Specification for Colour TFT Display module
12.1" XGA TFT module with PCAP Touchscreen

Manufacturer	Data Image Corporation
Part n°	LCX1201XXXGGU05
Ordering n°	LCX1201XXXGGU05
Customer Part n°	n/a
Revision n°	1
Issue Date	2015/09/04

Customer's Approval

Company name	
Printed name	
Job title	
Signature	
Approval Stage:	This product is approved for the following production stage: - ☐ Sample / Prototype ☐ Pre-Production ☐ Mass Production
Approval Date	

Supplied by Anders Electronics plc
Manufactured by Data Image Corporation

DATA IMAGE   CORPORATION

CTP Module Specification
Preliminary
ITEM NO.:   LCX1201XXXGGU05

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Customer Companies	R&D Dept.	Q.C. Dept.	Eng. Dept.	Prod. Dept.
	ALEX	PRETTY	DAVID	KEN
Approved by	Version:	Issued Date:	Sheet Code:	Total Pages:
	1	04/SEP/15'		26

2. RECORD OF REVISION

Rev	Date	Item	Page	Comment	Source
1	04/SEP/15'			Initial Preliminary	ESR0402021 ECR110-F60037 ECR110-F80035

3. GENERAL SPECIFICATIONS

Composition: A touch panel module with 9 inches Capacitive Touch Panel (CTP).

Parameter	Specifications	Unit
Screen size	12.1 (diagonal)	inch
Display resolution	1024 x R.G.B. x 768	dot
Outline dimension	290(W) x 220.5(H) x10.29(D)	mm
Display active area	245.76(H) x 184.32(V)	mm
Pixel pitch	0.240(H) x 0.240(V)	mm
Pixel configuration	RGB vertical stripe	
Weight	TBD	g
Transmissive Mode	Normally white	
View angle direction(gray inversion)	6 o'clock	
LCM part number	FG120111DSSWBG01	
Our components and processes are compliant to RoHS. standard		

4. LCD ABSOLUTE MAXIMUM RATINGS

GND=0V

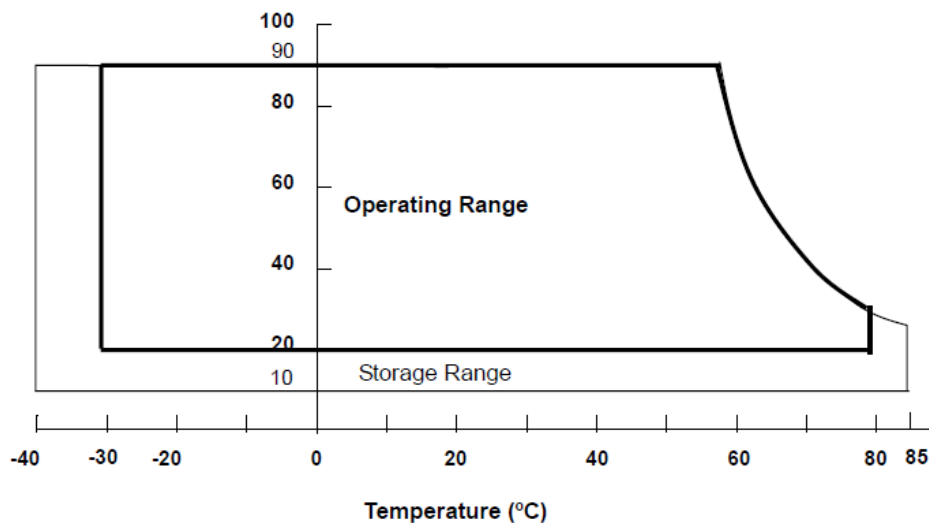| Parameter	Symbol	MIN.	MAX.	Unit	Remark
Power voltage	VCC	-0.3	7.0	V	Ta=25°C
Operating temperature	Top	-30	80	°C	Module surface*
Storage temperature	Tst	-40	85	°C	

Note 1：Temperature and relative humidity range is shown in the figure below.

Note 2：90 %RH Max. (Ta $\leq$ 40 ºC).

Note 3：Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

Note 4：No condensation.

Relative Humidity (%RH)

5. LCD ELECTRICAL CHARACTERISTICS
5.1 TFT LCD MODULE

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	at Vcc=3.3V
			4.75	5.0	5.25	V	at Vcc=5.0V
Rush Current		I$_{RUSH}$			4	A	(2)
Power Supply Current	White	-	-	410	490	mA	(3) a, at Vcc=3.3V
				320	395	mA	(3) a, at Vcc=5.0V
	Black		-	540	650	mA	(3) b, at Vcc=3.3V
				400	480	mA	(3) b, at Vcc=5.0V
LVDS differential input voltage		|VID|	100		600	mV	
LVDS common input voltage		VICM	0.7	-	1.6	V	

Note (1) The module is recommended to operate within specification ranges listed above for normal function.
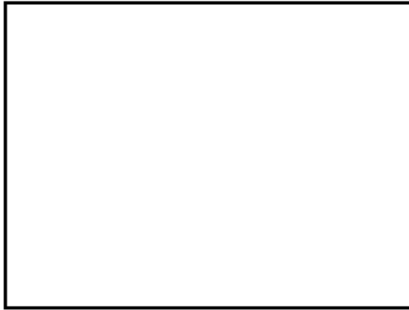Note (2) Measurement Conditions:
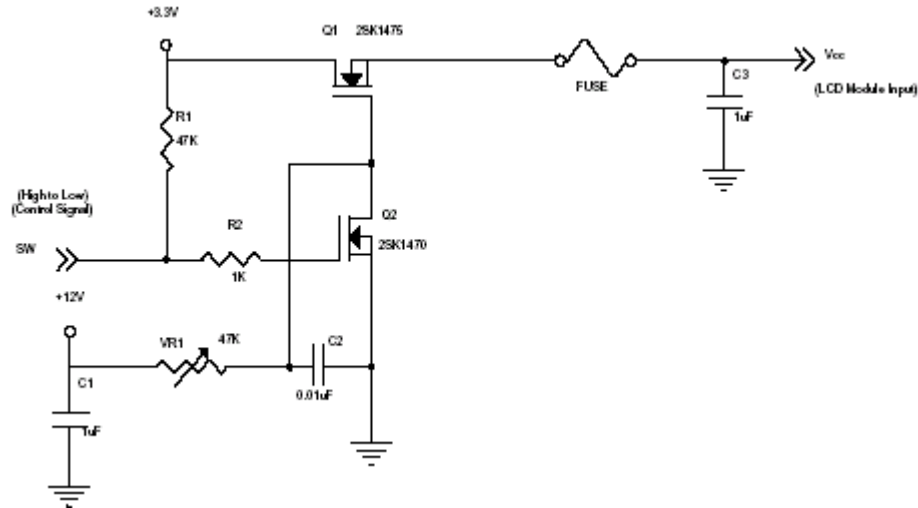
Vcc rising time is 470μs
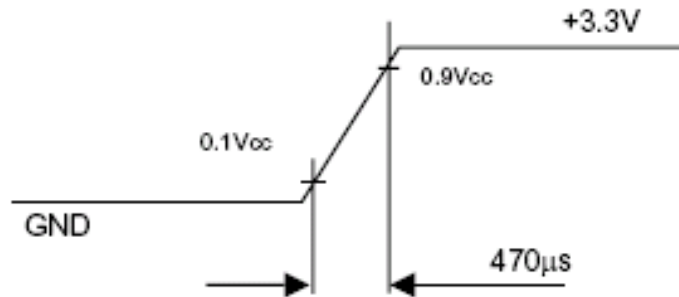
Note (3) The specified power supply current is under the conditions at Vcc = 3.3 V or 5V, Ta = 25 ± 2 ºC, f_V= 60 Hz, whereas a power dissipation check pattern below is displayed.

