

## ***TFT-Display Datenblatt***

Modell FG100451DSSWNG01

### **Kurzdaten**

Hersteller	Data Image
Diagonale	10,4" / 26,4 cm
Format	4:3
Auflösung	1024 x 768
Backlight	LED / 350 cd/m <sup>2</sup>
Interface	LVDS
Touchscreen	nein
Temperatur	-20... +70°C (Betrieb)



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# DATA IMAGE CORPORATION

## TFT Module Specification

ITEM NO.: FG100451DSSWNG01

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	Alex	Joe	Gany	Ken
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	A	14/SEP/12'		23

**2. RECORD OF REVISION**

Rev	Date	Item	Page	Comment
1	3/AUG/09'			Initial PRELIMINARY
2	8/FEB/12'	3.2	3	1. Modify contrast ratio and temperature range
		4.1	4	2. Modify High Temperature Storage test condition and High Temperature & High Humidity Operation test condition
		5.1	5, 6	3. Modify power supply current I <sub>cc</sub> , rush current I <sub>rush</sub> and note(2) ,note(3)
		5.1	5	4. Modify LVDS differential input voltage and common input voltage
		5.2	7	5. Modify LED converter power supply current I <sub>i</sub> .
		5.2	7	6. Modify PWM control frequency, PWM control duty ratio and add note(3) .
		5.2	7	7. Modify note(2)
		9.2	15	8. Modify CR value and add color chromaticity RGB data
		12	22	9. Modify outline drawing from rev:2 to rev:3.
		13	23	10. Add package information.
A	14/SEP/12'	12	22	1. Release Rev: A for production. 2. Modify OUTLINE DRAWING from Rev.1 to Rev.A.

### 3. GENERAL DESCRIPTION

#### 3.1 OVERVIEW

The FG100451D is a 10.4" TFT Liquid Crystal Display module with LED backlight unit and 30-pin-and-1ch LVDS interface. This product supports 1024x768 XGA format and can display true 16.2M colors (6-bits colors with FRC). The converter module for LED backlight is built-in.

#### 3.2 FEATURES

- ✧ Excellent brightness (350 nits)
- ✧ Ultra high contrast ratio (1000:1)
- ✧ Fast response time (Ton+Toff average 25ms)
- ✧ High color saturation NTSC 57%
- ✧ XGA (1024 x 768 pixels) resolution
- ✧ DE (Data Enable) only mode
- ✧ LVDS (Low Voltage Differential Signaling) interface
- ✧ Ultra wide viewing angle: 176(H) / 176(V) (CR>10) Super MVA technology
- ✧ 180 degree rotation display option
- ✧ Color reproduction (Nature color)
- ✧ Wide operation and storage temperature range (-20°C to 70°C operation, -20°C to 70°C storage)

#### 3.3 APPLICATION

- ✧ TFT LCD monitor for industrial applications
- ✧ Slim design display for portable applications
- ✧ Digitizer Applicable Design

#### 3.4 GENERAL SPECIFICATIONS

Parameter	Specifications	Unit	Note
Active Area	210.432 (H) x 157.824 (V) (10.4" diagonal)	mm	1
Bezel Opening Area	215.4 (H) x 161.8 (V)	mm	
Driver Element	a-Si TFT active matrix	-	-
Pixel Number	1024 x R.G.B. x 768	pixel	-
Pixel Pitch (Sub Pixel)	0.0685 (H) x 0.2055 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.2M	color	-
Display Operation Mode	Transmissive mode / Normally black	-	-
Surface Treatment	Anti-glare	-	-

Note 1: Please refer to the attached drawings for more information of front and back outline dimensions.

#### 3.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	-	238.6	-	mm	1
	Vertical (V)	-	175.8	-	mm	
	Depth (D)	-	7.5	-	mm	-
Weight		-	280	-	-	-

Note 1: Please refer to the attached drawings for more information of front and back outline dimensions.

## 4. ABSOLUTE MAXIMUM RATINGS

### 4.1 ABSOLUTE RATINGS OF ENVIRONMENT

Test Item	Test Condition	Note
High Temperature Storage Test	70°C, 240 hours	(1) (2)
Low Temperature Storage Test	-20°C, 240 hours	
Thermal Shock Storage Test	-20°C, 0.5hour $\longleftrightarrow$ 70°C, 0.5hour; 100cycles, 1hour/cycle	
High Temperature Operation Test	70°C, 240 hours	
Low Temperature Operation Test	-20°C, 240 hours	
High Temperature & High Humidity Operation Test	40°C, RH 90%, 240hours	
Shock (Non-Operating)	200G, 2ms, half sine wave, 1 time for $\pm X$ , $\pm Y$ , $\pm Z$ .	(3)
Vibration (Non-Operating)	1.5G, 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z	(3)

Note (1) There should be no condensation on the surface of panel during test.

Note (2) Temperature of panel display surface area should be 70 °C Max.

Note (3) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

### 4.2 ELECTRICAL ABSOLUTE RATINGS

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	V <sub>CC</sub>	-0.3	4.0	V	(1)
Input Signal Voltage	V <sub>IN</sub>	-0.3	3.6	V	(1)
LED Converter Voltage	V <sub>I</sub>	-0.3	18	V	(1)
Enable Voltage	EN	---	5.5	V	(1)
Backlight Adjust	ADJ	---	5.5	V	(1)

Note (1) Permanent damage to the device may occur if maximum values are exceeded. Functional operation should be restricted to the conditions described under normal operating conditions.

