b>I. Precautions.....</b>	<b>28</b>

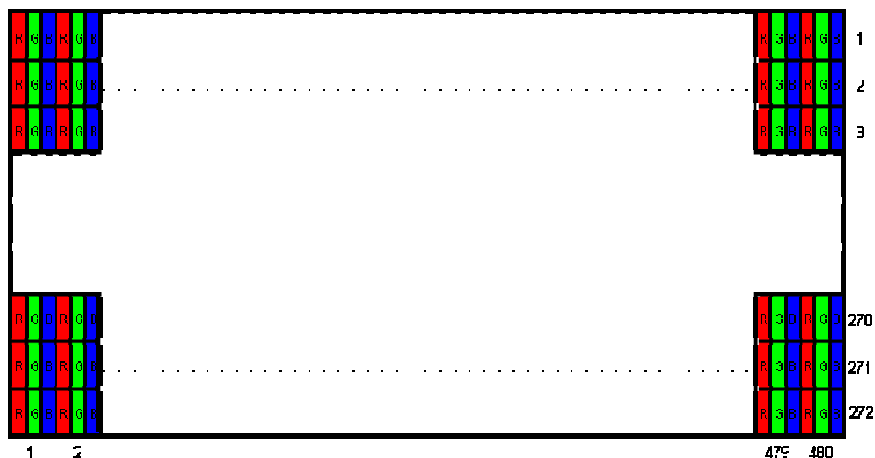
## A. General Information

This product is for PND application.

NO.	Item	Unit	Specification	Remark
1	Screen Size	inch	4.3(Diagonal)	
2	Display Resolution	dot	480RGB(H)×272(V)	
3	Overall Dimension	mm	105.5(H) × 67.2(V) × 4.3(T)	Note 1
4	Active Area	mm	95.04(H)×53.856(V)	
5	Pixel Pitch	mm	0.066(R.G.B)×0.198(V)	
6	Color Configuration	--	R. G. B. Stripe	Note 2
7	Color Depth	--	16.7M Colors	
8	NTSC Ratio	%	50	
9	Display Mode	--	Normally White	
10	Touch panel surface treatment	--	Hard coating 3H	
11	Weight	g	63.7±10%	
12	Viewing direction		6 o'clock (gray inversion)	

Note 1: Not include backlight cable and FPC. Refer next page to get further information.

Note 2: Below figure shows dot stripe arrangement.

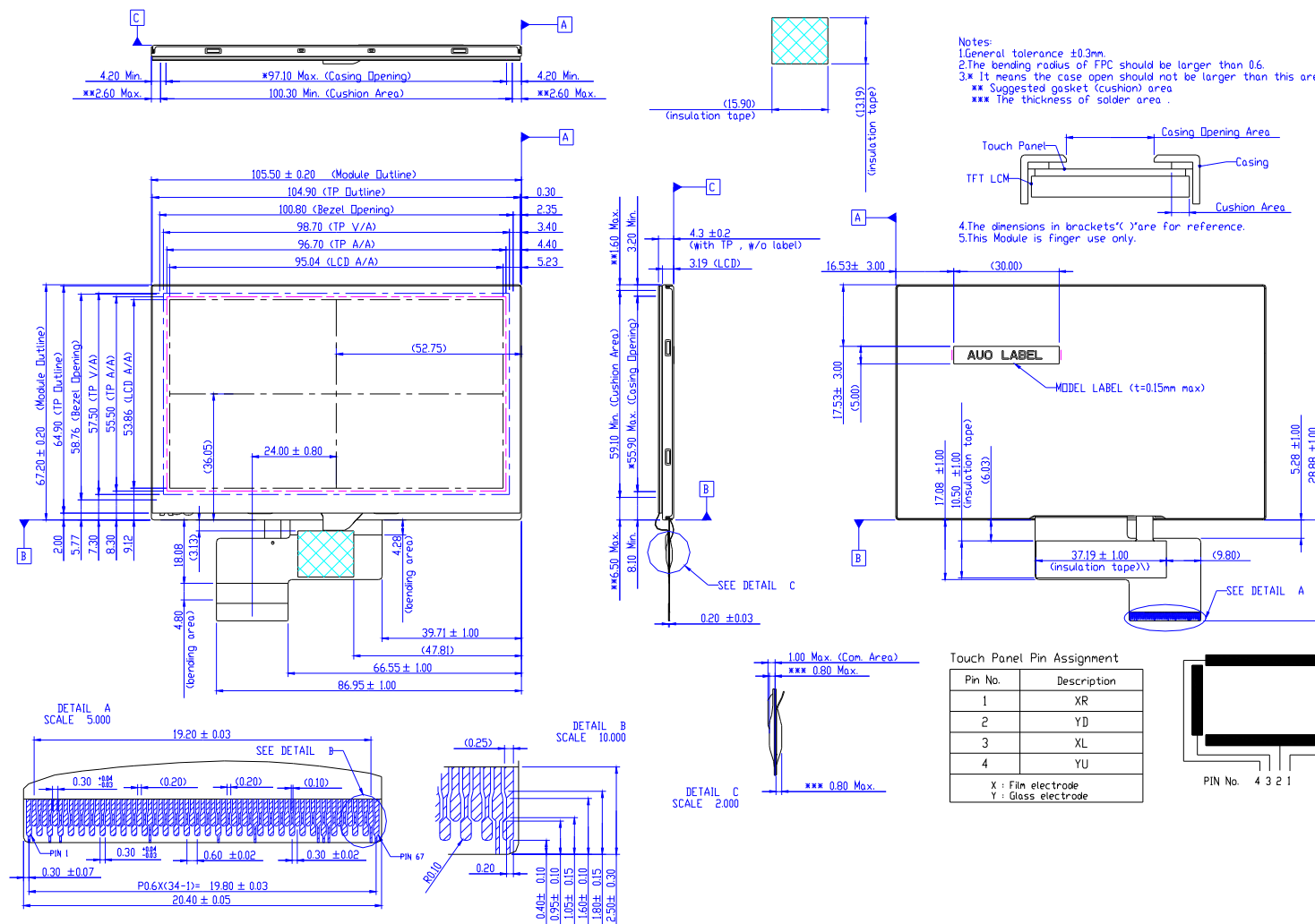




Version: 0.2

Page: 4/28

## B. Outline Dimension



ALL RIGHTS STRICTLY RESERVED. ANY PORTION OF THIS PAPER SHALL NOT BE REPRODUCED, COPIED, OR TRANSFORMED TO ANY OTHER FORMS WITHOUT PERMISSION FROM AU OPTRONICS CORP.

## C. Electrical Specifications

### 1. TFT LCD Panel Pin Assignment

Recommended connector : FH26G-67S-0.3SHBW(6)

No.	Pin Name	I/O	Description	Remarks
1	VLED-	P	Power for LED backlight cathode	
2	VLED+	P	Power for LED backlight anode	
3	GND	P	GND	
4	TP_R	O	Touch Panel Right Electrode	
5	TP_B	O	Touch Panel Bottom Electrode	
6	TP_L	O	Touch Panel Left Electrode	
7	TP_U	O	Touch Panel Top Electrode	
8	GND	P	GND	
9	VGH	C	Stabilizing capacitor	
10	C1P	C	Booster capacitor	
11	C1M	C	Booster capacitor	
12	C2P	C	Booster capacitor	
13	C2M	C	Booster capacitor	
14	VGL	C	Stabilizing capacitor	
15	C3P	C	Booster capacitor	
16	C3M	C	Booster capacitor	
17	GND	P	GND	
18	VCC	C	Stabilizing capacitor	
19	C4P	C	Booster capacitor	
20	C4M	C	Booster capacitor	
21	VDD	P	Charge Pump Supply Voltage input pin for booster circuit	
22	ID2	-	Connect to VDDIO on FPC	
23	GND	P	Grounding for analog circuit	
24	NC	-		
25	C9P	C	Booster capacitor	
26	C9M	C	Booster capacitor	
27	ID1	-	Connect to VDDIO on FPC	
28	GRB	I	System reset pin(active 'Low')	
29	GND	P	GND	
30	VDDIO	P	Digital interface Supply Voltage input	
31	VDDA	C	Stabilizing capacitor	
32	GND	P	GND	
33	DISP	I	Standby control signal	
34	CS	I	Chip select pin of serial interface	