a. White Pattern

Active Area

b. Black Pattern

Active Area

5.2 Backlight Units

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Power Supply Voltage		Vi	7	12.0	17	V	
Converter Power Supply Current		Ii	0.7	0.83	0.9	A	@ Vi=12V (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		-	10	-	100	%	
PWM Control Frequency		f_{PWM}	190	200	210	Hz	
LED Life time		L_L	50,000	-	-	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 Ta=25±2 ºC and Duty 100% until the brightness becomes $\leqq$ 50% of its original value.

Input Power Pi

Power Supply

Vi, Ii

GND

Converter

LED Backlight Unit
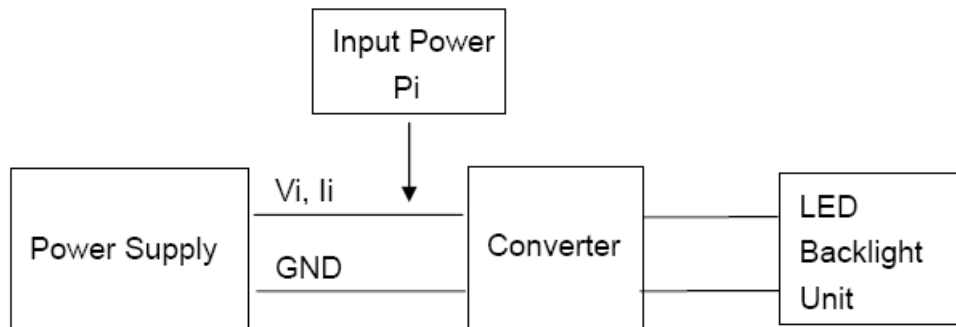
6. LCD BLOCK DIAGRAM
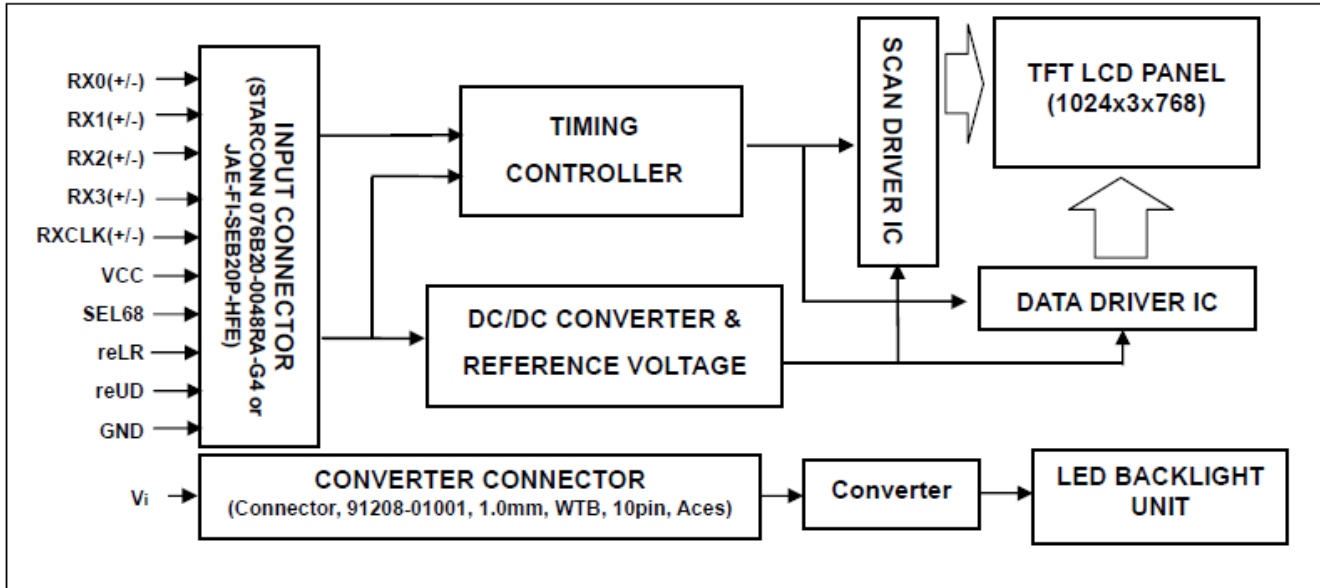
7. LCD INPUT SIGNAL CHARACTERISTICS

7.1 AC Characteristics

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

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	Fc	57.5	64.9	74.4	MHz	
	Period	Tc	13.4	15.4	17.3	ns	
Vertical Active Display Term	Total	Tv	774	806	848	Th	Tv=Tvd+Tvb
	Display	Tvd	768	768	768	Th	
	Blank	Tvb	6	38	80	Th	
Horizontal Active Display Term	Total	Th	1240	1344	1464	Tc	Th=Thd+Thb
	Display	Thd	1024	1024	1024	Tc	
	Blank	Thb	216	320	440	Tc	

Note：(1) Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low
logic level or ground. Otherwise, this module would operate abnormally.
(2) Frame rate is 60Hz

INPUT SIGNAL TIMING DIAGRAM
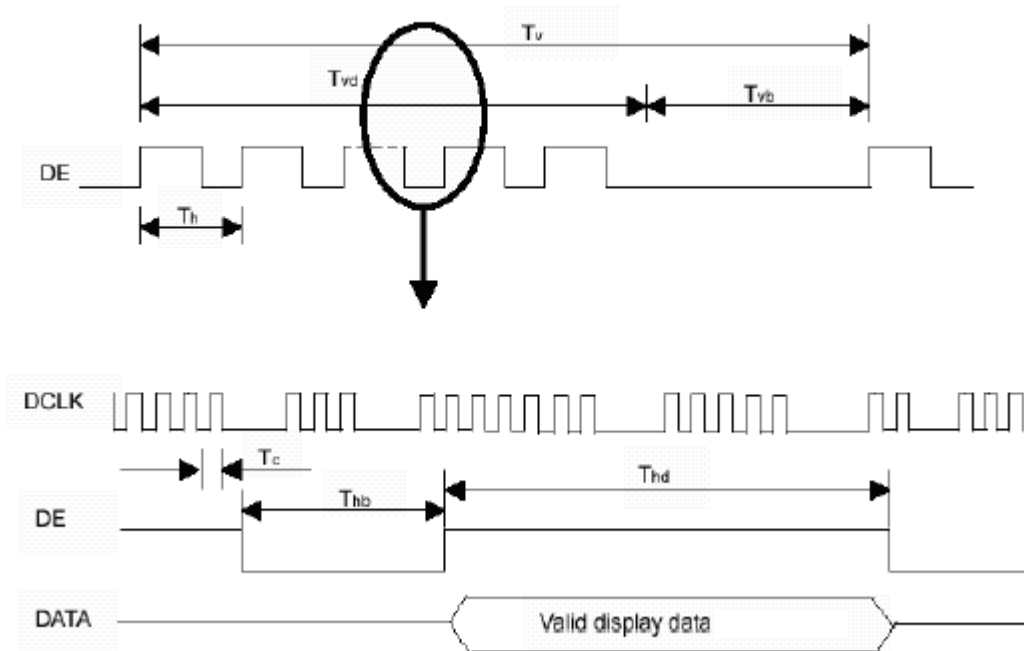
7.2 Power On/Off Sequence