## 5. ELECTRICAL CHARACTERISTICS

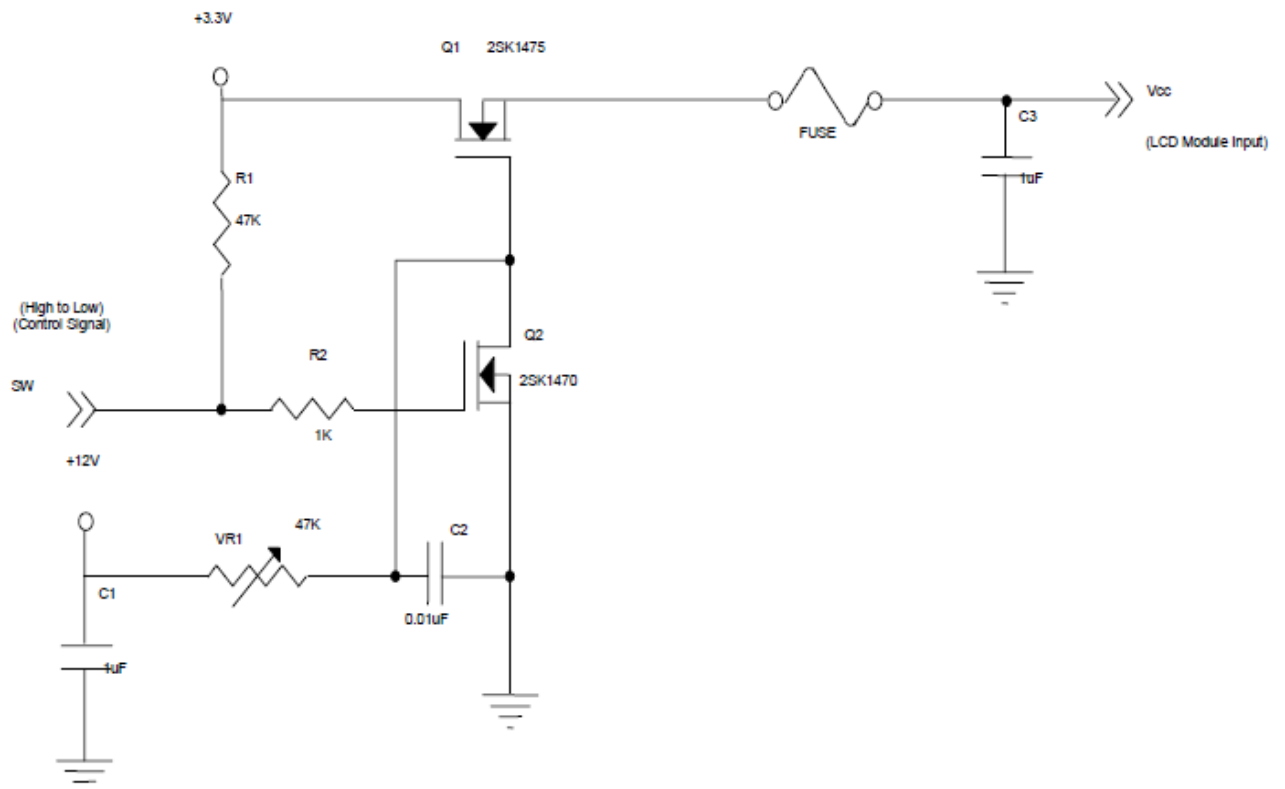
### 5.1 TFT LCD MODULE

 $T_a = 25\text{ }^\circ\text{C}$ 

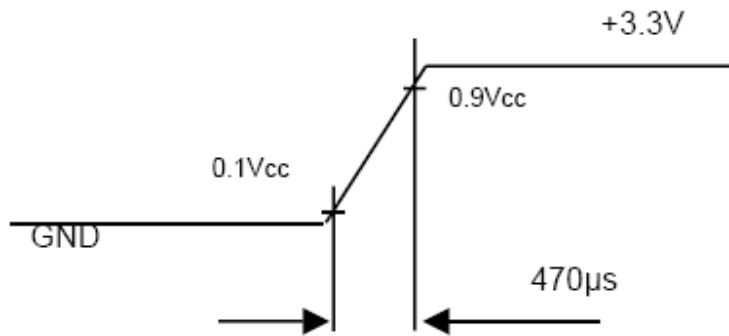
Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Power Supply Voltage	$V_{CC}$	3.0	3.3	3.6	V	(1)
Power Supply Ripple Voltage	$V_{RP}$	-	-	100	mV	
Rush Current	$I_{RUSH}$	-	-	4	A	(2)
Power Supply Current	White	$I_{CC}$	570	620	mA	(3)
	Black	$I_{CC}$	420	460	mA	(3)
LVDS Interface	Differential Input Voltage	$ VID $	100	600	mV	-
	Common Input Voltage	$V_{ICM}$	0.7	1.6	V	-
CMOS interface	Input High Threshold Voltage	$V_{IH}$	2.7	3.3	V	-
	Input Low Threshold Voltage	$V_{IL}$	0	0.7	V	-

Note (1) The assembly should be always operated within above ranges.

Note (2) Measurement Conditions:



**Vcc rising time is 470us**



Note (3) The specified power supply current is under the conditions at  $V_{cc} = 3.3\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^\circ\text{C}$ ,  $f_v = 60\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

b. Black Pattern



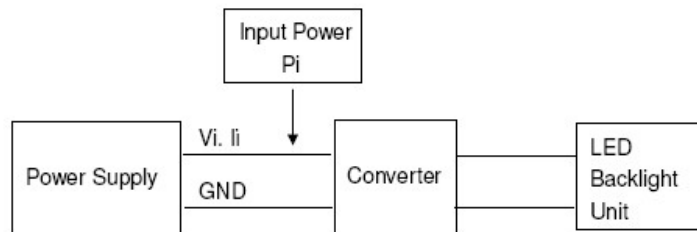
Active Area

**5.2 LED CONVERTER**
 $T_a = 25 \pm 2^\circ\text{C}$ 

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Converter Power Supply Voltage	$V_i$	10.8	12.0	13.2	V	
Converter Power Supply Current	$I_i$	---	0.28	---	A	@ $V_i = 12\text{V}$ (Duty 100%)
EN Control Level	Backlight on	2.0	3.3	5.0	V	
	Backlight off	0	---	0.8	V	
PWM Control Level	PWM High Level	2.0	3.3	5.0	V	
	PWM Low Level	0	---	0.15	V	
PWM Control Duty Ratio		2		100	%	(3)
PWM Control Frequency	$f_{\text{PWM}}$	190	200	20K	Hz	(3)
LED Life Time	LL	30,000			Hrs	(2)

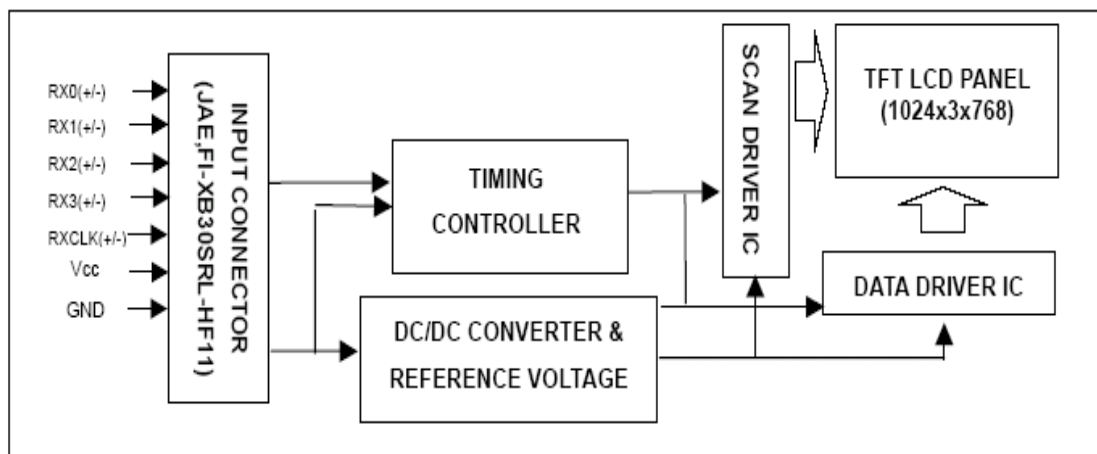
Note (1): LED current is measured by utilizing a high frequency current meter as shown below:

Note (2): The lifetime of LED is defined as the time when it continues to operate under the conditions at  $T_a = 25 \pm 2^\circ\text{C}$  and  $I_{\text{LED}} = 20\text{mA DC}$  (LED forward current) until the brightness becomes  $\leq 50\%$  of its original value. Operating LED under high temperature environment will reduce life time and lead to color shift.



Note (3): At 190 ~1KHz PWM control frequency, duty ratio range is restricted from 2% to 100%.

1K ~20KHz PWM control frequency, minimum duty on-time  $\geq 20 \mu\text{s}$ .

**6. BLOCK DIAGRAM**
**6.1 TFT LCD MODULE**




## 7. INTERFACE PIN CONNECTION

### 7.1 TFT LCD MODULE

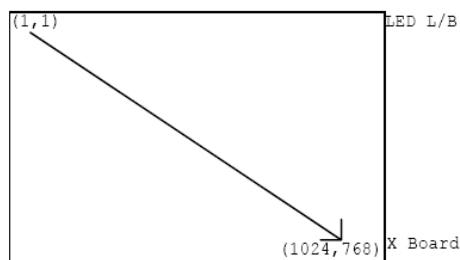
#### CN1 Connector Pin Assignment

Pin No.	Symbol	Description	Note
1	VCC	Power supply: +3.3V	-
2	VCC	Power supply: +3.3V	-
3	VCC	Power supply: +3.3V	-
4	GND	Ground	-
5	GND	Ground	-
6	GND	Ground	-
7	RPFI	Reverse Panel Function (Display Rotation)	3
8	NC	No Connection	-
9	NC	No Connection	-
10	NC	No Connection	-
11	Sel 6/8	6/8 Bits Select	4
12	GND	Ground	-
13	NC	No Connection	-
14	GND	Ground	-
15	RX0-	Negative transmission data of pixel 0	-
16	RX0+	Positive transmission data of pixel 0	-
17	GND	Ground	-
18	RX1-	Negative transmission data of pixel 1	-
19	RX1+	Positive transmission data of pixel 1	-
20	GND	Ground	-
21	RX2-	Negative transmission data of pixel 2	-
22	RX2+	Positive transmission data of pixel 2	-
23	GND	Ground	-
24	RXCLK-	Negative of clock	-
25	RXCLK+	Positive of clock	-
26	GND	Ground	-
27	RX3-	Negative transmission data of pixel 3	-
28	RX3+	Positive transmission data of pixel 3	-
29	GND	Ground	-
30	NC	No Connection	2

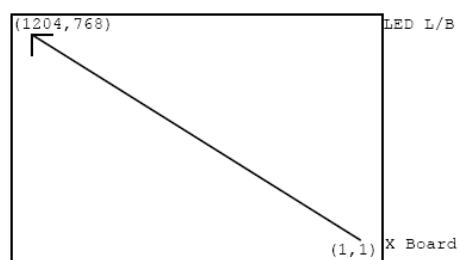
Note (1) Connector Part No.: JAE,FI-XB30SRL-HF11 or compatible

Note (2) Reserved for internal use. Please leave it floating.