No.	Pin Name	I/O	Description	Remarks
35	SDA	I	Data input pin in serial mode	
36	SCL	I	Clock input in serial mode	
37	NC	-		
38	DE	I	Display enable pin from controller	
39	B7	I	Blue data	
40	B6	I	Blue data	
41	B5	I	Blue data	
42	B4	I	Blue data	
43	B3	I	Blue data	
44	NC	-		
45	G7	I	Green data	
46	G6	I	Green data	
47	G5	I	Green data	
48	G4	I	Green data	
49	G3	I	Green data	
50	G2	I	Green data	
51	R7	I	Red data	
52	R6	I	Red data	
53	R5	I	Red data	
54	R4	I	Red data	
55	R3	I	Red data	
56	NC	-		
57	NC	-		
58	NC	-		
59	DCLK	I	Dot-clock and oscillator source	
60	COMVSS	C	Stabilizing capacitor	
61	GND	P	GND	
62	VSSA	C	Stabilizing capacitor	
63	VSSA	C	Stabilizing capacitor	
64	VCOM	C	Stabilizing capacitor	
65	GND	P	GND	
66	NC	-		
67	NC	-		

I: Input pin; P: Power pin; G: Ground pin; C: capacitor pin



## 2. Absolute Maximum Ratings

Items	Symbol	Values		Unit	Condition
		Min.	Max.		
Power Supply Voltage	VDD	-0.3	6	V	
Interface Supply Voltage	VDDIO	-0.3	6	V	
LED Reverse Voltage	$V_r$	3.2	3.5	V	One LED
LED Forward Current	$I_f$	--	25	mA	One LED
Operation Temperature	$T_{op}$	-20	70	°C	
Storage Temperature	$T_{st}$	-30	80	°C	

Note 1.If the operating condition exceeds the absolute maximum ratings, the TFT-LCD module may be damaged permanently. Also, if the module operated with the absolute maximum ratings for a long time, its reliability may drop

## 3. Electrical DC Characteristics

### a. Typical Operation Condition (AGND =GND = 0V)

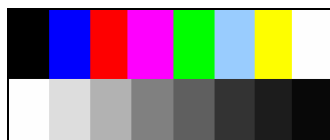
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Power Voltage		VDDIO	1.65	3.3	VDD	V	Digital Power Supply
		VDD	3.0	3.3	3.6	V	Analog Power Supply
Input Signal Voltage	H Level	$V_{IH}$	$0.7 \times VDDIO$	--	VDDIO	V	
	L Level	$V_{IL}$	GND	--	$0.3 \times VDDIO$	V	

### b. Current Consumption (AGND=GND=0V)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Input Current for VDD	$I_{VDD}$	VDD=3.3V	-	14	18	mA	Note 1, 2
	$I_{VDD}$ (STANDBY)	VDD=3.3V	-	12	15	uA	Note 3
Input Current for VDDIO	$I_{VDDIO}$	VDDIO=3.3V	-	8	12	uA	Note 1, 2
	$I_{VDDIO}$ (STANDBY)	VDDIO=3.3V	-	5	8	uA	Note 3

Note 1:Test Condition is under typical Eletrical DC and AC characteristics.

Note 2: Test pattern is the following picture.

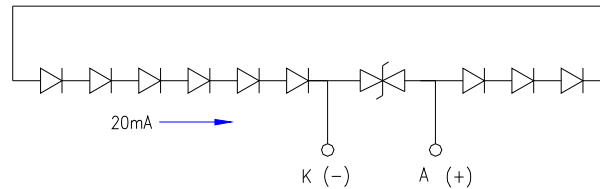


Note 3: In standby mode, all digital signals are stopped. Ex. DCLK, HSYNC ..etc.

### c. Backlight Driving Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
LED Supply Current	$I_L$		20	22	mA	single serial
Power Consumption	PBL		576	693	mW	
LED Life Time	$L_L$	10,000	---	---	Hr	Note 2

Note 1: LED backlight is 9 LEDs serial type. Suggestion is driven by current 20mA for each LED string.



Circuit Diagram

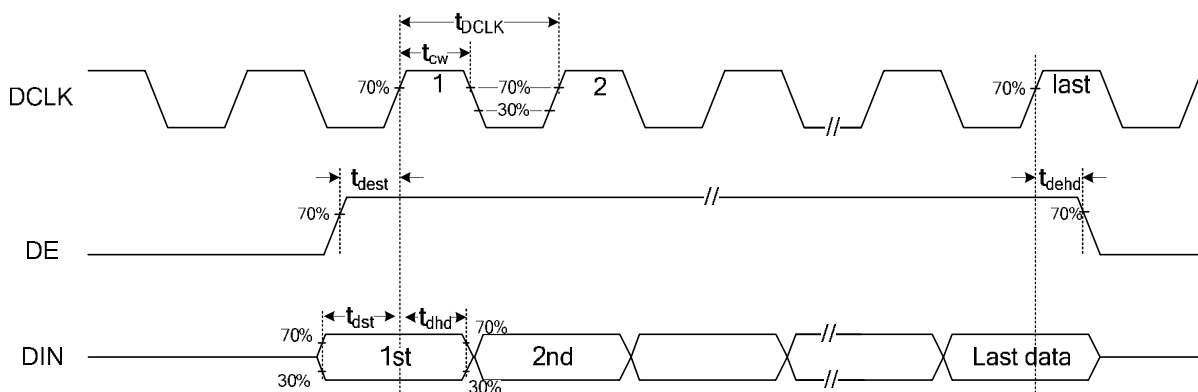
Note 2: Define "LED Lifetime": brightness is decreased to 50% of the initial value. LED Lifetime is restricted under normal condition, ambient temperature = 25 and LED lightbar current = 20 mA.

Note 3: If it uses larger LED lightbar voltage/ current more than 25mA, it maybe decreases the LED lifetime

## 4. Electrical AC Characteristics

### a. Signal AC Characteristics

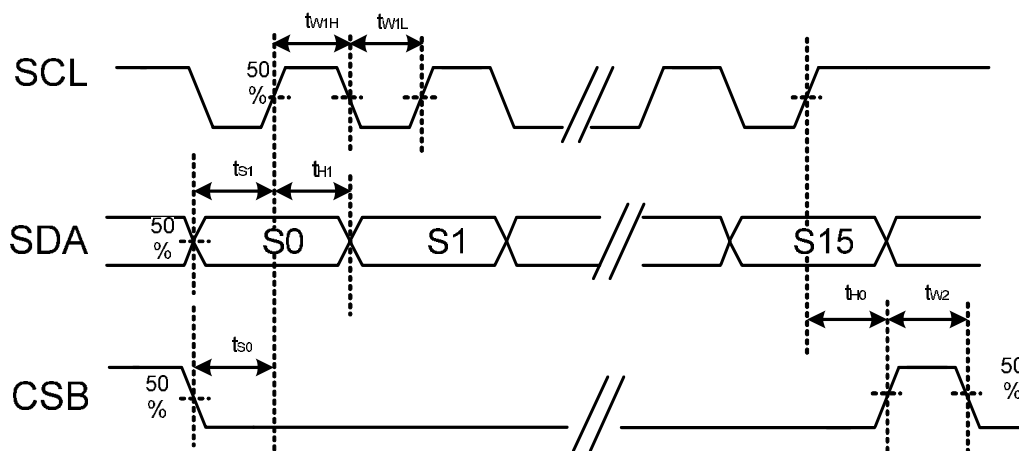
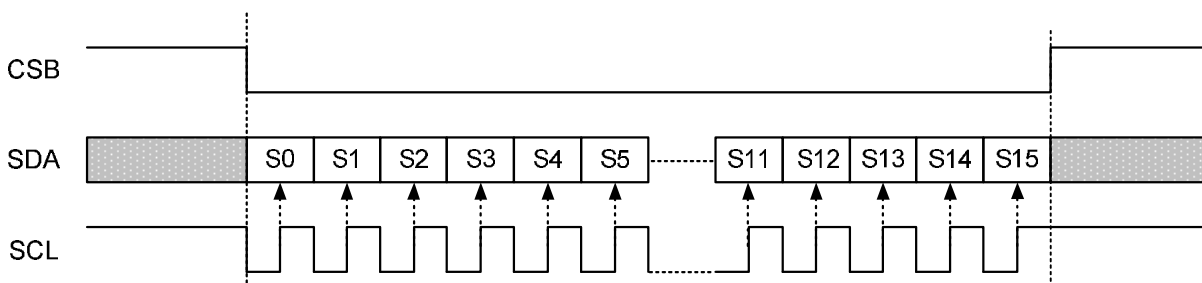
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Time	$t_{DCLK}$	83	111	188	ns	
DCLK Width	$t_{cw}$	40	-	-	ns	$D_{CW} = 50\%$
Data Setup Time	$t_{dst}$	6	--	--	ns	
Data Hold Time	$t_{dhd}$	6	--	--	ns	
DE Setup Time	$t_{dest}$	6	--	--	ns	
DE Hold Time	$t_{dehd}$	6	--	--	ns	