To prevent a latch-up or DC operation of LCD assembly, the power on/off sequence should be as the diagram below.
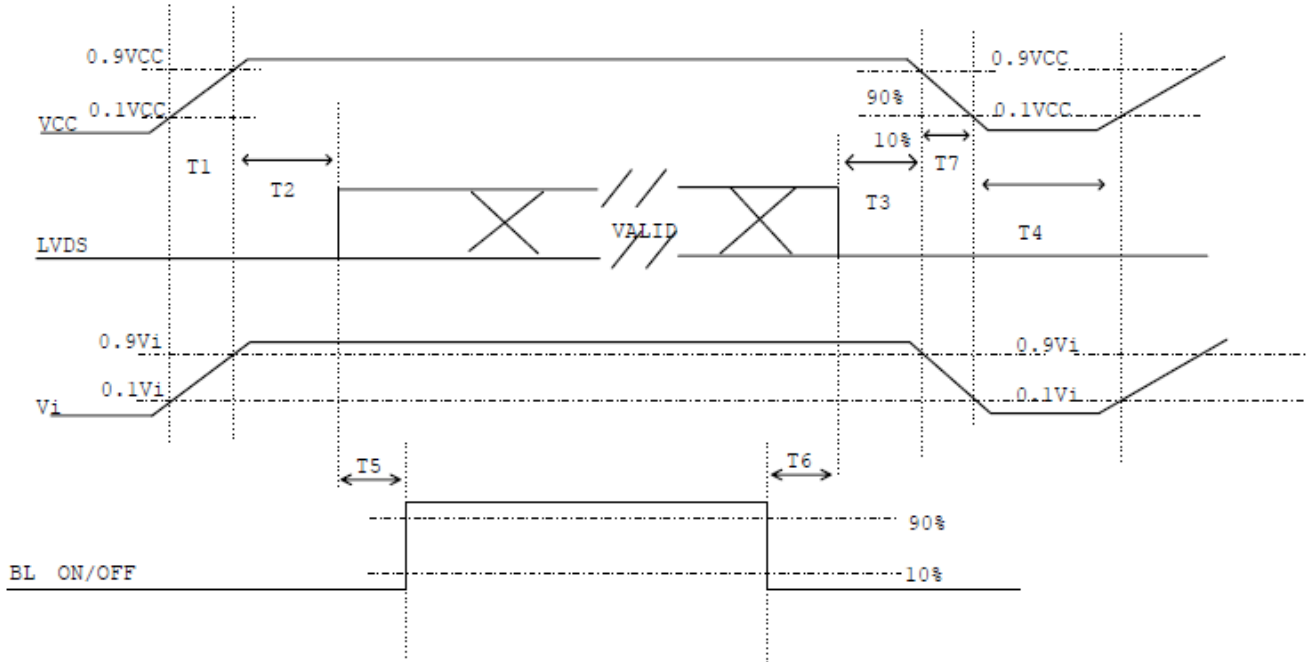
Note (1) Please avoid floating state of interface signal at invalid period.
Note (2) When the interface signal is invalid, be sure to pull down the power supply of LCD VCC to 0 V.
Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

Parameter	Value			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	0	-	50	ms
T4	500	-	-	ms
T5	200	-	-	ms
T6	200	-	-	ms
T7	5	-	300	ms

7.3 The input data format

SEL68 = "Low" or "NC" for 6 bits LVDS Input
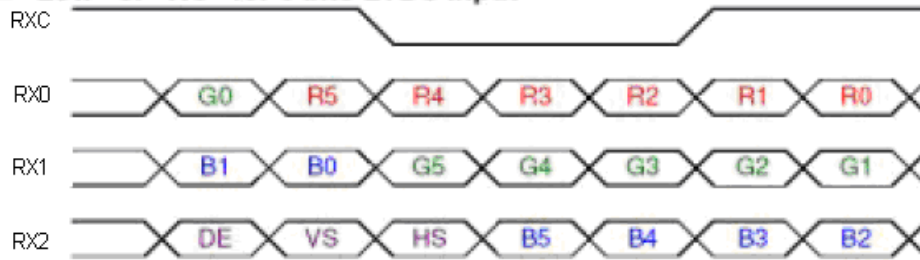
SEL68 = "High" for 8 bits LVDS Input

Note (1) R/G/B data 7: MSB, R/G/B data 0: LSB

Note (2) Please follow PSWG

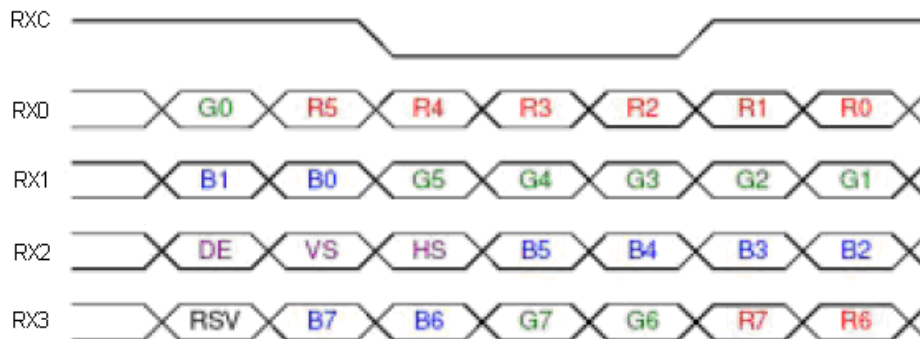| Signal Name	Description	Remark
R7	Red Data 7 (MSB)	Red-pixel Data
R6	Red Data 6	Each red pixel's brightness data consists of these
R5	Red Data 5	8 bits pixel data.
R4	Red Data 4	
R3	Red Data 3	
R2	Red Data 2	
R1	Red Data 1	
R0	Red Data 0 (LSB)	
G7	Green Data 7 (MSB)	Green-pixel Data
G6	GreenData 6	Each green pixel's brightness data consists of these
G5	GreenData 5	8 bits pixel data.
G4	GreenData 4	
G3	GreenData 3	
G2	GreenData 2	
G1	GreenData 1	
G0	GreenData 0 (LSB)	
B7	Blue Data 7 (MSB)	Blue-pixel Data
B6	Blue Data 6	Each blue pixel's brightness data consists of these
B5	Blue Data 5	8 bits pixel data.
B4	Blue Data 4	
B3	Blue Data 3	
B2	Blue Data 2	
B1	Blue Data 1	
B0	Blue Data 0 (LSB)	
RXCLKIN+ RXCLKIN-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync	
HS	Horizontal Sync	

