

SPEC for Mass Production

Spec No.	CPD-355343AL-01 Rev.01
Date	March 11, 2024

TYPE : T-55343GD035JU-LW-ALN

<3.5 inch QVGA transmissive color TFT
with LED backlight and touch panel>

CONTENTS

1. Application
2. General Specifications
3. Operating Conditions
4. Block Diagram
5. I/O Terminal
6. Electrical Specifications
7. Optical Specifications
8. Test
9. Appearance Standards
10. Lot Number Identification
11. Applying Precautions
12. Precautions Relating Product Handling
13. Outline Drawing



KYOCERA CORPORATION

This specification is subject to change without notice.
Consult Kyocera before ordering.

Original Issue Date	Designed by: Engineering dept.			Confirmed by: QA dept.
	Prepared	Checked	Approved	Approved
April 5, 2023	<i>K. Komurasaki</i>	<i>T. Fukui</i>	<i>A. Iwasaki</i>	<i>T. Sawada</i>

Warning

1. This Kyocera LCD module has been specifically designed for use only in electronic devices and industrial machines in the area of audio control, office automation, industrial control home appliances, etc. The module should not be used in applications where the highest level of safety and reliability are required and module failure or malfunction of such module results in physical harm or loss of life, as well as enormous damage or loss. Such fields of applications include, without limitation, medical, aerospace, communications infrastructure, atomic energy control. Kyocera expressly disclaims any and all liability resulting in any way to the use of the module in such applications.
2. Customer agrees to indemnify, defend and hold Kyocera harmless from and against any and all actions, claims, damages, liabilities, awards, costs, and expenses, including legal expenses, resulting from or arising out of Customer's use, or sale for use, or Kyocera modules in applications.

Caution

1. Kyocera shall have the right, which Customer hereby acknowledges, to immediately scrap or destroy tooling for Kyocera modules for which no Purchase Orders have been received from the Customer in a two-year period.
2. Please note that we may not be able to respond to new environmental regulations after receiving the final mass production order for this product.

Revision record

Date		Designed by : Engineering dept.			Confirmed by : QA dept.
		Prepared	Checked	Approved	Approved
March 11, 2024		<i>K. Komurasaki</i>	<i>T. Fukui</i>	<i>A. Iwasaki</i>	<i>T. Sawada</i>
Rev. No.	Date	Page	Descriptions		
01	Mar. 11, 2024	27	9.3 Standards Add Acceptable Zone to Bright and Dark dot.		

1. Application

This specification applies to TFT-LCD module 「with Touch Panel」 .
(T-55343GD035JU-LW-ALN)