## b. Serial port interface AC characteristics

(VDDSI=1.65 ~ VDD)

3-wire serial communication AC timing					
Parameter	Symbol	Min	Typ	Max	Unit
CSB input setup time	$t_{s0}$	50	-	-	ns
CSB input hold time	$t_{H0}$	50	-	-	ns
CSB pulse high width	$t_{W2}$	400	-	-	us
SDA input setup time	$t_{s1}$	50	-	-	ns
SDA input hold time	$t_{H1}$	50	-	-	ns
SCL pulse low width	$t_{W1L}$	50	-	-	ns
SCL pulse high width	$t_{W1H}$	50	-	-	ns

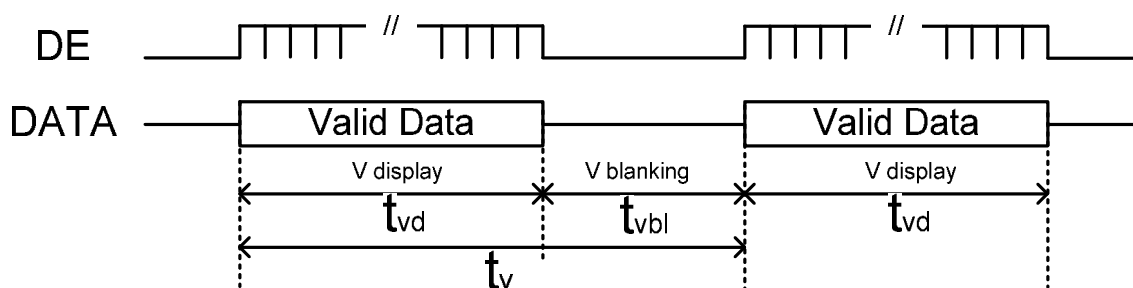


## b. Input Timing

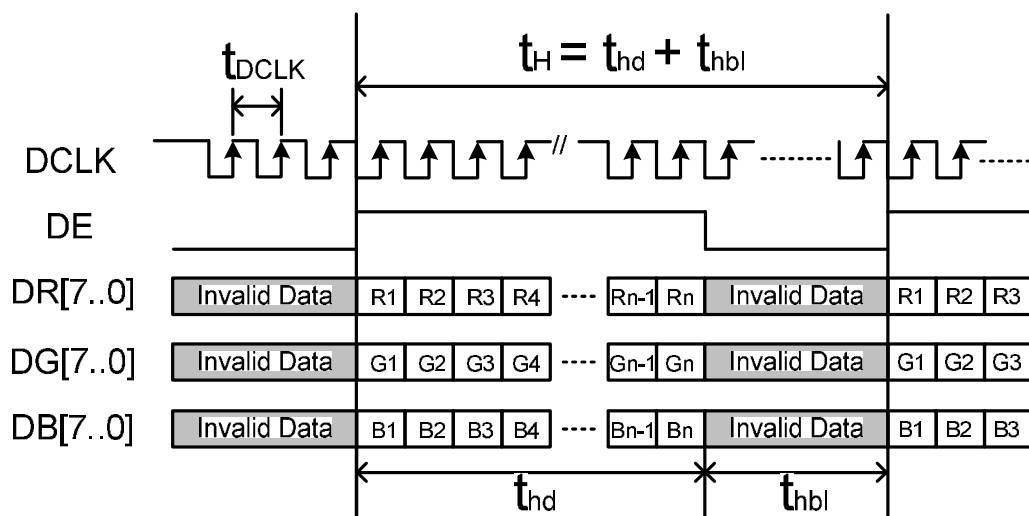
Parameter		Symbol	Min.	Typ.	Max.	Unit.	Remark
DCLK	Frequency	1/tdclk	5	9.5	12	MHz	
Frame Rate	Frequency		-	60	-	Hz	
1 Frame Scanning Time	Cycle	tv	282	288	400	H	
	Display Period	tvdisp	272			H	
	Blanking	tvbl	10	16	128	H	
1 Line Scanning Time	Cycle	th	525	550	800	DCLK	
	Display Period	thdisp	480			DCLK	
	Blanking	thbl	45	70	320	DCLK	

## c. Timing Diagram

### Vertical Timing of Input(DE mode)

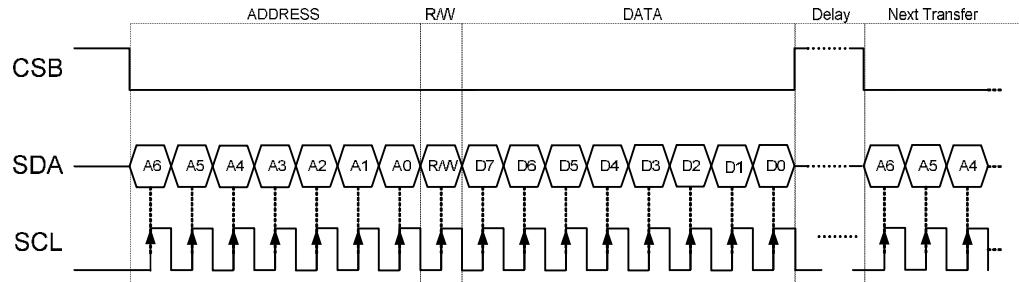


### Horizontal Timing of Input (DE mode)



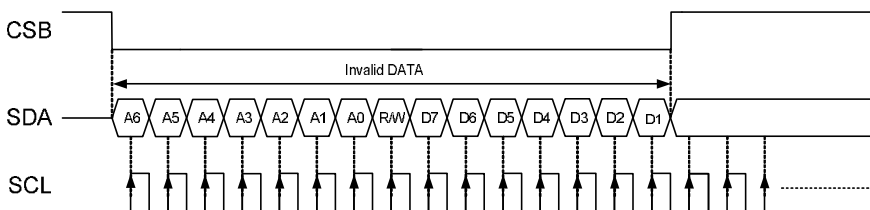
## 5. Serial Interface Characteristics

### 5.1 3-Wire Command Format

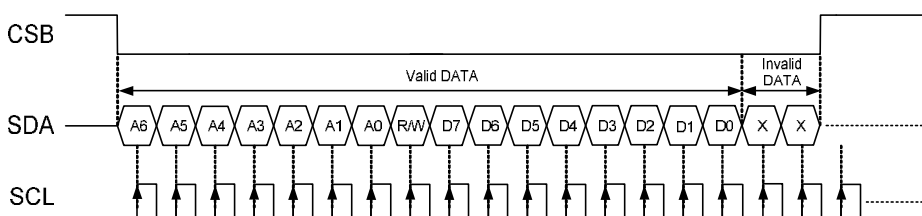


1. Each serial command consists of 16 bits of data which is loaded one bit a time at the rising edge of serial clock SCL.
2. Command loading operation starts from the falling edge of CSB and is completed at the next rising edge of CSB.
3. The serial control block is operational after power on reset, but commands are established by the VSYNC signal. If command is transferred multiple times for the same register, the last command before the VSYNC signal is valid.
4. If less than 16 bits of SCL are input while CSB is low, the transferred data is ignored.(Note1)
5. If 16 bits or more of SCL are input while CSB is low, the previous 16 bits of transferred data after the falling edge of CSB pulse are valid data.(Note2)
6. Serial block operates with the SCL clock.
7. Serial data can be accepted in the standby (power save) mode.