Note (3) Output signals from any system shall be low or Hi-Z state when VCC is off

7.4 Scanning Direction

The following figures show the image see from the front view. The arrow indicates the direction of scan
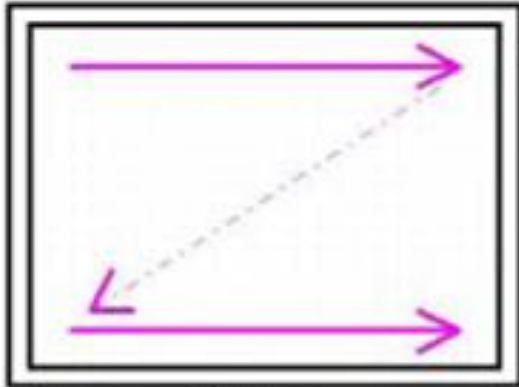
Fig. 1
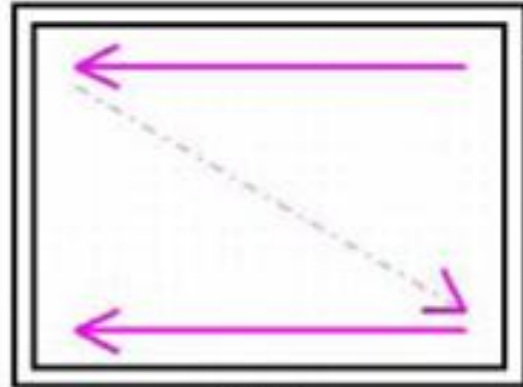
Fig. 2
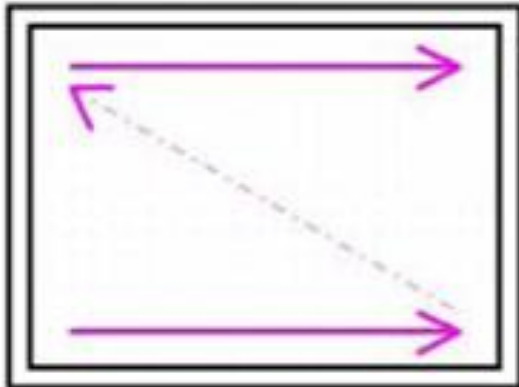
Fig. 3

Fig. 4

Fig. 1   Normal scan (pin 17, reLR = Low or NC, pin 18, reUD = Low or NC)

Fig. 2   Reverse scan (pin 17, reLR = High, pin 18, reUD = Low or NC)

Fig. 3   Reverse scan (pin 17, reLR = Low or NC, pin 18, reUD = High)

Fig. 4   Reverse scan (pin 17, reLR = High, pin 18, reUD = High)

8. LCD PIN CONNECTIONS

8.1 Input Pins Connection

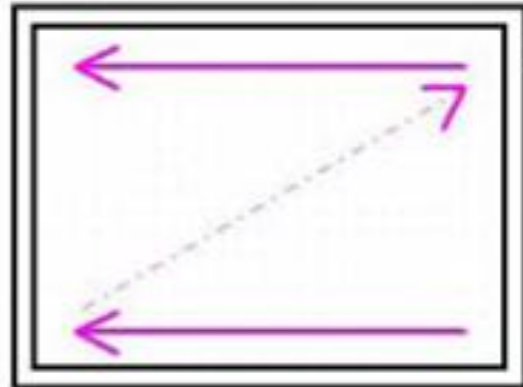| Pin	Name	Description	Remark
1	RX3+	Differential Data Input, CH3 (Positive)	
2	RX3-	Differential Data Input, CH3 (Negative)	
3	NC	NC	
4	SEL68	LVDS 6/8 bit select function control, Low or NC → 6 bit Input Mode High → 8bit Input Mode	Note (3)
5	GND	Ground	
6	RXC+	Differential Clock Input (Positive)	
7	RXC-	Differential Clock Input (Negative)	
8	GND	Ground	
9	RX2+	Differential Data Input , CH2 (Positive)	
10	RX2-	Differential Data Input , CH2 (Negative)	
11	GND	Ground	
12	RX1+	Differential Data Input , CH1 (Positive)	
13	RX1-	Differential Data Input, CH1 (Negative)	
14	GND	Ground	
15	RX0+	Differential Data Input, CH0 (Positive)	
16	RX0-	Differential Data Input, CH0 (Negative)	
17	reLR	Horizontal Reverse Scan Control, Low or NC → Normal Mode. High → Horizontal Reverse Scan	Note (3)
18	reUD	Vertical Reverse Scan Control, Low or NC → Normal Mode, High → Vertical Reverse Scan	Note (3)
19	VCC	Power supply	
20	VCC	Power supply	

Note (1) Connector Part No.: STARCONN 076B20-0048RA-G4 or JAE FI-SEB20P-HFE or equivalent.
Note (2) User's connector Part No.: JAE FI-SE20ME or equivalent.
Note (3) "Low" stands for 0V. "High" stands for 3.3V. "NC" stands for "No Connected".

8.2 Converter Connector Pin

Pin	Symbol	Description	Remark
1	V_i	Converter input voltage	12V
2	V_i	Converter input voltage	12V
3	V_i	Converter input voltage	12V
4	V_i	Converter input voltage	12V
5	V_{GND}	Converter ground	Ground
6	V_{GND}	Converter ground	Ground
7	V_{GND}	Converter ground	Ground
8	V_{GND}	Converter ground	Ground
9	EN	Enable pin	3.3V
10	ADJ	Backlight Adjust	PWM Dimming (190-210Hz, Hi: $3.3V_{DC}$, Lo: $0V_{DC}$)

Note (1) Connector Part No.: 91208-01001-H01 (ACES) or equivalent.
Note (2) User's connector Part No.: 91209-01011 (ACES) or equivalent

8.3 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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	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	0	1	0	0	0	0	0	0	0	0
	Green(2)	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(253)	0	0	0	0	0	0	0	0	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	0	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	0	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
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	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	0	1	1	1	1	1	1	1	1

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

The brightness of each primary color (red, green and blue) is based on the 6-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.
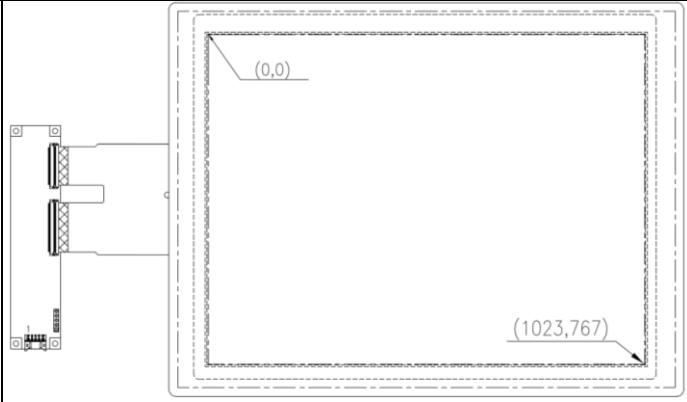
Color		Data Signal																	
		Red						Green						Blue					
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
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
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	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
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	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
	Blue(1)	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	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

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

9. CTP INTERFACE AND DATA FORMAT

10.1 CTP General Specifications

Composition: It's 12.1inch Capacitive Touch Panel (CTP).