2. General Specifications

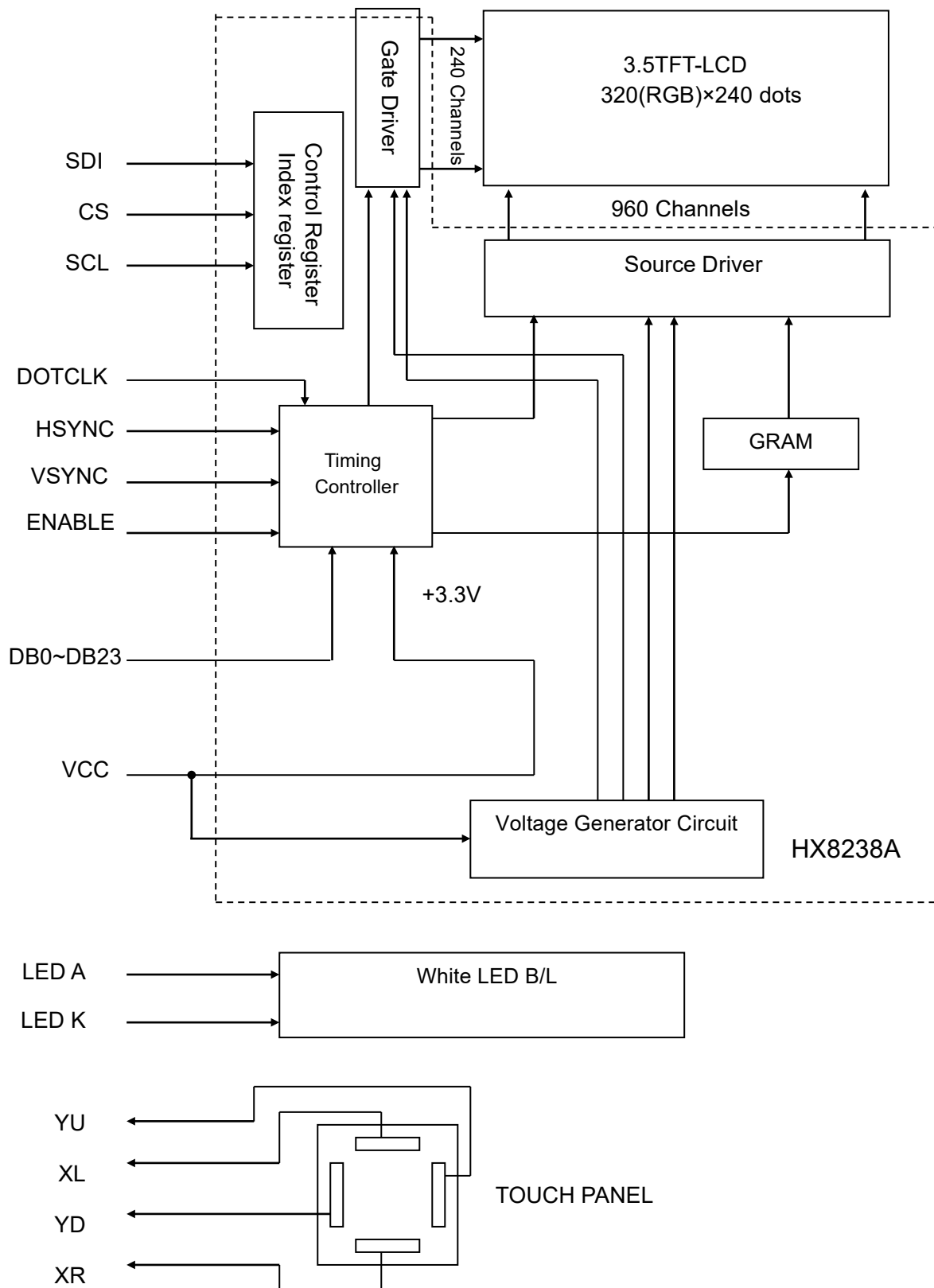
Screen Size	: 3.5 inches (8.9cm) Diagonal
Active Area	: 70.08(W) × 52.56(H) mm
Display Format	: 320(W) × 3[R.G.B] × 240(H)
Pixel Size	: 0.073 × 3[R.G.B] (W) × 0.219(H) mm
Pixel Arrangement	: RGB-Stripe
Color Depth	: 16M colors
Display Mode	: Normally White
Surface Treatment	: AG Coating
Interface	: 24-bit Digital RGB interface(8-bit / color)
Outline Dimension	: 79.0(W) × 65.0(H) × 4.8Max.*(D) mm *Without FPC and Component Area
Weight	: 46.5g Max.
Backlight	: LED Backlight / White
RoHS Directive	: This product satisfies material requirement of RoHS directive.

3. Operating Conditions

Item	Conditions	Temperature range	Remark
Operating Temperature Range	Panel surface	-20~70°C	Note1
Storage Temperature Range	Panel surface	-30~80°C	

Note1: Operating temperature range defines the operation only and the contrast, response time and other display optical characteristics are set at Ta=+25°C.