Note1 (data < 16bits):



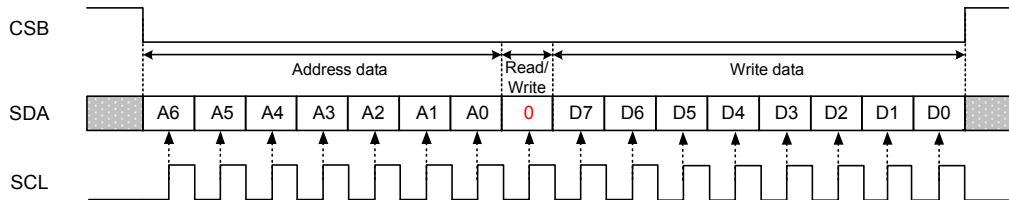
Note2 (data > 16bits):



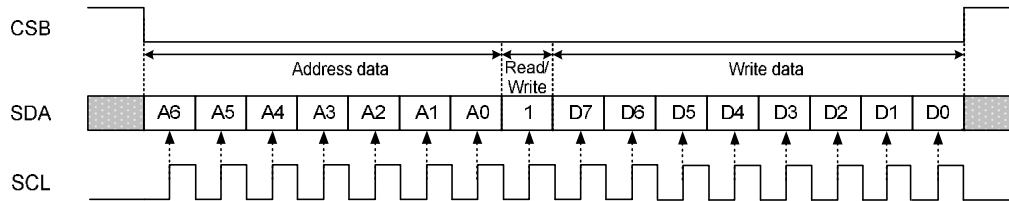
### 3-Wire Command Format:

MSB								LSB							
A6	A5	A4	A3	A2	A1	A0	R/W	D7	D6	D5	D4	D3	D2	D1	D0
Register Address [6:0]							Read or Write	DATA (Issue by external controller)							

### 3-Wire Writer Format:



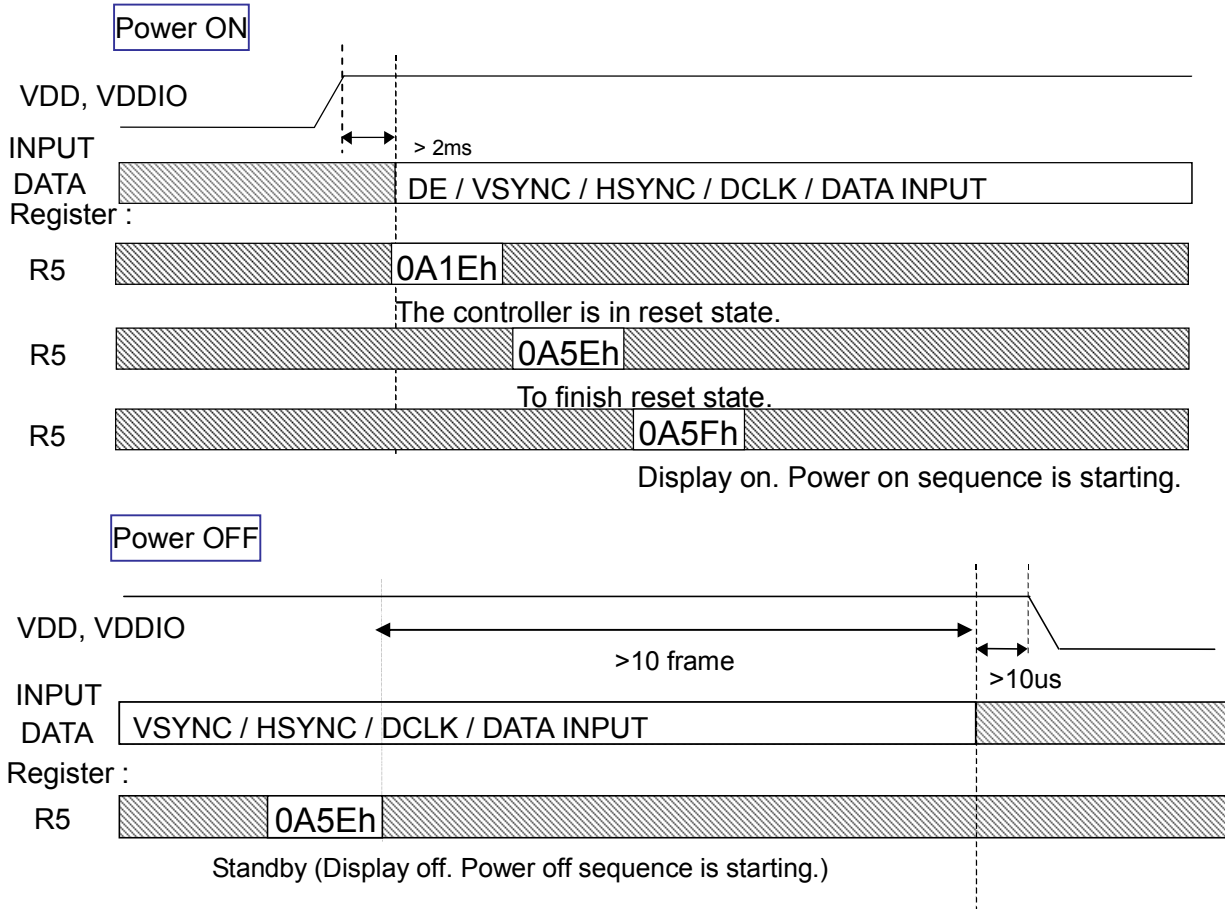
### 3-Wire Read Format:



## 5.2 3-Wire Control Register List

NO.	Address								MSB	Initial value							LSB
	A6	A5	A4	A3	A2	A1	A0	R/W	D7	D6	D5	D4	D3	D2	D1	D0	
R2	0	0	0	0	0	1	0	R/W(0)				CONTRAST_SW	CONTRAST_A				
									0	0	0	1	0	1	0	0	
R3	0	0	0	0	0	1	1	R/W(0)	BRIGHTNESS (40h)								
R5	0	0	0	0	1	0	1	R/W(0)		GRB							STB
									0	1	0	1	1	1	1	0	
R12	0	0	0	1	1	0	0	R/W(0)					DEpol				DCLK
									0	0	0	0	0	0	0	0	
R13	0	0	0	1	1	0	1	R/W(0)	CONTRAST_GRB (40h)								
R14	0	0	0	1	1	1	0	R/W(0)	SUB_CONTRAST_R (40h)								
R15	0	0	0	1	1	1	1	R/W(0)	SUB_BRIGHTNESS_R (40h)								
R16	0	0	1	0	0	0	0	R/W(0)	SUB_CONTRAST_B (40)								
R17	0	0	1	0	0	0	1	R/W(0)	SUB_BRIGHTNESS_B (40)								

### 5.3 Suggested Serial Command Settings



### 5.4 3-wire Registers Function Description

#### R02 Register

Bit	Name	Initial	R/W	Description
Bit[7:5]	-	-	-	Reserve
Bit [4]	CONTRAST_SW	01h	R/W	4-bit or 8-bit contrast selection. CONTRAST_SW = "0", 4bit contrast, Contrast_A(R02) CONTRAST_SW = "1", 8bit contrast, Contrast_RGB(R13). (Default)
Bit[3:0]	CONTRAST_A[3:0]	04h	R/W	RGB contrast level setting.

CONTRAST\_A: RGB contrast level setting, the gain changes 0.25 / bit.

CONTRAST_A[3:0]	Contrast level
00h	0
:	:
04h(Default)	1
:	:
0Fh	3.75

### R03 Register

Bit	Name	Initial	R/W	Description
Bit[7:0]	BRIGHTNESS[7:0]	40h	R/W	Display Brightness level adjustment register. (1 step/bit) Adjust range from 00h(level = -64) to FFh(level = +191) <b>Default</b> value <b>40h</b> (level = +0)

### BRIGHTNESS: RGB brightness level setting, setting accuracy: 1 step / bit

BRIGHTNESS[7:0]	Brightness level
00h	Dark(-64)
:	:
40h( <b>Default</b> )	Center(0)
:	:
FFh	Bright(+191)

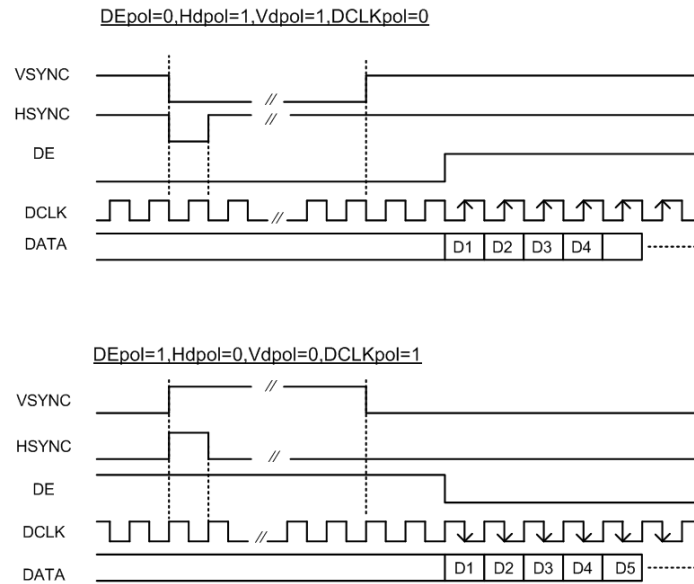
### R05 Register

Bit	Name	Initial	R/W	Description
Bit [6]	GRB	01h	R/W	Register reset setting. GRB = "0", Reset all registers to default value. GRB = "1", Normal operation.( <b>Default</b> )
Bit [0]	STB	00h	R/W	Standby (Power saving) mode setting. STB = "0", Standby; timing control, DAC, and DC/DC converter are off, and register data should be kept.( <b>Default</b> ) STB = "1", Normal operation, with power on/off sequence.