Item	Specification	Unit
Type	Transparent type projected capacitive touch panel	
Input mode	Human's finger	
Interface	USB	
(X,Y) Position		

10.2 Absolute Maximum Rating

Symbol	Description	Min	Typ.	Max	Unit	Notes
V	Supply voltage	-	-	6	V	

10.3 Electrical Characteristic

Symbol	Description	Min	Typ.	Max	Unit	Notes
V	Supply voltage	4.75	5.0	5.25	V	
I	Supply current		40	100	mA	VDD=5V

10.4 Pin Connections

Pin Number	Pin Name	Description
1	G	Ground
2	V	Power Supply voltage for CTP
3	G	Ground
4	D-	USB D-
5	D+	USB D+

10. OPTICAL CHARACTERISTIC

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	$_oC$
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	Vcc	3.3	V
Input Signal	According to typical value in "5. ELECTRICAL CHARACTERISTICS"		

Note 1: The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≦ 2lux, and at room temperature.

Note 2: Vin=12V, Duty 100% for Backlight.

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity	Red	Rx	θ $_x$=0°, θY=0° CS-1000	Typ -0.05	0.625	Typ +0.05	-	(1), (5)
		Ry			0.358		-	
	Green	Gx			0.324		-	
		Gy			0.604		-	
	Blue	Bx			0.144		-	
		By			0.088		-	
	White	Wx			0.313		-	
		Wy			0.329		-	
Center Luminance of White		L$_C$		400	500	---	cd/m^2	(4), (5)
Contrast Ratio		CR		500	700	---	-	(2), (5)
Response Time		T$_R$	θ $_x$=0°, θY=0°	---	5	10	ms	(3)
		T$_F$		--	11	16	ms	
White Variation		δ W	θ $_x$=0°, θY=0°	---	1.25	1.4	-	(5), (6)
Viewing Angle	Horizontal	θ $_{x+}$	CR≥10	70	80	---	Deg.	(1), (5)
		θ $_{x-}$		70	80	---	Deg.	
	Vertical	θ $_{Y+}$		60	70	---	Deg.	
		θ $_{Y-}$		60	70	---	Deg.	

Note (1) Definition of Viewing Angle (θx, θy):
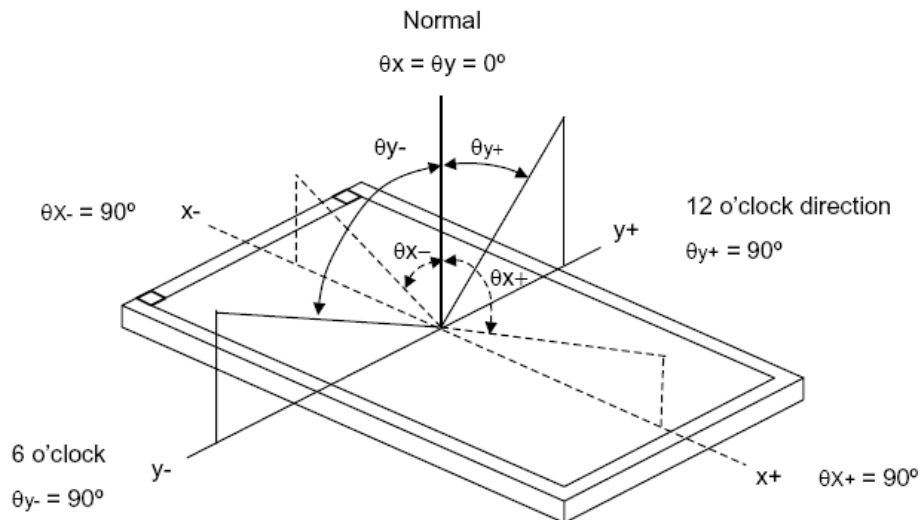
Note (2) Definition of Contrast Ratio (CR):

    The contrast ratio can be calculated by the following expression.
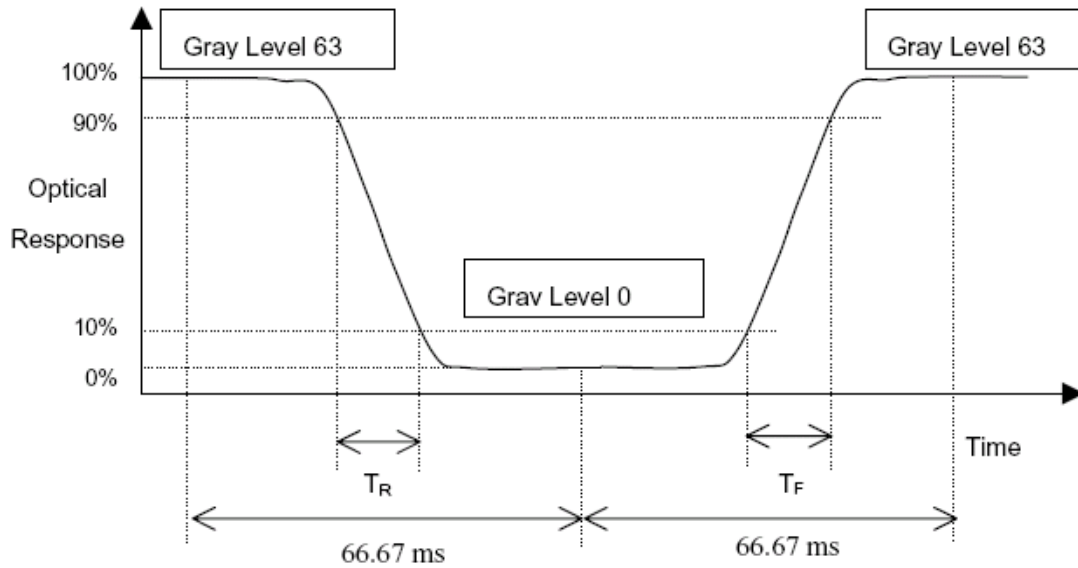
    Contrast Ratio (CR) = L63 / L0

    L63: Luminance of gray level 63

    L 0: Luminance of gray level 0

   CR = CR (5)

   CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F) and measurement method:
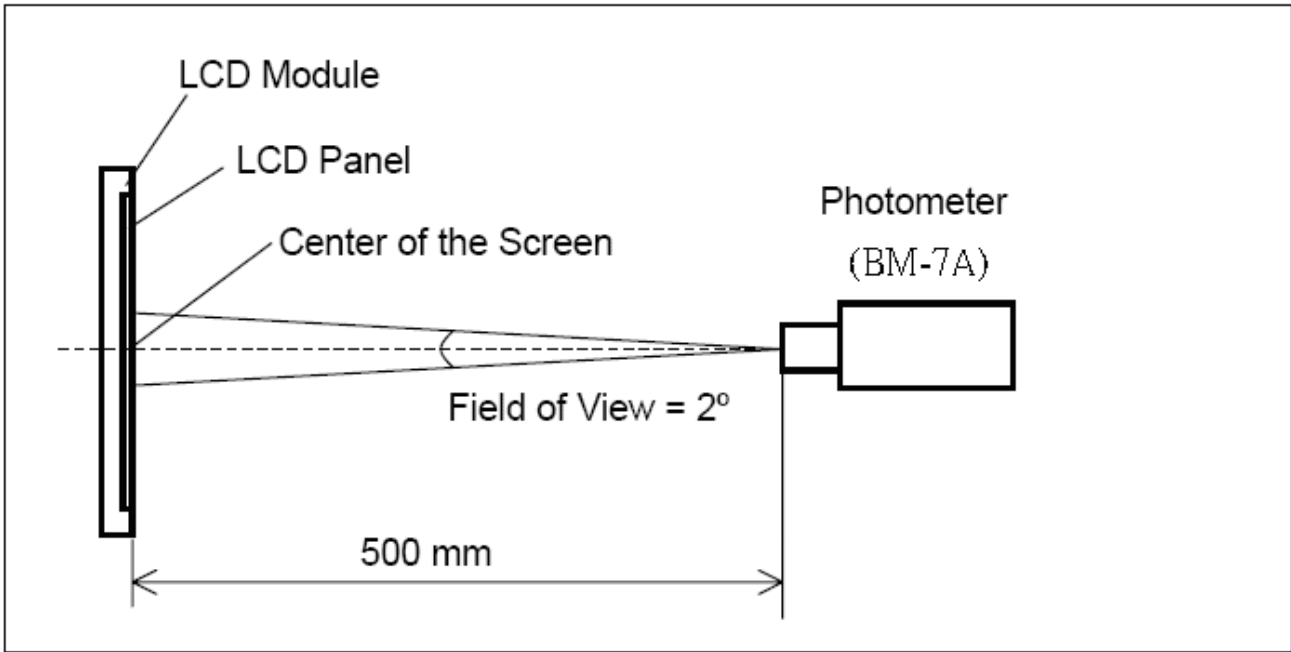

Note (4) Definition of Luminance of White (L_C):

    Measure the luminance of gray level 63 at center point

    L_C = L (5)

    L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

    The LCD module should be stabilized at given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 20 minutes in a windless room.

Note (6) Definition of White Variation (δ W):

Measure the luminance of gray level 63 at 5 points

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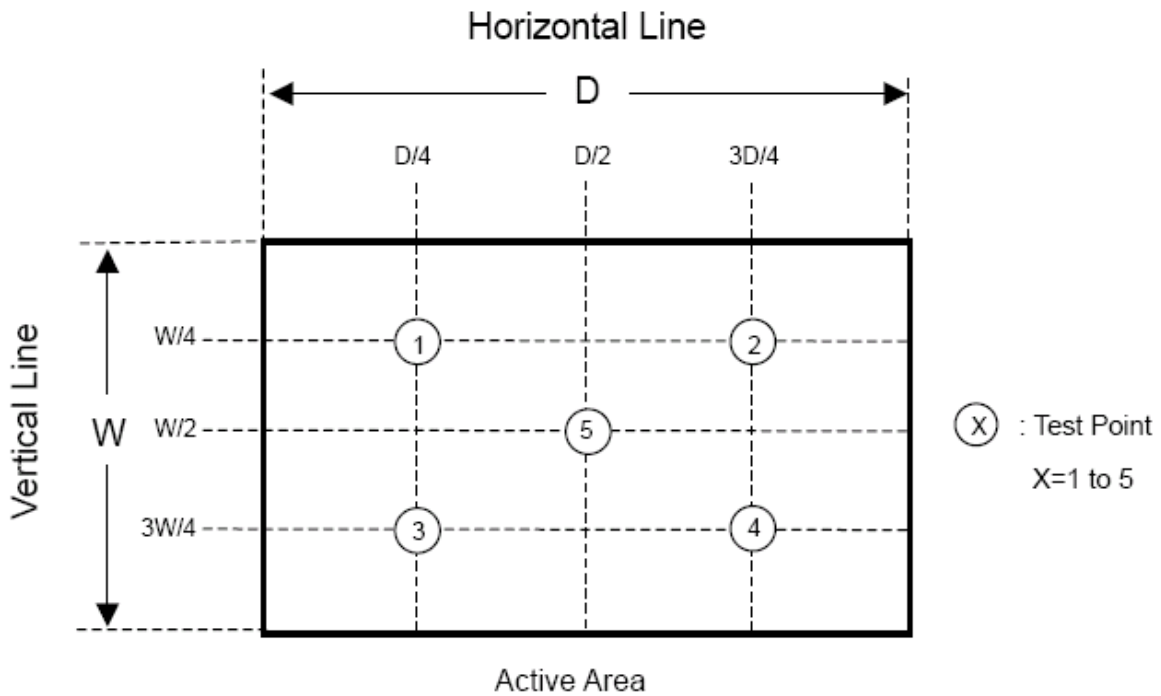
11. QUALITY ASSURANCE

11.1 Test Condition

11.1.1 Temperature and Humidity (Ambient Temperature)
Temperature : $25 \pm 5°C$
Humidity   : $65 \pm 5\%$

11.1.2 Operation
Unless specified otherwise, test will be conducted under function state.

11.1.3 Container
Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

11.1.4 Test Frequency

In case of related to deterioration such as shock test.   It will be conducted only once.

11.1.5 Test Method

No.	Reliability Test Item	Test Level	Remark
1	High Temperature Storage Test	T=85°C,240hrs	IEC68-2-2
2	Low Temperature Storage Test	T=-40°C,240hrs	IEC68-2-1
3	High Temperature Operation Test	T=80°C,240hrs	IEC68-2-2
4	Low Temperature Operation Test	T=-30°C,240hrs	IEC68-2-1
5	High Temperature and High Humidity Operation Test	T=60°C,90%RH,240hrs	IEC68-2-3
6	Thermal Cycling Test (No operation)	-30°C → +25°C → +80°C,200 Cycles 30 min 5 min 30 min	IEC68-2-14
7	Vibration Test (No operation)	Frequency：10 ~ 55 Hz Amplitude：1.5 mm Sweep Time：11mins Test Period：6 Cycles for each Direction of X,Y,Z	IEC68-2-6
8	Shock test (Non-Operating)	200G, 2ms, half sine wave, 1 time for ± X, ± Y, ± Z.	IEC68-2-27
9	ESD TEST	State: operating Location: LCM/TP surface Condition:150pf 330Ω Contact +/- 4kV Air +/-8kV Criteria: Class C	IEC61000-4-2