4. Block Diagram



5. I/O Terminal

5.1 CN1 Pin Assignment

Used FPC: P0.5mm, 40pin, T=0.3mm

Corresponding Connector: 6240 SERIES (KYOCERA)

No.	Symbol	Functional Description
1	RL	Input to select Source driver Datashift direction
2	TB	Input to select Gate driver Datashift direction
3	DOTCLK	Clock Signal
4	VSYNC	Vertical Sync Input
5	HSYNC	Horizontal Sync Input
6	ENABLE	Input Data Enable Control
7	DB23	Data Signal Graphic Display Data Red-data (MSB)
8	DB22	Data Signal Graphic Display Data Red-data
9	DB21	Data Signal Graphic Display Data Red-data
10	DB20	Data Signal Graphic Display Data Red-data
11	DB19	Data Signal Graphic Display Data Red-data
12	DB18	Data Signal Graphic Display Data Red-data
13	DB17	Data Signal Graphic Display Data Red-data
14	DB16	Data Signal Graphic Display Data Red-data (LSB)
15	GND	Power Supply (0V, GND)
16	DB15	Data Signal Graphic Display Data Green-data (MSB)
17	DB14	Data Signal Graphic Display Data Green-data
18	DB13	Data Signal Graphic Display Data Green-data
19	DB12	Data Signal Graphic Display Data Green-data
20	DB11	Data Signal Graphic Display Data Green-data
21	DB10	Data Signal Graphic Display Data Green-data
22	DB9	Data Signal Graphic Display Data Green-data
23	DB8	Data Signal Graphic Display Data Green-data (LSB)
24	GND	Power Supply (0V, GND)
25	DB7	Data Signal Graphic Display Data Blue-data (MSB)
26	DB6	Data Signal Graphic Display Data Blue-data
27	DB5	Data Signal Graphic Display Data Blue-data
28	DB4	Data Signal Graphic Display Data Blue-data
29	DB3	Data Signal Graphic Display Data Blue-data
30	DB2	Data Signal Graphic Display Data Blue-data
31	DB1	Data Signal Graphic Display Data Blue-data
32	DB0	Data Signal Graphic Display Data Blue-data (LSB)

No.	Symbol	Functional Description
33	SDI	Serial Interface Data
34	SCL	Serial Interface Clock
35	CS	Serial Interface Chip Select L : Active
36	RESET	System RESET L : Reset
37	SDO	Serial Interface Data
38	GND	Power Supply (0V, GND)
39	V _{CC}	Power Supply for System
40	V _{CC}	Power Supply for System

5.2. CN2 Pin Assignment

Used FPC: P0.5mm, 3pin, T=0.2mm

Corresponding Connector: 6298 SERIES (KYOCERA)

No.	Symbol	Functional Description
1	LED A	LED Anode Terminal
2	NC	Non Connection
3	LED K	LED Cathode Terminal

5.3. CN3 Pin Assignment

Used FPC: P1.0mm, 4pin, T=0.3mm

Corresponding Connector: 6227 SERIES (KYOCERA)

No.	Symbol	Functional Description
1	YU	Y [TTS- 12 o'clock side]
2	XL	X [TTS- left side]
3	YD	Y [TTS- 6 o'clock side]
4	XR	X [TTS- right side]

6. Electrical Specifications

6.1 Absolute Maximum Ratings

Ta=-20~70°C, GND=0V

Parameter	Symbol	Conditions	Min.	Max.	Units
Supply Voltage	V _{CC}	-	-0.3	4.0	V
Input Voltage	V _{IN}	-	GND-0.3	4.0	V