### R12 Register

Bit	Name	Initial	R/W	Description
Bit[7:4]	-	-	-	Reserve
Bit[3]	DEpol	00h	R/W	DE polarity selection. DEpol = "0", Positive polarity. ( <b>Default</b> ) DEpol = "1", Negative polarity
Bit[0]	DCLKpol	00h	R/W	DCLK polarity selection. DCLKpol = "0", Positive polarity. ( <b>Default</b> ) DCLKpol = "1", Negative polarity





### R13 Register

Bit	Name	Initial	R/W	Description
Bit[7:0]	CONTRAST_RGB[7:0]	40h	R/W	RGB contrast level setting.

### CONTRAST\_RGB: RGB contrast level setting, the gain changes (1/64) / bit

CONTRAST_RGB[7:0]	Contrast level
00h	0
:	:
40h(Default)	1
:	:
FFh	3.984

### R14 Register

Bit	Name	Initial	R/W	Description
Bit[7]	-	-	-	Reserve.
Bit[6:0]	SUB-CONTRAST_R[6:0]	40h	R/W	R sub-contrast level setting.

### R16 Register

Bit	Name	Initial	R/W	Description
Bit[7]	-	-	-	Reserve.
Bit[6:0]	SUB-CONTRAST_B[6:0]	40h	R/W	B sub-contrast level setting.

### SUB-CONTRAST: R/B sub-contrast level setting, the gain changes (1/256) / bit

SUB-CONTRAST_R/B[6:0]	Sub-Contrast level
00h	0.75

:	:
40h(Default)	1
:	:
7Fh	1.246

### R15 Register

Bit	Name	Initial	R/W	Description
Bit[7]	-	-	-	Reserve.
Bit[6:0]	SUB-BRIGHTNESS_R[6:0]	40h	R/W	R sub-brightness level setting.

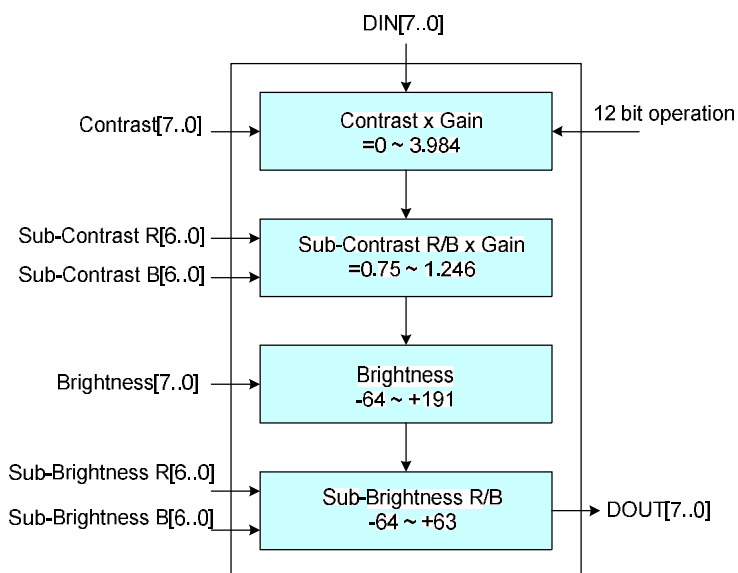
### R17 Register

Bit	Name	Initial	R/W	Description
Bit[7]	-	-	-	Reserve.
Bit[6:0]	SUB-BRIGHTNESS_B[6:0]	40h	R/W	B sub-brightness level setting.

**SUB-BRIGHTNESS:** R/B sub-brightness level setting, setting accuracy 1 step / bit

SUB-BRUGHTNESS_R/B[6:0]	Sub-Brightness level
00h	Dark(-64)
:	:
40h(Default)	Center(0)
:	:
7Fh	Bright(+63)

### Contrast / Brightness circuit





## Contrast Circuit

- 8-bit serial setting to control the contrast (gain) for RGB signals
- 7-bit sub-contrast adjustment for R/B

$DOUT\_G[7:0] = DIN[7:0] \times Contrast[0 \text{ to } 1.0 \text{ to } 3.984]$

$DOUT\_R[7:0] = DIN[7:0] \times Contrast[0 \text{ to } 1.0 \text{ to } 3.984] \times \text{sub-contrast R } [0.75 \text{ to } 1.0 \text{ to } 1.246]$

$DOUT\_B[7:0] = DIN[7:0] \times Contrast[0 \text{ to } 1.0 \text{ to } 3.984] \times \text{sub-contrast B } [0.75 \text{ to } 1.0 \text{ to } 1.246]$

Note: output values above “255” clipped.

<b>CONTRAST</b>	<b>00h</b>	<b>to</b>	<b>40h(Default)</b>	<b>to</b>	<b>FFh</b>
<b>Gain value range</b>	<b>0</b>	<b>to</b>	<b>1</b>	<b>to</b>	<b>3.984</b>

<b>SUB-CONTRAST R/B</b>	<b>00h</b>	<b>to</b>	<b>40h(Default)</b>	<b>to</b>	<b>7Fh</b>
<b>Gain value range</b>	<b>0.75</b>	<b>to</b>	<b>1</b>	<b>to</b>	<b>1.246</b>

## Brightness Circuit

- 8-bit serial setting to control the RGB brightness level
- 7-bit serial setting to control the R/B sub-brightness level

$DOUT\_G[7:0] = DIN\_G[7:0] + Bright[-64 \text{ to } 0 \text{ to } +191]$

$DOUT\_R[7:0] = DIN\_R[7:0] + Bright[-64 \text{ to } 0 \text{ to } +191] + \text{Sub-bright R}[-64 \text{ to } 0 \text{ to } +63]$

$DOUT\_B[7:0] = DIN\_B[7:0] + Bright[-64 \text{ to } 0 \text{ to } +191] + \text{Sub-bright B}[-64 \text{ to } 0 \text{ to } +63]$

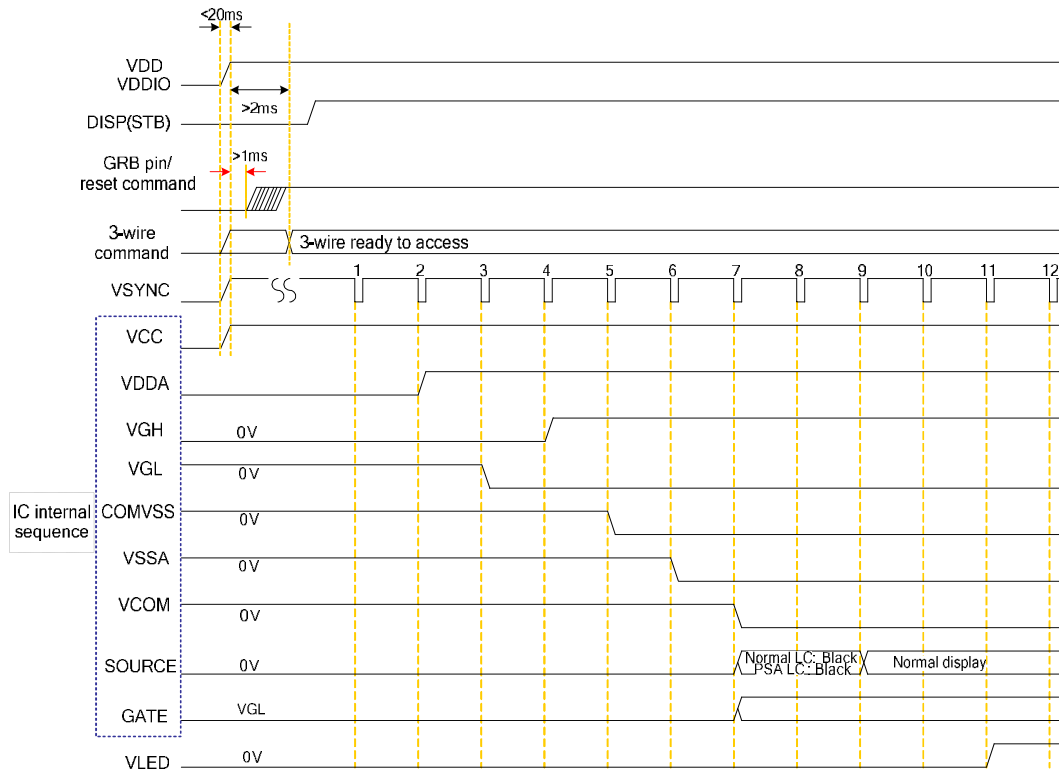
Note: Output values below “0” and above “255” clipped.