Note (3) Scanning direction:

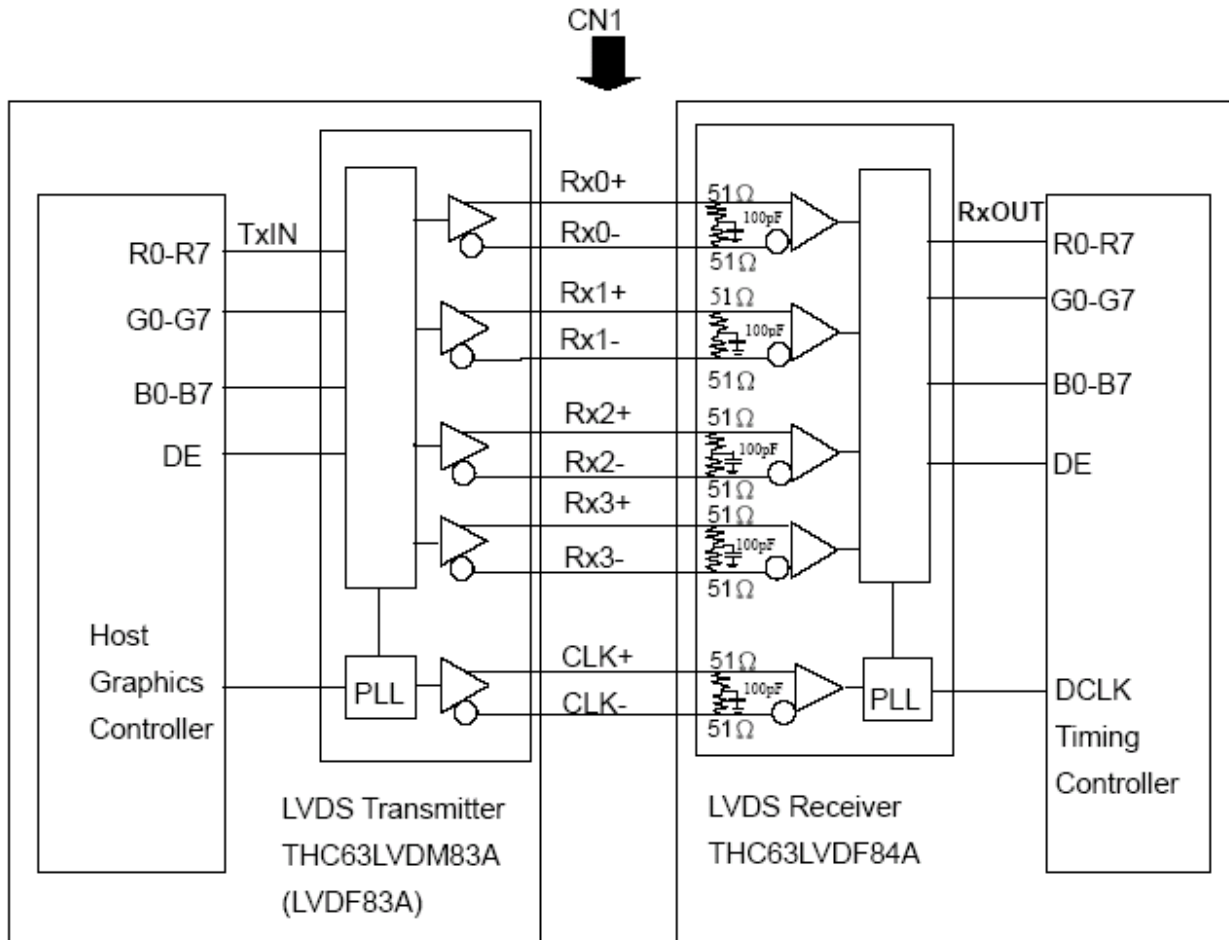


RPF = Low/ floating : normal display (default)



RPF = High : display with 180 degree rotation

Note (4) Default 8 Bits Input (NC or Low); Pull High is 6Bits Input.

**7.2 BLOCK DIAGRAM OF INTERFACE**


R0~R7 : Pixel R Data ,  
 G0~G7 : Pixel G Data ,  
 B0~B7 : Pixel B Data ,  
 DE : Data enable signal

Note (1) The system must have the transmitter to drive the assembly.

Note (2) LVDS cable impedance shall be 50 ohms per signal line or about 100 ohms per twist-pair line when it is used differentially.

**7.3 BACKLIGHT UNIT**

<b>Pin</b>	<b>Symbol</b>	<b>Description</b>	<b>Remark</b>
1	V <sub>i</sub>	Converter input voltage	12V
2	V <sub>i</sub>	Converter input voltage	12V
3	V <sub>i</sub>	Converter input voltage	12V
4	V <sub>i</sub>	Converter input voltage	12V
5	V <sub>GND</sub>	Converter ground	Ground
6	V <sub>GND</sub>	Converter ground	Ground
7	V <sub>GND</sub>	Converter ground	Ground
8	V <sub>GND</sub>	Converter ground	Ground
9	EN	Enable pin	3.3V
10	ADJ	Backlight Adjust	PWM Dimming

Note (1): Connector Part No: 91208-01001(ACES) or equivalent.

**7.4 LVDS INTERFACE**

	SIGNAL	TRANSMITTER THC63LVDM83 A		INTERFACE CONNECTOR		RECEIVER THC63LVDF84A		TFT CONTROL INPUT
		PIN	INPUT	Host	TFT-LCD	PIN	OUTPUT	
24 bit	R0	51	TxIN0	TA OUT0+	Rx 0+	27	Rx OUT0	R0
	R1	52	TxIN1			29	Rx OUT1	R1
	R2	54	TxIN2			30	Rx OUT2	R2
	R3	55	TxIN3			32	Rx OUT3	R3
	R4	56	TxIN4	TA OUT0-	Rx 0-	33	Rx OUT4	R4
	R5	3	TxIN6			35	Rx OUT6	R5
	G0	4	TxIN7			37	Rx OUT7	G0
	G1	6	TxIN8			38	Rx OUT8	G1
	G2	7	TxIN9	TA OUT1+	Rx 1+	39	Rx OUT9	G2
	G3	11	TxIN12			43	Rx OUT12	G3
	G4	12	TxIN13			45	Rx OUT13	G4
	G5	14	TxIN14			46	Rx OUT14	G5
	B0	15	TxIN15	TA OUT1-	Rx 1-	47	Rx OUT15	B0
	B1	19	TxIN18			51	Rx OUT18	B1
	B2	20	TxIN19			53	Rx OUT19	B2
	B3	22	TxIN20			54	Rx OUT20	B3
	B4	23	TxIN21	TA OUT2+	Rx 2+	55	Rx OUT21	B4
	B5	24	TxIN22			1	Rx OUT22	B5
	DE	30	TxIN26			6	Rx OUT26	DE
	R6	50	TxIN27			TA OUT2-	Rx 2-	7
	R7	2	TxIN5	34	Rx OUT5			R7
	G6	8	TxIN10	41	Rx OUT10			G6
	G7	10	TxIN11	42	Rx OUT11			G7
	B6	16	TxIN16	TA OUT3+	Rx 3+	49	Rx OUT16	B6
	B7	18	TxIN17			50	Rx OUT17	B7
	RSVD 1	25	TxIN23			2	Rx OUT23	NC
	RSVD 2	27	TxIN24			TA OUT3-	Rx 3-	3
	RSVD 3	28	TxIN25	5	Rx OUT25			NC
	DCLK	31	TxCLK IN	TxCLK OUT+	RxCLK IN+	26	RxCLK OUT	DCLK
				TxCLK OUT-	RxCLK IN-			

R0~R7: Pixel R Data (7; MSB, 0; LSB)

G0~G7: Pixel G Data (7; MSB, 0; LSB)

B0~B7: Pixel B Data (7; MSB, 0; LSB)

DE : Data enable signal

Notes (1) RSVD(reserved)pins on the transmitter shall be "H" or "L".