6.2 DC Characteristics

Ta=-20~70°C, GND=0V

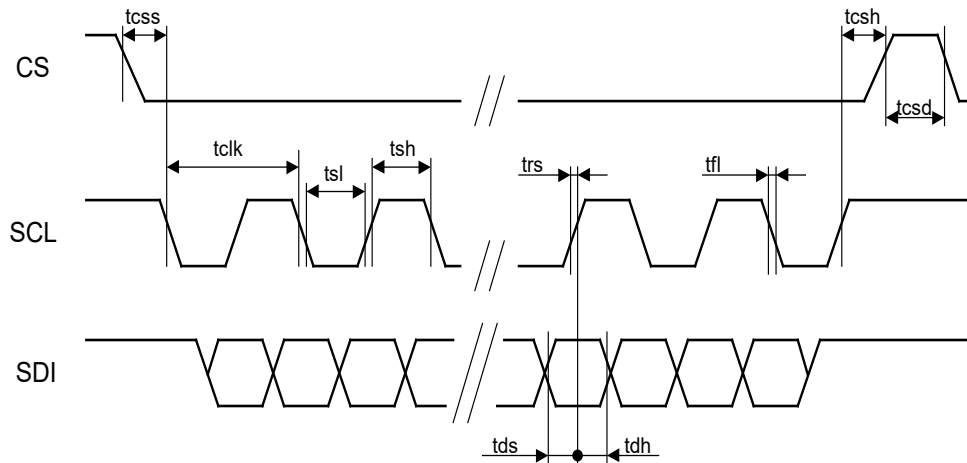
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage for System	V _{CC}	-	3.0	3.3	3.6	V
"High" Level Input Voltage	V _{IH}	-	0.8V _{CC}	-	V _{CC}	V
"Low" Level Input Voltage	V _{IL}	-	0	-	0.2V _{CC}	V
"High" Level Output Voltage	V _{OH}	-	0.9V _{CC}	-	V _{CC}	V
"Low" Level Output Voltage	V _{OL}	-	0	-	0.1V _{CC}	V
Opeating Mode Current	I _{CC}	V _{CC} -GND=3.3V	-	11.0	16.5	mA

AC Characteristics

6.3.1 Serial Interface Timing Characteristics

Ta=-20~70°C, GND=0V

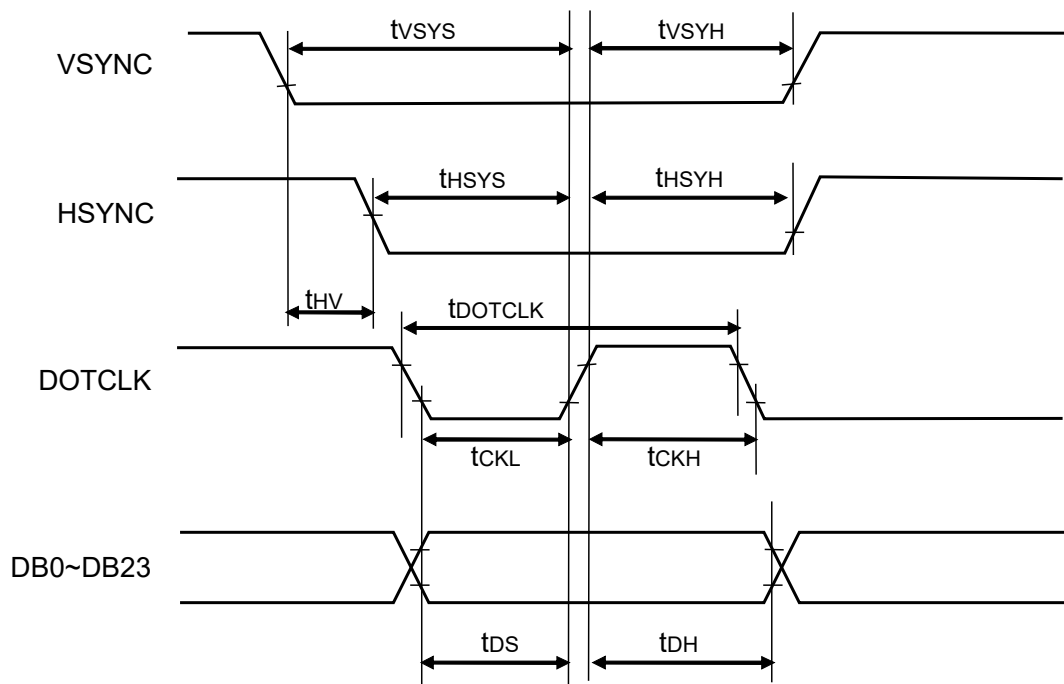
Parameter	Symbol	Min.	Typ.	Max.	Units
Serial Clock Cycle Time	tclk	50	-	-	ns
Clock Low Width	tsl	25	-	-	ns
Clock High Width	tsh	25	-	-	ns
Clock Rising Time	trs	-	-	30	ns
Clock falling Time	tfl	-	-	30	ns
Chip Select Setup Time	tcss	0	-	-	ns
Chip Select Hold Time	tcsh	10	-	-	ns
Chip Select High Delay Time	tcsd	20	-	-	ns
Data Setup Time	tds	5	-	-	ns
Data Hold Time	tdh	10	-	-	ns