<b>BRIGHTNESS</b>	<b>00h</b>	<b>to</b>	<b>40h(Default)</b>	<b>to</b>	<b>FFh</b>
<b>Variable range</b>	<b>-64</b>	<b>to</b>	<b>0</b>	<b>to</b>	<b>+191</b>

<b>SUB-BRIGHTNESS R/B</b>	<b>00h</b>	<b>to</b>	<b>40h(Default)</b>	<b>to</b>	<b>7Fh</b>
<b>Variable range</b>	<b>-64</b>	<b>to</b>	<b>0</b>	<b>to</b>	<b>+63</b>

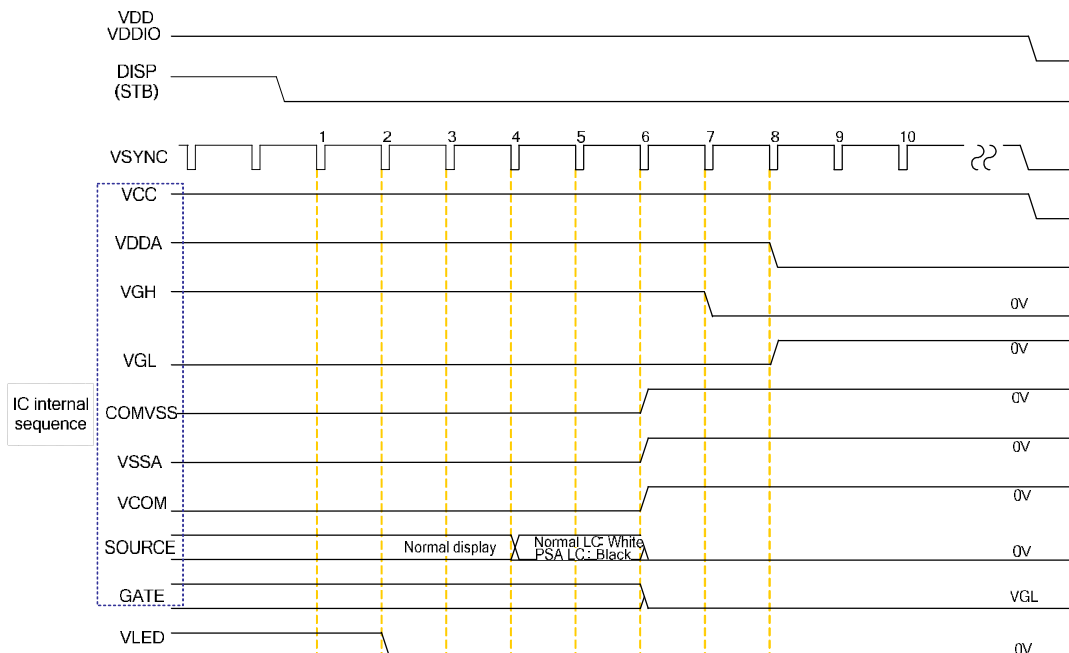
## 5. Power On/Off Characteristics

### a. Recommended Power On Sequence



Note: The driver IC default is on standby mode. It can be changed to normal operation by using DISP hardware pin.

### b. Recommended Power Off Sequence



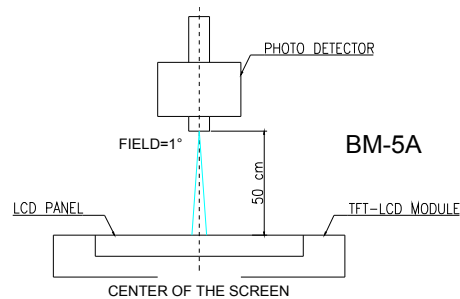
## D. Optical Specification

All optical specification is measured under typical condition (Note 1, 2)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Response Time							
Rise	Tr	$\theta=0^\circ$	--	15		ms	Note 3
Fall	Tf		--	20		ms	
Contrast ratio	CR	At optimized viewing angle	300	400	--		Note 4 (TBD)
Viewing Angle	Top	CR 10	35	50	--	deg.	Note 5 (TBD)
	Bottom		40	55	--		
	Left		50	65	--		
	Right		50	65	--		
Brightness	$Y_L$	$\theta=0^\circ$	350	400	--	cd/m <sup>2</sup>	Note 6 (TBD)
Chromaticity	Wx	X	$\theta=0^\circ$	0.27	0.32	0.37	(TBD)
	Wy	Y	$\theta=0^\circ$	0.29	0.34	0.39	(TBD)
Uniformity	$Y_L$	%	70	75	--	%	Note 6 (TBD)

Note 1: Measurement should be performed in the dark room, optical ambient temperature  $\approx 25^\circ\text{C}$ , and backlight current  $IL=20\text{ mA}$ .

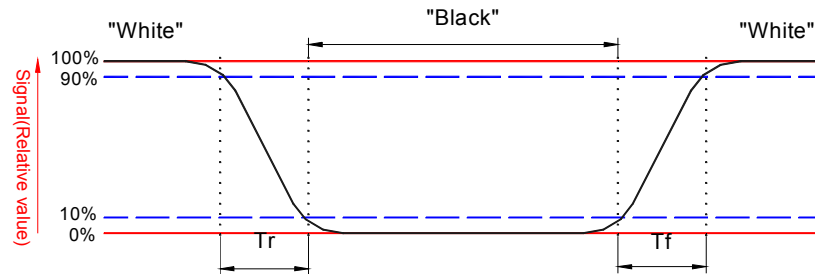
Note 2: To be measured on the center area of panel with a viewing cone of  $1^\circ$  by Topcon luminance meter BM-5A, after 15 minutes operation.



Note 3: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively.

The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.

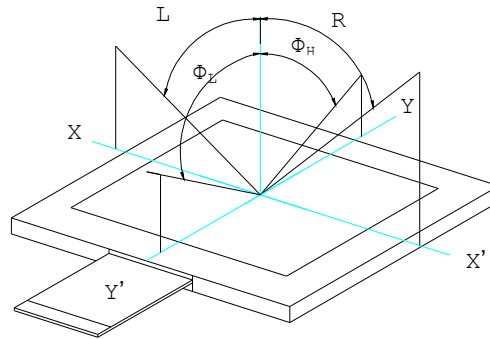


Note 4. Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

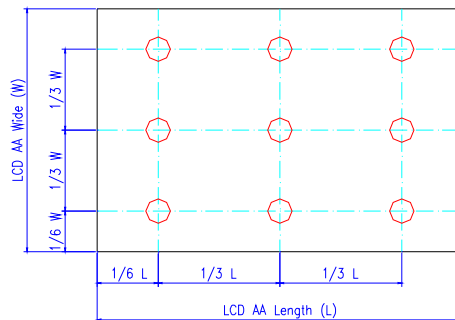
$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" status}}{\text{Photo detector output when LCD is at "Black" status}}$$

Note 5. Definition of viewing angle,  $\theta$ , Refer to figure as below.



Note 6. Definition of brightness and luminance uniformity:

Brightness = average brightness of nine points illustrated below



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

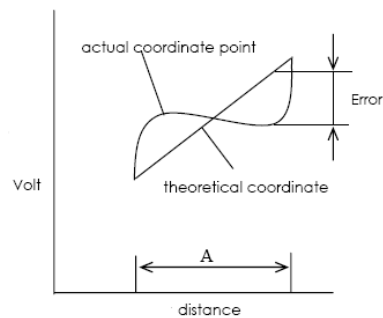
## E. Touch Screen Panel Specifications

### 1. Electrical Characteristics

Item		Min.	Max.	Unit	Remark
Rate DC Voltage		--	7	V	
Resistance	X (Film)	100	900	$\Omega$	Resistance

	Y (Glass)	100	900		
Linearity		-1.5%	1.5%	--	Note 1
Chattering		--	20	ms	At connector pin
Insulation Resistance		20	--	MΩ	DC 25V

Note 1: Measurement condition of Linearity: difference between actual voltage & theoretical voltage is an error at any points. Linearity is the value max. error voltage divided by voltage difference on within T/P active area inside 4mm.