### 7.5 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
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	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
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	Green(253)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Green(255)	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0
Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	

Note (1) 0: Low Level Voltage, 1: High Level Voltage

## 8. INTERFACE TIMING

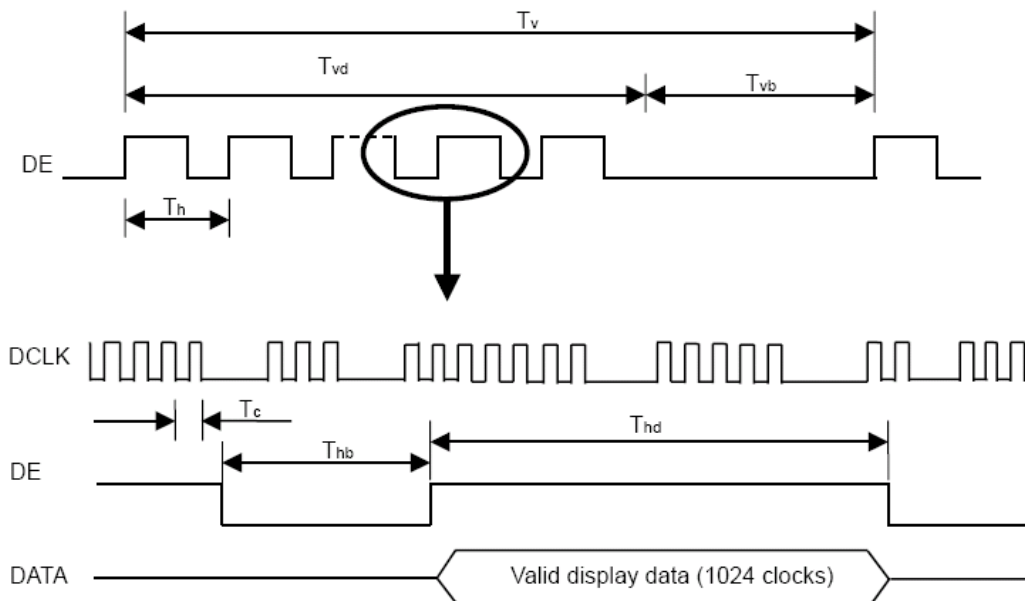
### 8.1 INPUT SIGNAL TIMING SPECIFICATIONS

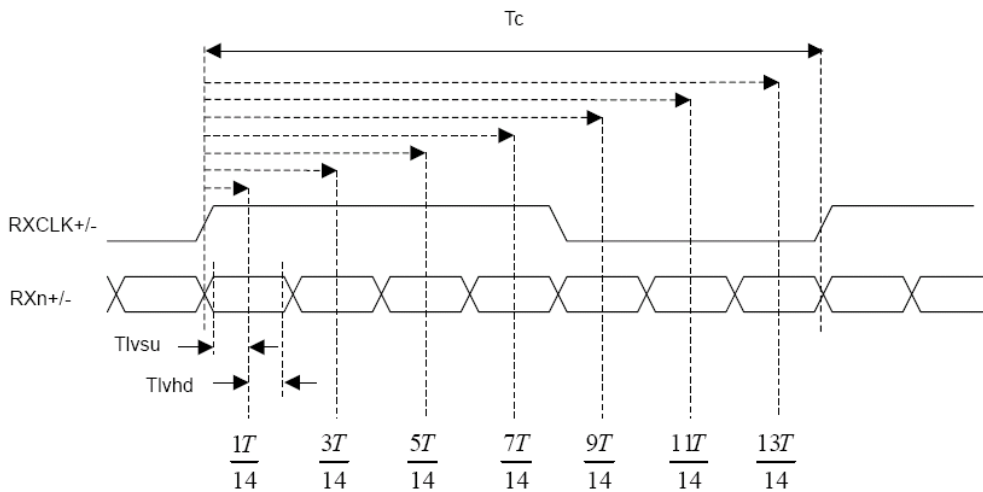
The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Receiver Clock	Frequency	1/Tc	55	65	75	MHz	
	Input cycle to cycle jitter	Trcl	-	-	200	ps	
LVDS Receiver Data	Setup Time	Tlvsu	600	-	-	ps	
	Hold Time	Tlvhd	600	-	-	ps	
Vertical Active Display Term	Frame Rate	Fv	50	60	70	Hz	
	Total	Tv	770	806	950	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	2	38	182	Th	-
Horizontal Active Display Term	Total	Th	1100	1344	1800	Tc	Th=Thd+Thb
	Display	Thd	1024	1024	1024	Tc	-
	Blank	Thb	76	320	776	Tc	-

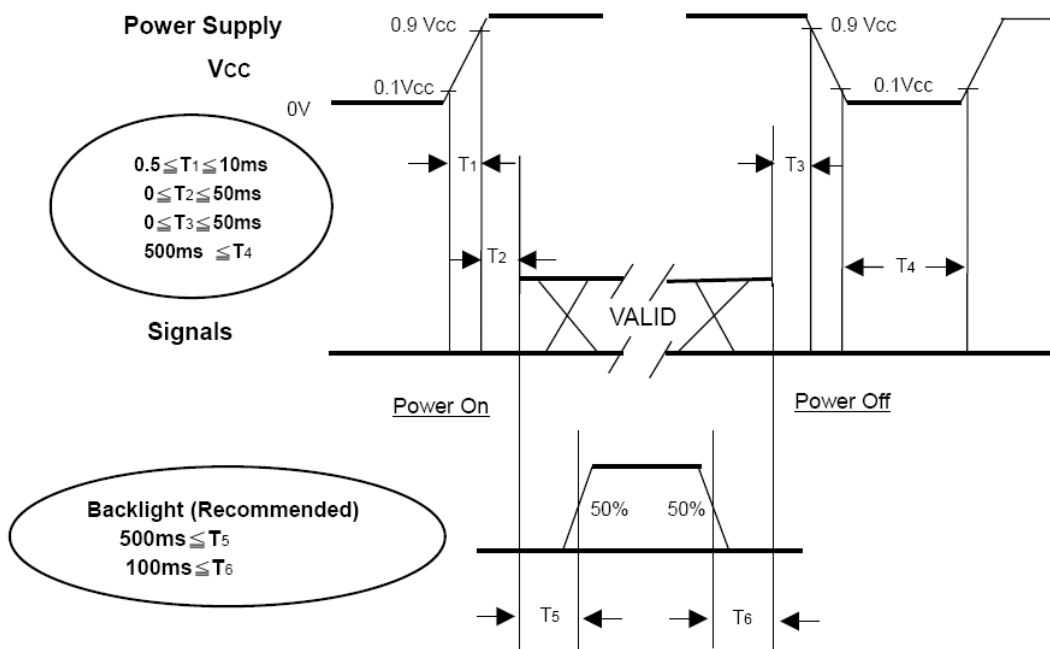
Note (1) Since this assembly is operated in DE only mode, Hsync and Vsync input signals should be set to low logic level. Otherwise, this assembly would operate abnormally.

#### INPUT SIGNAL TIMING DIAGRAM



**LVDS RECEIVER INTERFACE TIMING DIAGRAM**

**8.2 POWER ON/OFF SEQUENCE**

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should follow the conditions shown in the following diagram.