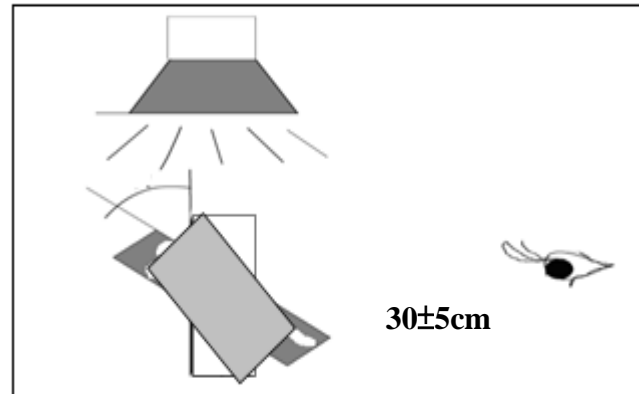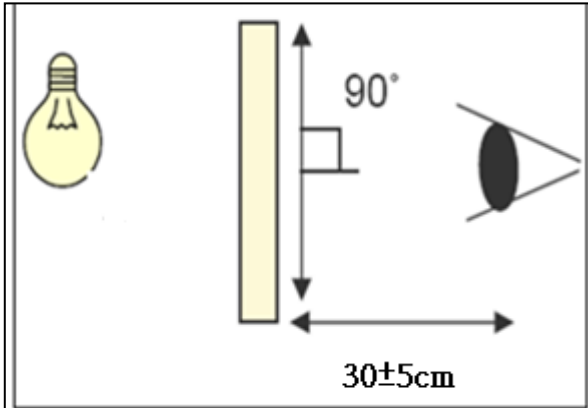# 12. APPEARANCE SPECIFICATION

12.1 Inspection condition

12.1.1 Inspection conditions

12.1.1.1 Inspection Distance : 30 ± 5 cm

12.1.1.2 View Angle :

(1) Inspection that light pervious to the product: 90±15°
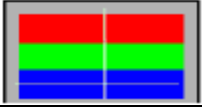
(2) Inspection that light reflects on the product: 90±15°

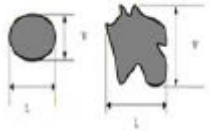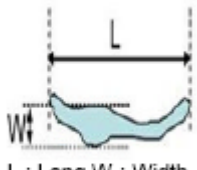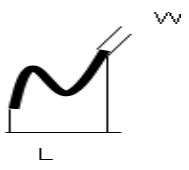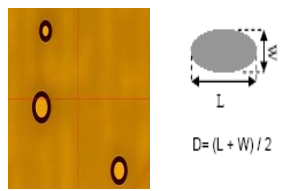12.1.2 Environment conditions :
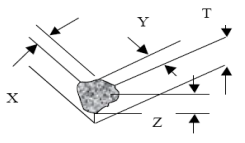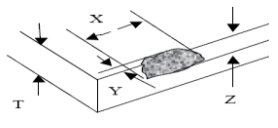
Ambient Temperature :	25±5℃
Ambient Humidity :	30~75%RH
Ambient Illumination	600~800 lux

12.2 Inspection Parameters

Appearance inspection standard (D: diameter, L: length; W: width, Z: height, T: glass thickness)

Inspection item	Inspection standard	Description
No image	Prohibited	
Image abnormal	Prohibited	
Bright line	Prohibited	
Thin line	It is acceptable that the defect can not be seen with 10% ND filter.	
Mura	It is acceptable that the defect can not be seen with 5% ND filter.	

Dot	Item	Acceptable Visible area	Total	One Dot Two adjacent dot
	Bright dot	3	6	
	Dark dot	5		
	Bright adjacent dots	1	1	
	Dark adjacent dots	2	2	
	Adjacent dots with a bright dot and a dark dot	2	2	

Foreign material in dot shape	SPEC (unit: mm)	Acceptable	
	D≦0.5	Ignored	
	0.5<D≦0.8, distance>5	n≦5	
	D＞0.8	0	D= (L + W) / 2

Foreign material in line shape	SPEC	Acceptable	
	W≦0.05 and L≦10	Ignored	
	0.05<W≦0.1, L≦10, distance >5	n≦5	
	W>0.1 or L>10	0	L : Long W : Width

Contamination	It is acceptable if the dirt can be wiped.	

Scratch	SPEC	Acceptable	
	W≦0.05 and L≦10	Ignored	
	0.05<W≦0.08, L≦10, distance >5	n≦5	
	0.08<W≦0.1, L≦10, distance >5	n≦3	
	W>0.1 or L>10	0	L

Bubble	SPEC (unit: mm)	Acceptable	
	D≦0.3	Ignored	
	Non visible area	Ignored	
	0.3<D≦0.5, distance >5	n≦5	
	D＞0.5	0	D= (L + W) / 2

Cover & Sensor Crack	Prohibited	

Cover angle missing	SPEC (unit: mm)		Acceptable	
	Side/Bottom		Ignored	
	It is prohibited if the defect appears on the front.		0	
Cover edge break	SPEC (unit: mm)		Acceptable	
	X≦3.0, Y≦3.0, Z≦T		Ignored	
	X>3.0, Y>3.0, Z＞T		0	
Inspection item	SPEC			Description
Ink	SPEC (unit: mm)		Acceptable	
	word unclear, inverted, mistake, break line		0	
Bubble under protection film	SPEC (unit: mm)		Acceptable	
	NA			
Function	Prohibited			

12.3 Sampling Condition

Unless otherwise agree in written, the sampling inspection shall be applied to the incoming inspection of customer.
Lot size: Quantity of shipment lot per model.
Sampling type: normal inspection, single sampling
Sampling table: MIL-STD-105E
Inspection level: Level II

			Definition
Class of defects	**Major**	AQL 0.65	It is a defect that is likely to result in failure or to reduce materially the usability of the product for the intended function.
	Minor	AQL 1.5	It is a defect that will not result in functioning problem with deviation classified.