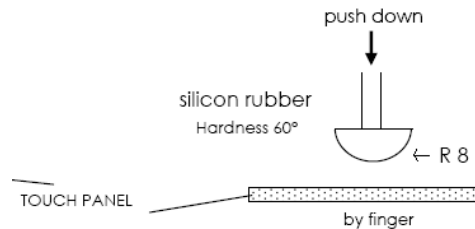


## 2. Mechanical Characteristics

Item	Min.	Max.	Unit	Remark
Hardness of Surface	3	--	H	JIS K-5600
activation force (Pen or Finger)		80	gf	Note 1, 2
Dot pitch	3		mm	
Dot size	0.05*0.05		mm	

Note 1: Within " active area inside 5mm", but not near the active area boundary and on the dot-spacer.

Note 2: Operation force measurement is under test condition as figure below.

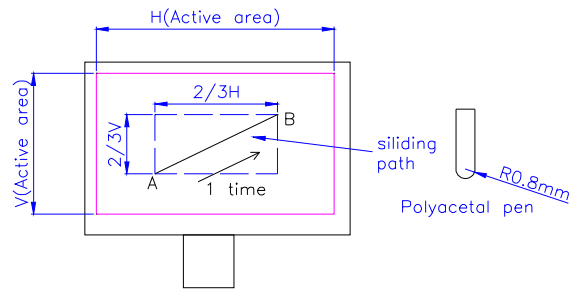


## 3. Life Test Condition

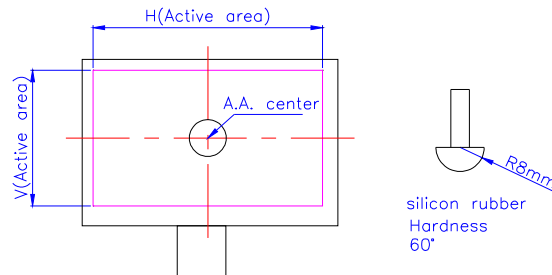
Item	Min.	Max.	Unit	Remark
Notes Life	10 <sup>5</sup>	--	lines	Note 1
Input Life	10 <sup>6</sup>	--	times	Note 2

Note 1: Notes Life test condition (by pen): slide on central 2/3 of active area and use R 0.8mm

polyacetal pen, input force : 250gf, frequency : 60mm/sec. Sliding from A to B complete 1 time. shown as figure2.



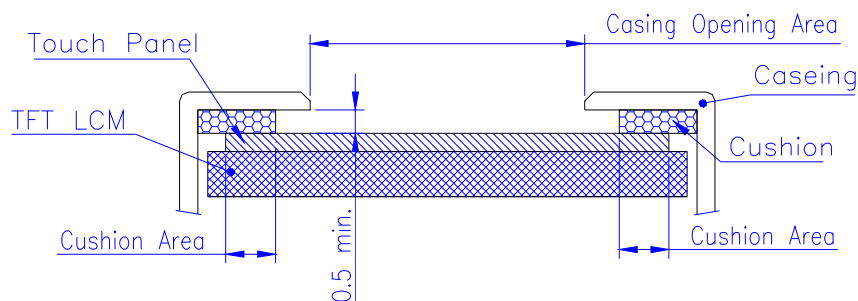
Note 2: Input Life test condition (by finger): test position on active area center and use R8.0mm silicon rubber (hardness 60°), test force: 250gf, frequency : 2times/sec. shown as figure.



#### 4. Attention

Please pay attention for below matters at mounting design of touch panel of LCD module.

- 1) Do not design casing opening area pressing the active area to prevent from miss input. Suggest casing opening area shown as mechanical drawing. Suggest the gap between casing and touch panel surface at least 0.5mm to avoid miss input.
- 2) Cushion area must not contact with active area. Suggest cushion area shown as mechanical drawing.
- 3) Use elastic or non-conductive material to enclosure touch panel.
- 4) Do not bond film of touch panel with casing.
- 5) The touch panel edge is conductive. Do not touch it with any conductive part after mounting.



- 6) If user wants to cleaning touch panel by air gun, pressure  $2\text{kg}/\text{cm}^2$  below is suggested. Not to blow glass from FPC site to prevent FPC peeled off.
- 7) Do not put a heavy shock or stress on touch panel and film surface. Ex. Don't lift the panel by film face with vacuum.





- 8) Do not lift LCD module by FPC.
- 9) Please use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning. Do not use any organic solvent, acid or alkali liquor.
- 10) Do not pile touch panel. Do not put heavy goods on touch panel.

## F. Reliability Test Items

( The following reliability conditions can be modified according to the actual test results of samples used cost down materials)

No.	Test items	Conditions		Remark
1	High Temperature Storage	Ta= 80	240Hrs	Note 3
2	Low Temperature Storage	Ta= -40	240Hrs	Note 3
3	High Ttemperature Operation	Tp= 70	240Hrs	Note 3
4	Low Temperature Operation	Ta= -20	240Hrs	Note 3
5	High Temperature & High Humidity	Tp= 60 . 90% RH	240Hrs	Operation/ Note 3
6	Heat Shock	-30°C ~80°C /20 cycles 18min/cycle		Non-operation/ Note 3
7	Electrostatic Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B		Note 5
8	Image Sticking	40	6hrs	Note 3/ Note 6
9	Vibration	Frequency range : 8~33.3Hz Stoke : 1.3mm Sweep : 2.9G ,33.3~400Hz 2 hours for each direction of X,Y,Z 4 hours for Y direction		Non-operation JIS C7021, A-10 condition A : 15 minutes
10	Mechanical Shock	100G . 6ms, ±X,±Y,±Z 3 times for each direction		Non-operation JIS C7021, A-7 condition C
11	Vibration (With Carton)	Random vibration: 0.015G <sup>2</sup> /Hz from 5~200Hz -6dB/Octave from 200~500Hz		IEC 68-34
12	Drop (With Carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces		

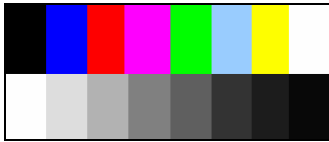
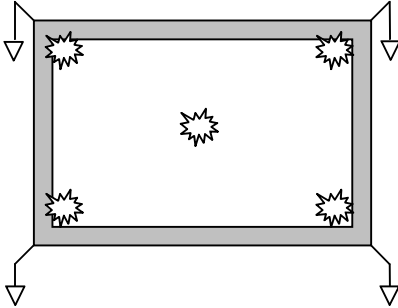
Note 1: Ta: Ambient Temperature. Tp: Panel Surface Temperature,

Note 2: In the standard conditions, there is not display function NG issue occurred. All the cosmetic specification is judged before the reliability stress.

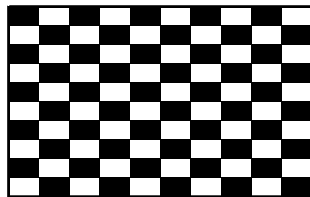
Note 3: All the ununiform optical performance caused by polarizer need to be ignored.

Note 4: temperature and relative umidity range is shown in the figure below

Note5 : All test techniques follow IEC6100-4-2 standard.