**Power ON/OFF Sequence**

- Note (1) The supply voltage of the external system for the assembly input should follow the definition of Vcc.  
 Note (2) Apply the lamp voltage within the LCD operation range. When the backlight turns on before the LCD operation or the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.  
 Note (3) In case of Vcc is in off level, please keep the level of input signals on the low or keep a high impedance.  
 Note (4) T4 should be measured after the assembly has been fully discharged between power off and on period.  
 Note (5) Interface signal shall not be kept at high impedance when the power is on.

## 9. OPTICAL CHARACTERISTICS

### 9.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V <sub>CC</sub>	3.3	V
Input Signal	According to typical value in "5. ELECTRICAL CHARACTERISTICS"		
Converter PWM duty		100%	

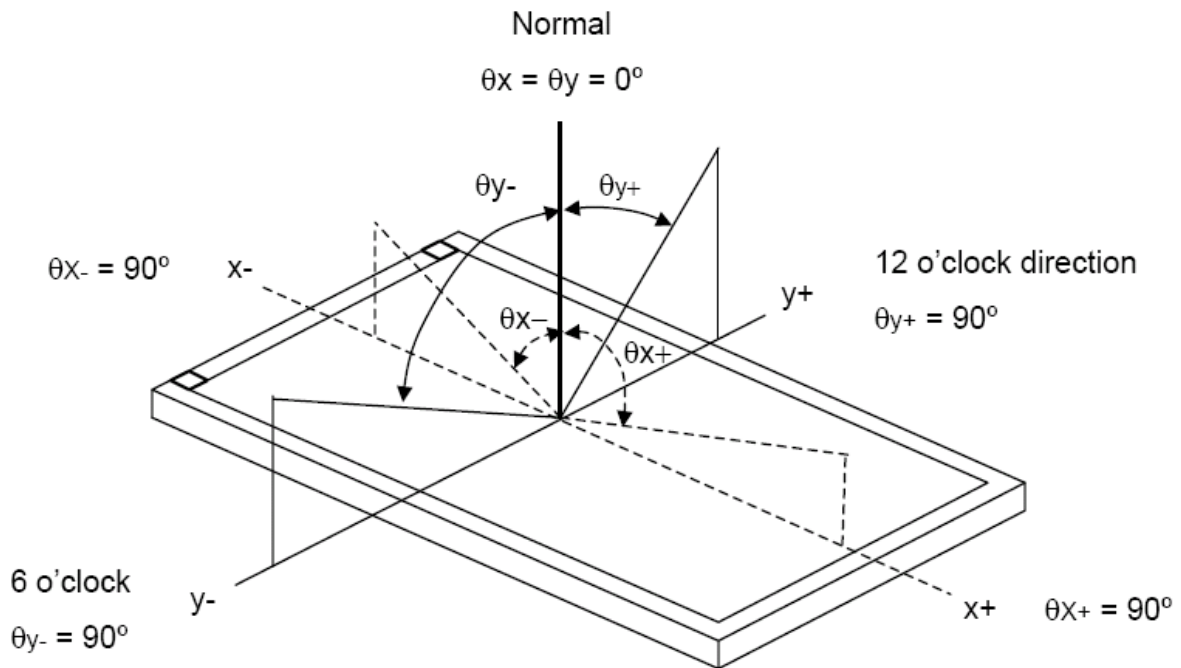
### 9.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 9.2. The following items should be measured under the test conditions described in 9.1 and stable environment shown in Note (6).

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast Ratio	CR	θ <sub>x</sub> =0°, θ <sub>Y</sub> =0° Viewing angle at normal direction	700	1000		-	(2)	
Response Time	TR		-	14	19	ms	(3)	
	TF		-	11	16	ms		
Center Luminance of White	LC		300	350	-	cd/m <sup>2</sup>	(4)	
White Variation	δW		-	-	1.4	-	(7)	
Cross Talk	CT		-	-	4	%	(5)	
Color Chromaticity	Red		R <sub>x</sub>	Typ. -0.05	0.610	Typ. +0.05	-	(6)
			R <sub>y</sub>		0.365		-	
	Green		G <sub>x</sub>		0.341			
			G <sub>y</sub>		0.564			
	Blue	B <sub>x</sub>	0.147					
		B <sub>y</sub>	0.087					
	White	W <sub>x</sub>	0.313					
		W <sub>y</sub>	0.329					
Viewing Angle	Horizontal	θ <sub>x</sub> <sup>+</sup>	80	88	-	Deg.	(1)	
		θ <sub>x</sub> <sup>-</sup>	80	88	-			
	Vertical	θ <sub>Y</sub> <sup>+</sup>	80	88	-			
		θ <sub>Y</sub> <sup>-</sup>	80	88	-			

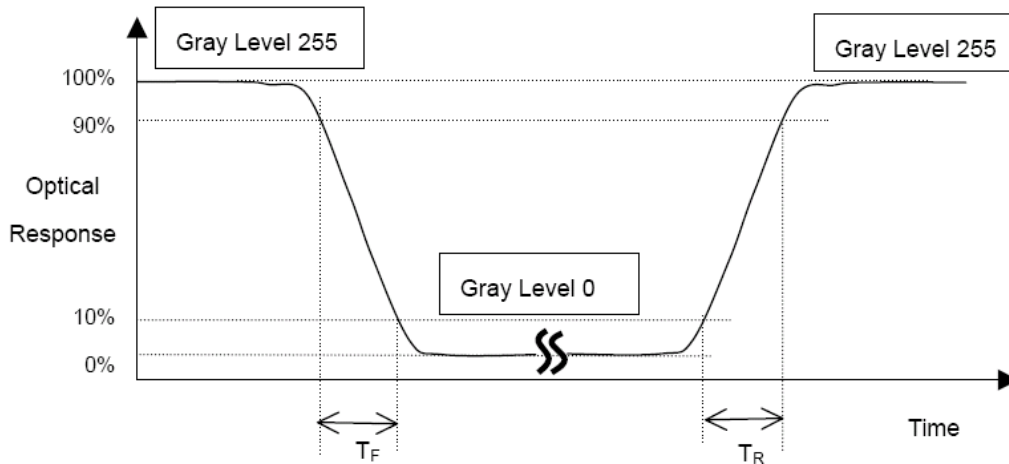


Note (1) Definition of Viewing Angle ( $\theta_x, \theta_y$ ):



Note (2) Definition of Contrast Ratio (CR): The contrast ratio can be calculated by the following expression.  
 Contrast Ratio (CR) =  $L_{255} / L_0$   
 L255: Luminance of gray level 255  
 L0: Luminance of gray level 0  
 $CR = CR(X)$ , where CR (X) is corresponding to the Contrast Ratio of the point X at the figure in Note (7).

Note (3) Definition of Response Time ( $T_R, T_F$ ):



Note (4) Definition of Luminance of White ( $L_c$ ):

Measure the luminance of gray level 255 at center point and 5 points

$L_c = L(5)$ , where L (X) is corresponding to the luminance of the point X at the figure in Note (7).