13. PRODUCT LABEL DEFINE

Product Label style:

35mm

Bar Code

A A 6 0 0 1 4 2 1 0 2 6 - 0 0 1 3

Product Name

L C X 1 2 0 1 X X X G G U 0 5

10mm
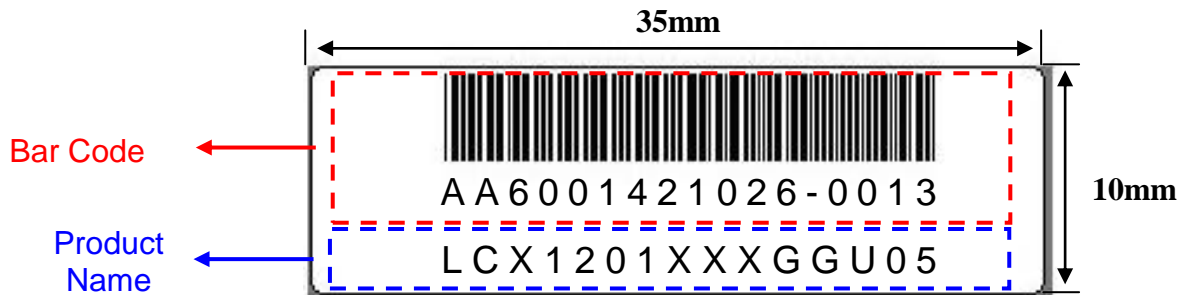
Bar Code Define:

A A 6 0014 2 10 26-0013

Serial number of the products
Serial number starts from 0000
Every work order is 10K at most

Week of production

Year of production

Storage area

Serial number of work order
Serial number starts from 0000 each

Month of work order

Year of work order

The first 3 numbers of work order

Product Name Define:

LC X 1201 XXX G G U 05

Serial Number

Material of Glue

C : OCA   N : None

R : Other   **U : UV**

Material of Cover Lens

N : None

G : Glass

P : PMMA

F : Film

E : PET

R : Other

Material of Sensor

G : Glass

F : Film

R : Other

IC Number

XXX : XXX

Size

1201 : 12.1inch

Module Type

N : None LCM

F : Standard CTP Module

X : Custom CTP Module

Capacitive Touch Panel (Optical Banding)

14. 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
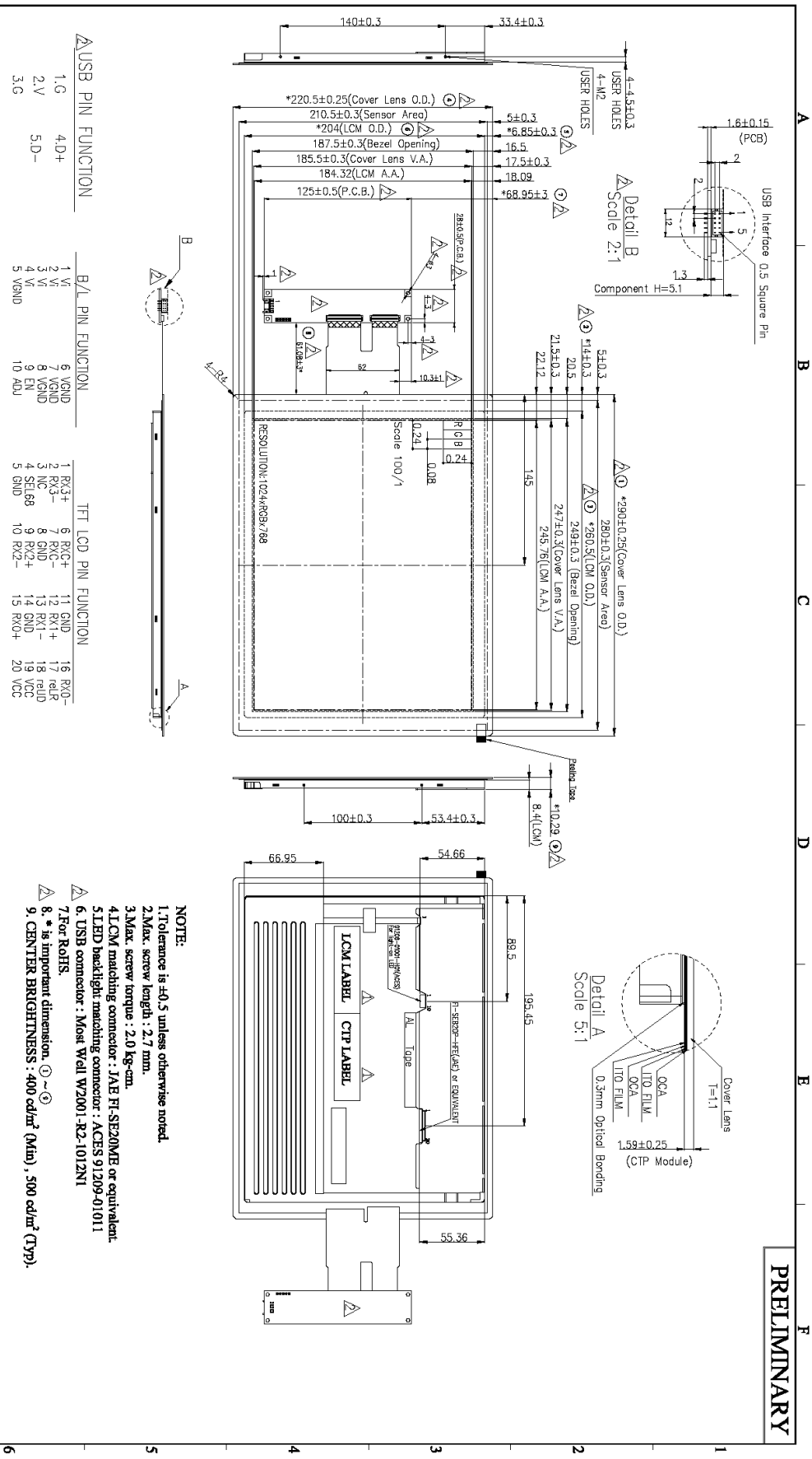   (3) Please do not leave the LCDs in the environment of low temperature; below -20°C.

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 Land 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:
   (4) Please do not pile them up more than 5 boxes. (They are not designed so.) And please do not turn over.
   (5) Please handle packaging box with care not to give them sudden shock and vibrations. And also please do not throw them up.
   (6) 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.

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15. OUTLINE DRAWING

PRELIMINARY

NOTE:
1. Tolerance is ±0.5 unless otherwise noted.
2. Max. screw length : 2.7 mm.
3. Max. screw torque : 2.0 kg-cm.
4. LCM matching connector : IAE FI-SE20ME or equivalent.
5. LED backlight matching connector : ACES 91209-01011
6. USB connector : Most Well W2001-R2-1012N1
7. For RoHS.
8. * is important dimension. ① ~ ⑤
9. CENTER BRIGHTNESS : 400 cd/m² (Min), 500 cd/m² (Typ).

USB PIN FUNCTION

1.G	4.D+	
2.V	5.D-	
3.G		

B/L PIN FUNCTION

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

TFT LCD PIN FUNCTION

1 RX3+	6 RXC+	11 GND	16 RX0-
2 RX3-	7 RXC-	12 RX1+	17 reLR
3 NC	8 GND	13 RX1-	18 reUD
4 SEL68	9 RX2+	14 GND	19 VCC
5 GND	10 RX2-	15 RX0+	20 VCC

REVISIONS

AUTH	DESCRIPTION		DATE	APPROVED
	Add control board & Add important dimension's number mark	ECR 110-F80035	2015/08/27	
	Change Label size	ECR 110-F60037	2015/06/29	
	<ESR0402021>			

DATE: 2015/05/18	DRAWN:	CHECK:	APPROVE:

TITLE: CTP MODULE OUTLINE DIMENSION

DWG. NO.	LCX1201XXXGGU05	REV. 3

SCALE 1/1	UNIT: M M	SHEET 1 OF 1

16. PACKAGE INFORMATION

TBD