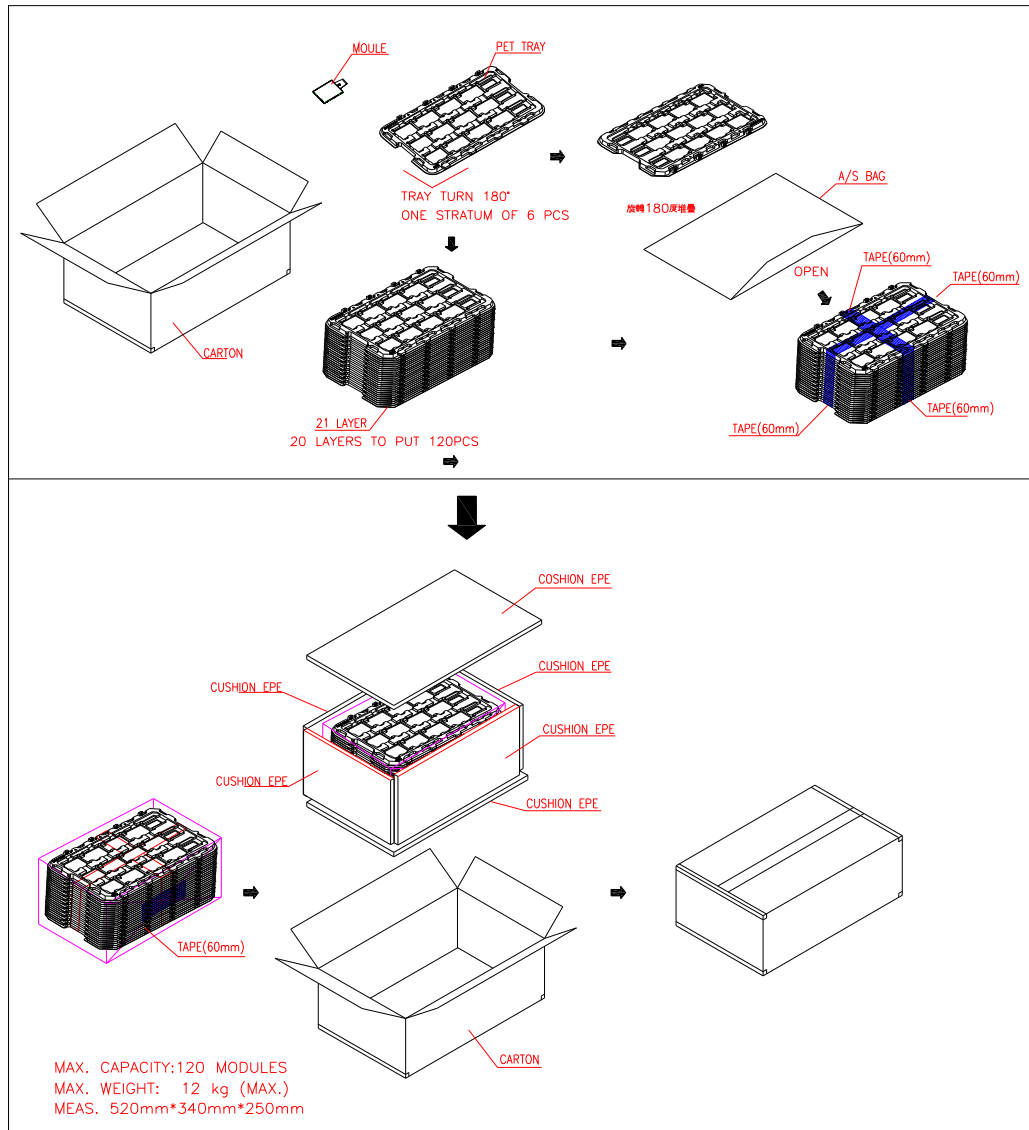
Test Condition		Note
Pattern		
Procedure And Set-up	<p><u>Contact Discharge</u> : 330Ω, 150pF, 1sec, 5point, 10times/point  <u>Air Discharge</u> : 330Ω, 150pF, 1sec, 5 point, 10times/point</p> 	
Criteria	B – Some performance degradation allowed. No data lost. Self-recoverable hardware failure.	
Others	1. Gun to Panel Distance 2. No SPI command, keep default register settings.	

Note 6: Operate with chess board pattern as figure and lasting time and temperature as the conditions.  
Then judge with 50% gray level , the mura is less than JND 2.8



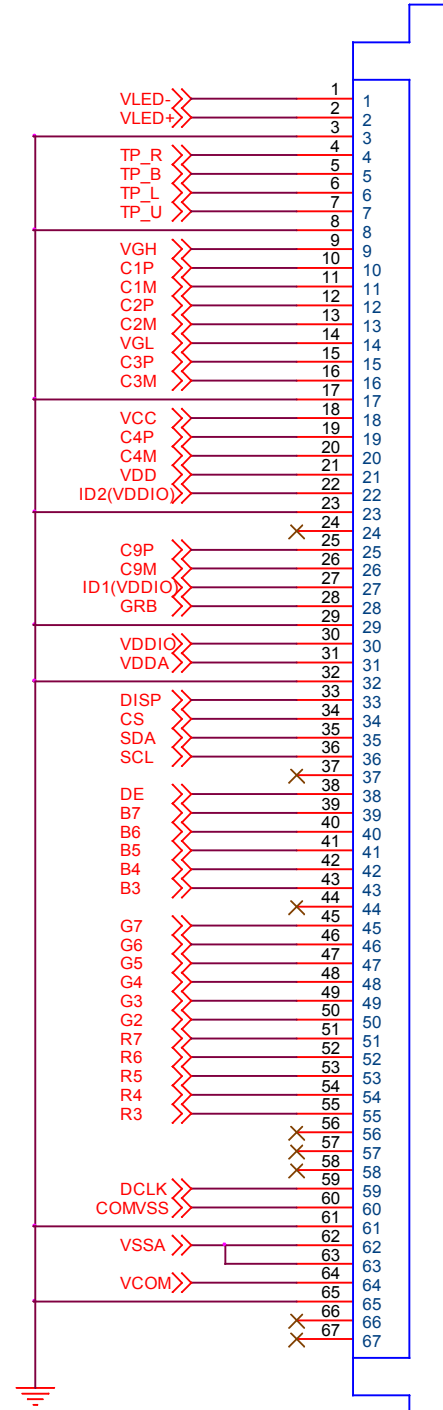
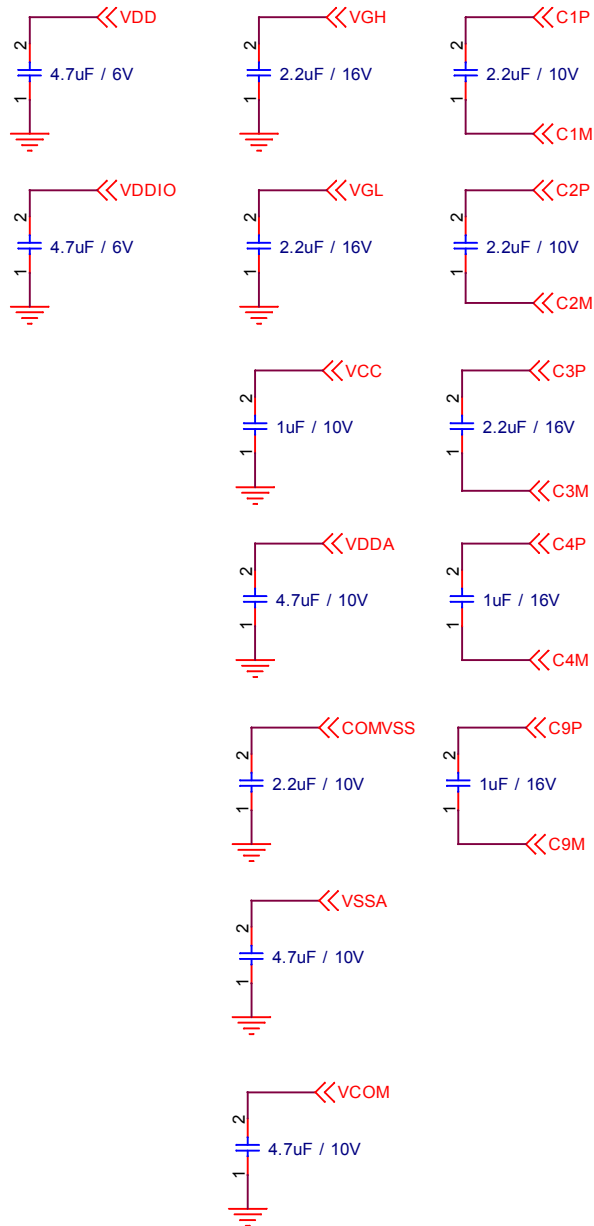
## G. Packing and Marking

### 1. Packing Form





## H. Application Note



FH26G-67S-0.3HBW(6)



## I. Precautions

1. Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.
2. Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.
3. Avoid dust or oil mist during assembly.
4. Follow the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.
5. Less EMI: it will be more safety and less noise.
6. Please operate module in suitable temperature. The response time & brightness will drift by different temperature.
7. Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it will cause image sticking.
8. Be sure to turn off the power when connecting or disconnecting the circuit.
9. Polarizer scratches easily, please handle it carefully.
10. Display surface never likes dirt or stains.
11. A dewdrop may lead to destruction. Please wipe off any moisture before using module.
12. Sudden temperature changes cause condensation, and it will cause polarizer damaged.
13. High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.
14. Acetic acid or chlorine compounds are not friends with TFT display module.
15. Static electricity will damage the module, please do not touch the module without any grounded device.
16. Do not disassemble and reassemble the module by self.
17. Be careful do not touch the rear side directly.
18. No strong vibration or shock. It will cause module broken.
19. Storage the modules in suitable environment with regular packing.
20. Be careful of injury from a broken display module.
21. Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity or other function issue.