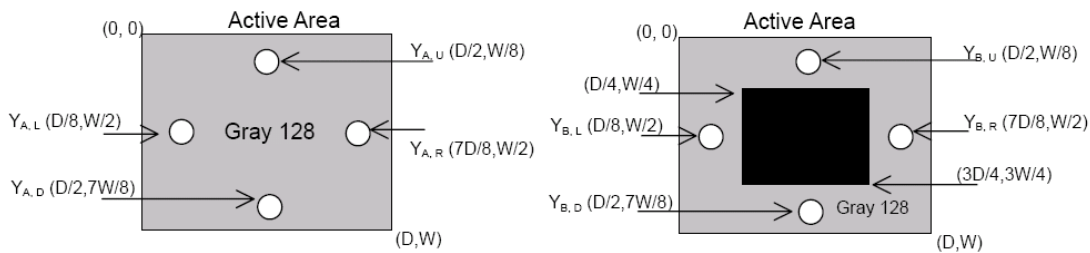
Note (5) Definition of Cross Talk (CT):

$$CT = |Y_B - Y_A| / Y_A \times 100 (\%)$$

Where:

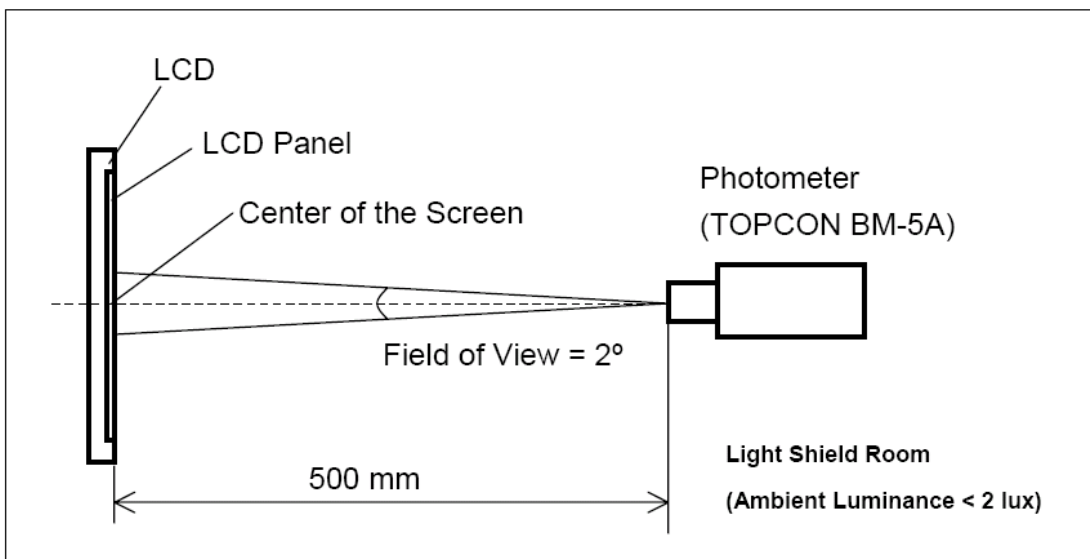
$Y_A$  = Luminance of measured location without gray level 0 pattern ( $\text{cd/m}^2$ )

$Y_B$  = Luminance of measured location with gray level 0 pattern ( $\text{cd/m}^2$ )



Note (6) Measurement Setup:

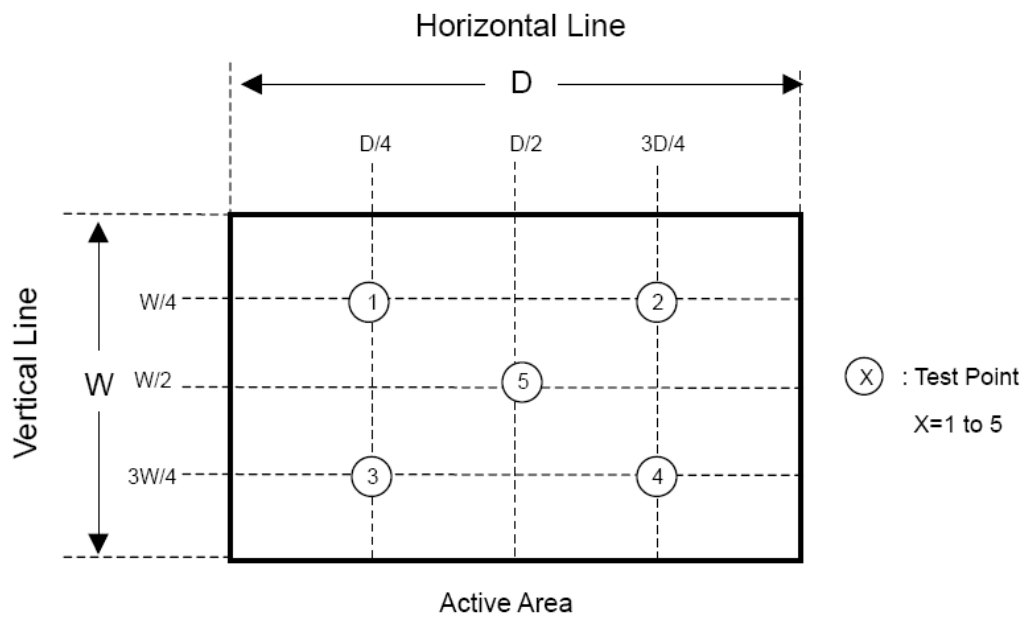
The LCD assembly should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (7) Definition of White Variation ( $\delta W$ ):

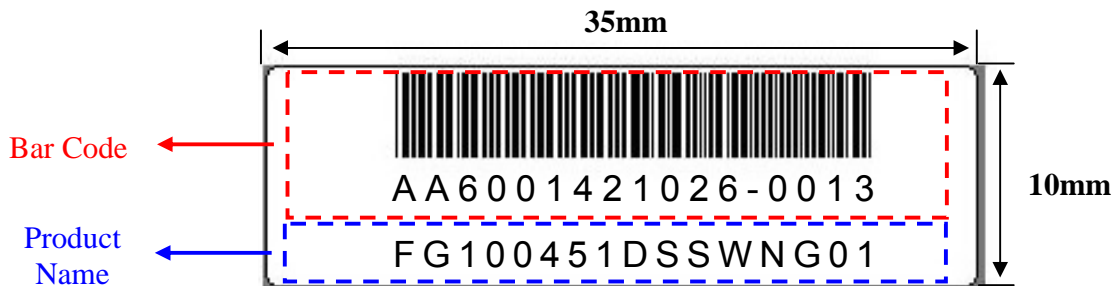
Measure the luminance of gray level 255 at 5 points

$$\delta W = \frac{\text{Maximum } [L(1), L(2), L(3), L(4), L(5)]}{\text{Minimum } [L(1), L(2), L(3), L(4), L(5)]}$$



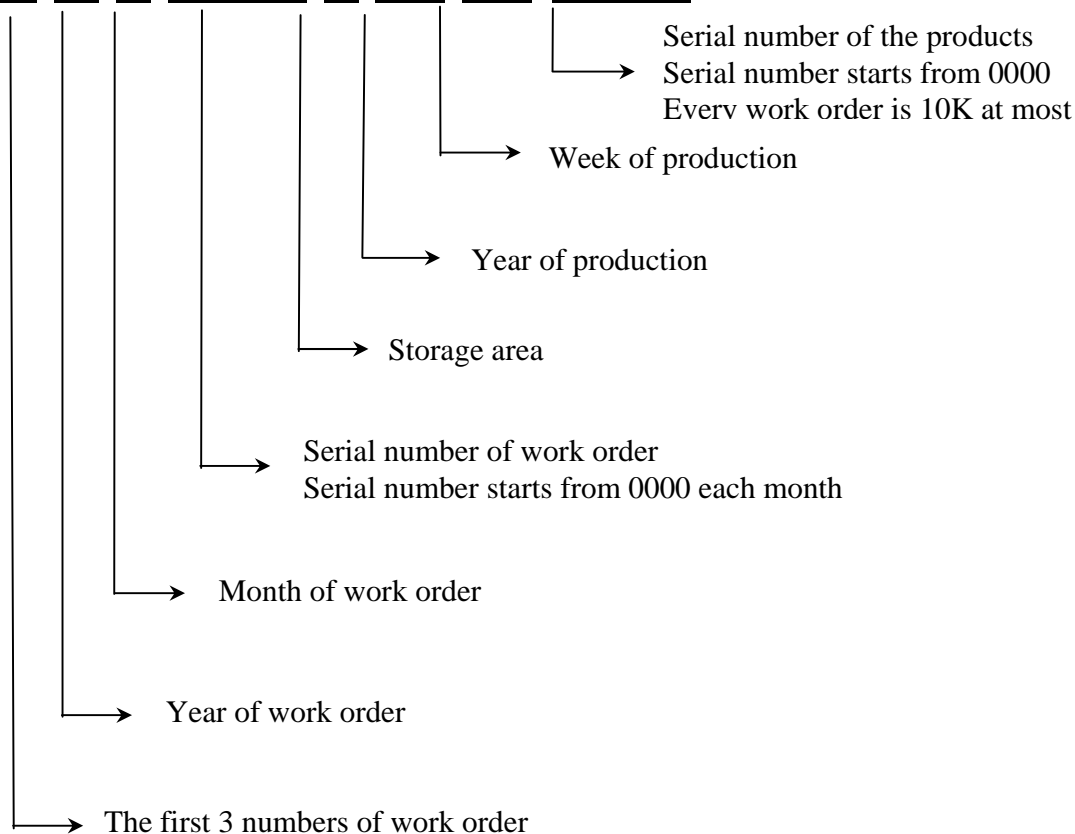
## 10. LCM PRODUCT LABEL DEFINE

Product Label style:

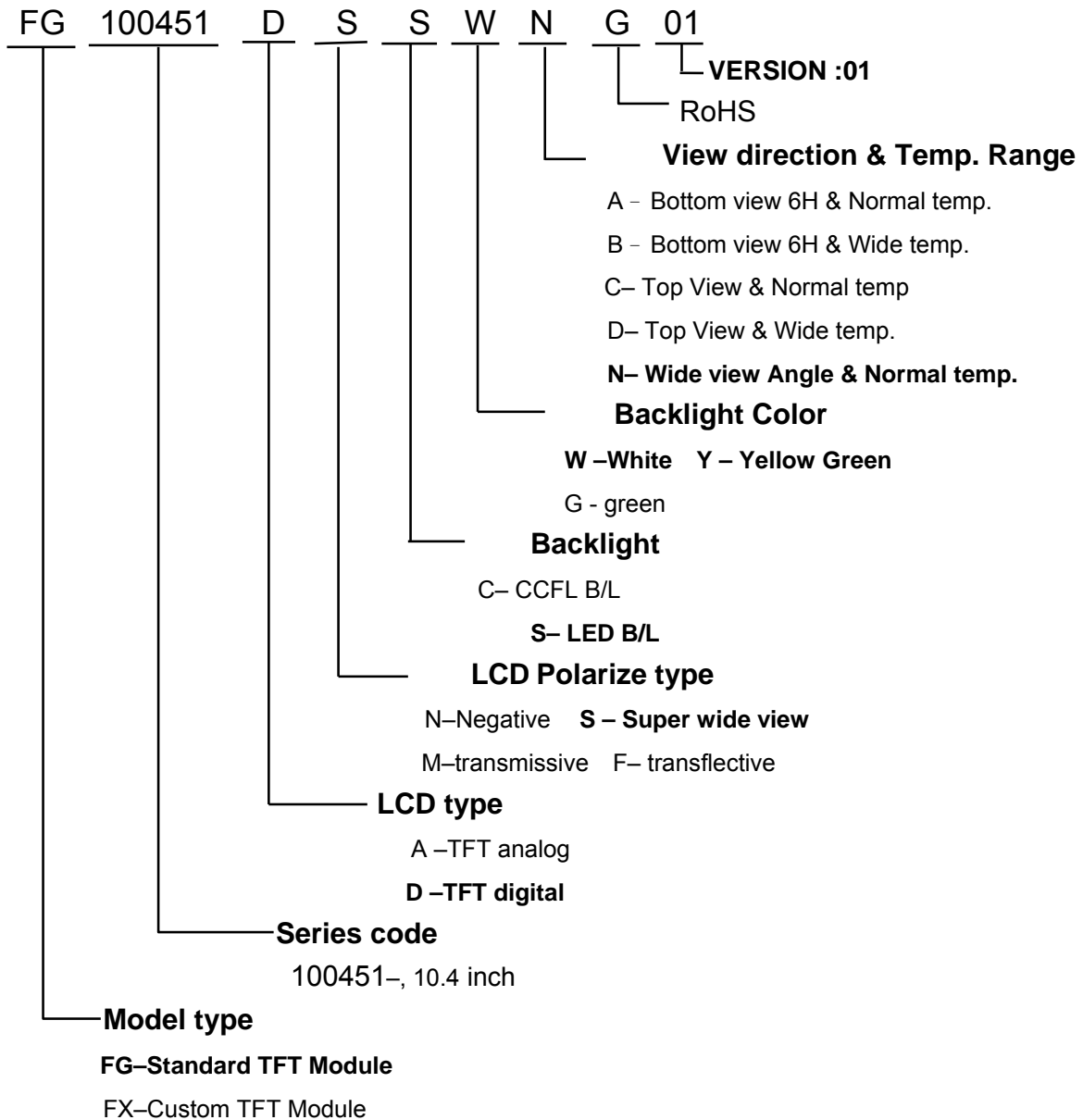


BarCode Define:

**A A 6 0014 2 10 26-0013**



**Product Name Define:**



## 11. PRECAUTIONS IN USE LCM

### 1. ASSEMBLY PRECAUTIONS

- (1) You must mount a module using holes arranged in four corners or four sides.
- (2) You should consider the mounting structure so that uneven force (ex. Twisted stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the module.
- (3) Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.
- (4) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- (5) Do not open the case because inside circuits do not have sufficient strength.
- (6) Please do not take a LCD module to pieces and reconstruct it. Resolving and reconstructing modules may cause them not to work well.
- (7) Please do not touch metal frames with bare hands and soiled gloves. A color change of the metal frames can happen during a long preservation of soiled LCD modules.
- (8) Please pay attention to handling lead wire of backlight so that it is not tugged in connecting with inverter.

### 2. OPERATING PRECAUTIONS

- (1) Please be sure to turn off the power supply before connecting and disconnecting signal input cable.
- (2) Please do not change variable resistance settings in LCD module. They are adjusted to the most suitable value. If they are changed, it might happen LCD does not satisfy the characteristics specification
- (3) Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.
- (4) When fixed patterns are displayed for a long time, remnant image is likely to occur.
- (5) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- (6) Please consider that LCD backlight takes longer time to become stable of radiation characteristics in low temperature than in room temperature.

### 3. ELECTROSTATIC DISCHARGE CONTROL

- (1) The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such the copper leads on the PCB and the interface terminals with any parts of the human body.

- (2) The modules should be kept in antistatic bags or other containers resistant to static for storage.
- (3) Only properly grounded soldering irons should be used.
- (4) If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
- (5) The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended
- (6) Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

### 4. STORAGE PRECAUTIONS

- (1) When you store LCDs for a long time, it is recommended to keep the temperature between 0°C-40°C without the exposure of sunlight and to keep the humidity less than 90%RH.
- (2) Please do not leave the LCDs in the environment of high humidity and high temperature such as 60°C 90%RH
- (3) Please do not leave the LCDs in the environment of low temperature; below -20°C.

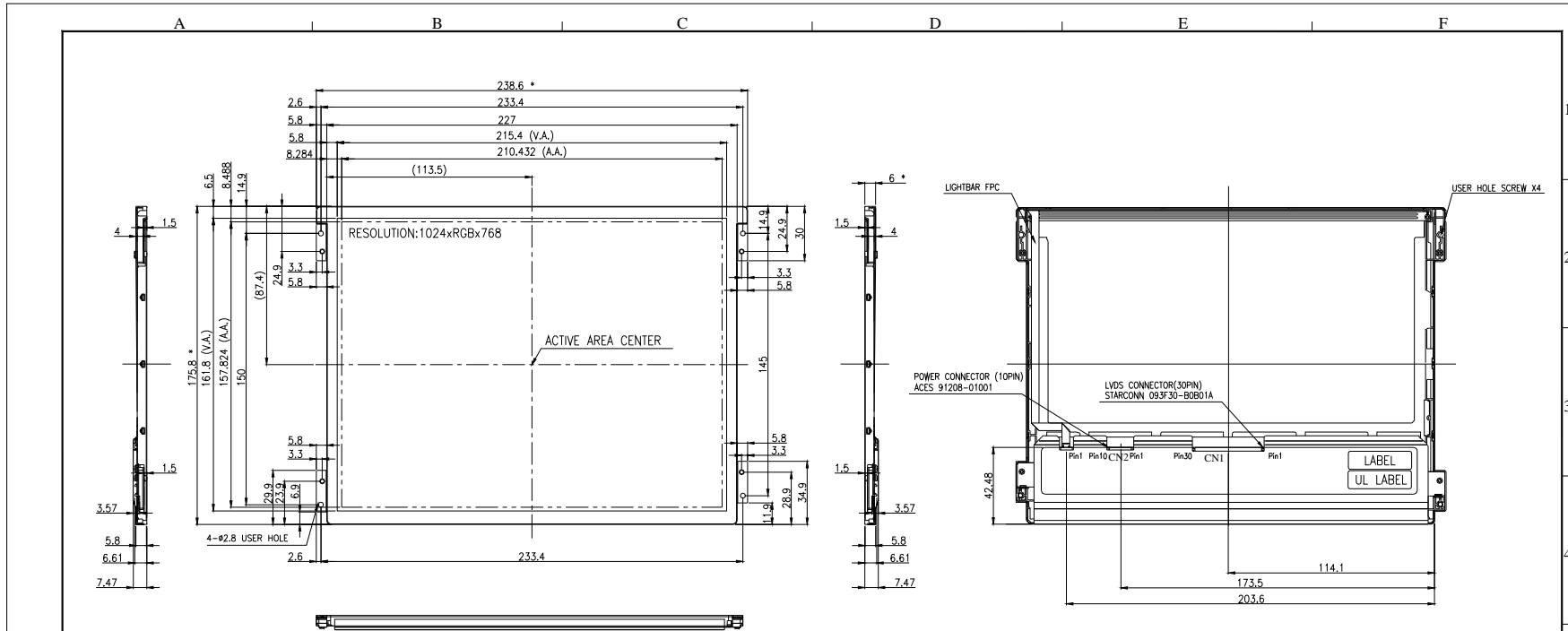
### 5. OTHERS

- (1) A strong incident light into LCD panel might cause display characteristics' changing inferior because of polarizer film, color filter, and other materials becoming inferior. Please do not expose LCD module direct sunlight and strong UV rays
- (2) Please pay attention to a panel side of LCD module not to contact with other materials in preserving it alone.
- (3) For the packaging box, please pay attention to the followings:
  - a. Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
  - b. Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
  - c. Packing box and inner case for LCDs are made of cardboard. So please pay attention not to get them wet. (Such like keeping them in high humidity or wet place can occur getting them wet.)

### 6. LIMITED WARRANTY

Unless otherwise agreed between DATA IMAGE and customer, DATA IMAGE will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DATA IMAGE acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DATA IMAGE is limited to repair and/or replacement on the terms set forth above. DATA IMAGE will not responsible for any subsequent or consequential events.

Confidential Document  
**12. OUTLINE DRAWING**



**NOTE:**

1. FOR RoHS.
2. TOLERANCE:  $\pm 0.5$  mm
3. POWER CONNECTOR: ACES 91208-01001 OR COMPATIBLE  
MATING CONNECTOR: ACES 91209-01001 OR EQUIVALENT
4. LVDS CONNECTOR: STARCONN 093F30-B0B01A OR COMPATIBLE  
MATING CONNECTOR: STARCONN 107J30-100000-00 (093J30-000000-00) OR EQUIVALENT
5. \* IS IMPORTANT DISTANCES.
6. CENTER BRIGHTNESS : 300 cd/m<sup>2</sup> (Min)  
350 cd/m<sup>2</sup> (Typ)

**CN2 PIN FUNCTION**

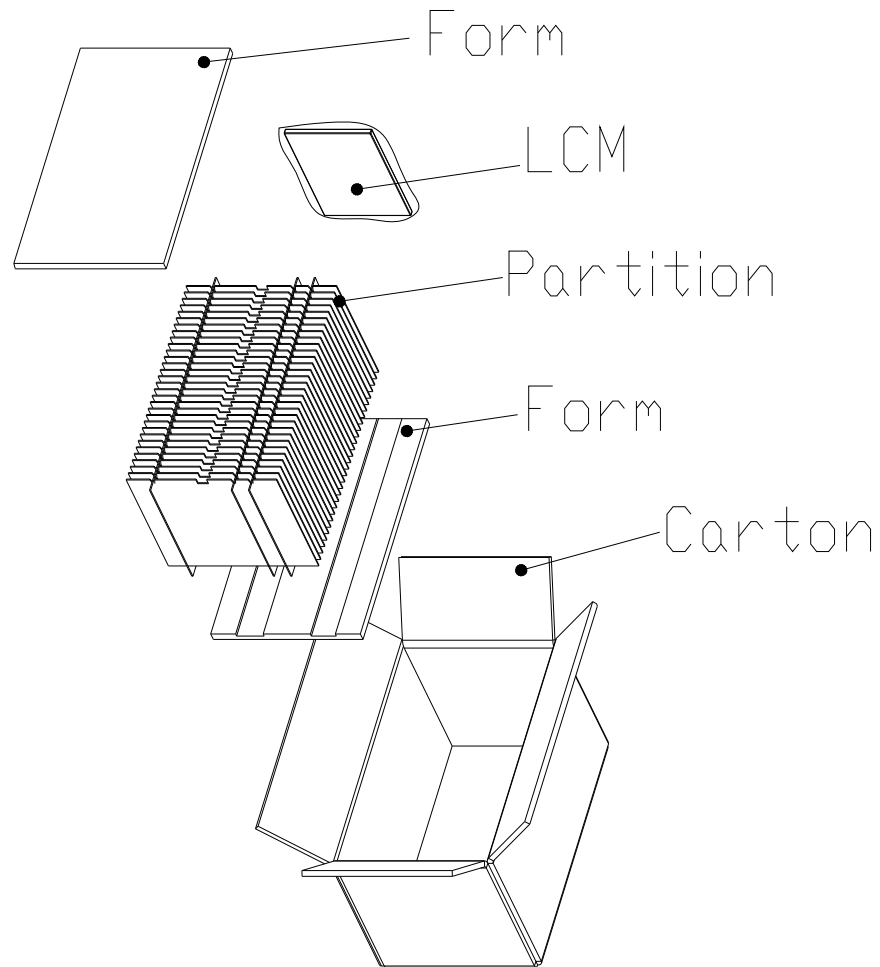
- |         |         |
|---------|---------|
| 1. Vi   | 6. VGND |
| 2. Vi   | 7. VGND |
| 3. Vi   | 8. VGND |
| 4. Vi   | 9. EN   |
| 5. VGND | 10. ADJ |

**CN1 PIN FUNCTION**

- |         |             |            |
|---------|-------------|------------|
| 1. VCC  | 11. Sel 6/8 | 21. RX2-   |
| 2. VCC  | 12. GND     | 22. RX2+   |
| 3. VCC  | 13. NC      | 23. GND    |
| 4. GND  | 14. GND     | 24. RXCLK- |
| 5. GND  | 15. RX0-    | 25. RXCLK+ |
| 6. GND  | 16. RX0+    | 26. GND    |
| 7. RPFI | 17. GND     | 27. RX3-   |
| 8. NC   | 18. RX1-    | 28. RX3+   |
| 9. NC   | 19. RX1+    | 29. GND    |
| 10. NC  | 20. GND     | 30. NC     |

				DATE:	09/13/12'	TITLE:		
				DRAWN:		LCM OUTLINE DIMENSION		
				CHECK:		DWG. NO.	FG100451-G01	
				APPROVE:		UNITS	M M	REV. A
Change the drawing << FG100451-G01 >> from REV:3 to REV:A. <<NPPR No.: 0521>>						SCALE	1 / 1	
AUTH	DESCRIPTION	DATE	APPROVED					
REVISIONS								

### 13. PACKAGE INFORMATION



FG100451DSSWNG01 (280g) =  $280 \times 18 = 5040$  g

Carton+Form+Inner layer = 1500 g

Total Weight = 6.54 kg

Carton size : 482L x 282W x 279H (mm)