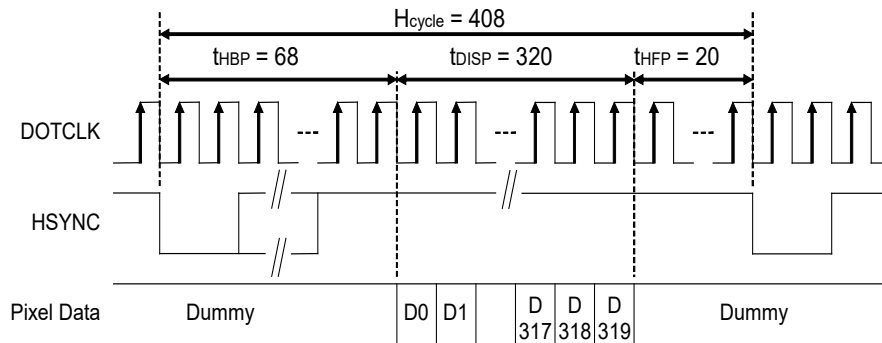
6.3.2 Digital RGB Interface Timing Characteristics

Ta=-20~70°C, GND=0V

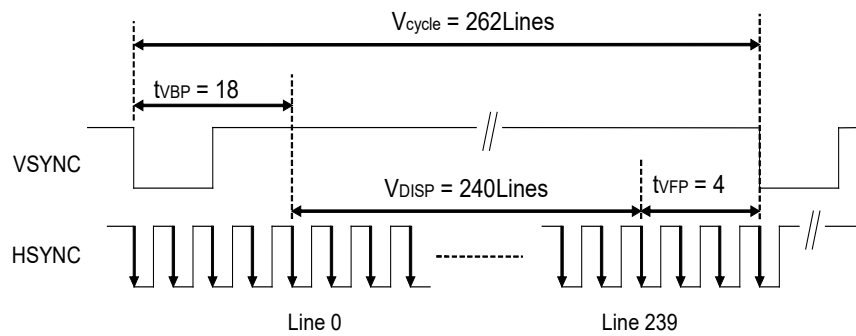
Parameter	Symbo	Min.	Typ.	Max.	Units
DOTCLK Frequency	f_{DOTCLK}	-	6.5	10	MHz
DOTCLK Cycle Time	t_{DOTCLK}	100	154	-	ns
Vertical Sync Setup Time	t_{VSYs}	20	-	-	ns
Vertical Sync Hold Time	t_{VSYH}	20	-	-	ns
Horizontal Sync Setup Time	t_{HSYs}	20	-	-	ns
Horizontal Sync Hold Time	t_{HSYH}	20	-	-	ns
Phase difference of Sync Signal Falling Edge	t_{HV}	1	-	240	t_{DOTCLK}
DOTCLK Low Width	t_{CKL}	50	-	-	ns
DOTCLK High Width	t_{CKH}	50	-	-	ns
Data Setup Time	t_{DS}	12	-	-	ns
Data Hold Time	t_{DH}	12	-	-	ns



6.3.3 Data Transaction Timing in Parallel RGB Interface (SYNC Mode)

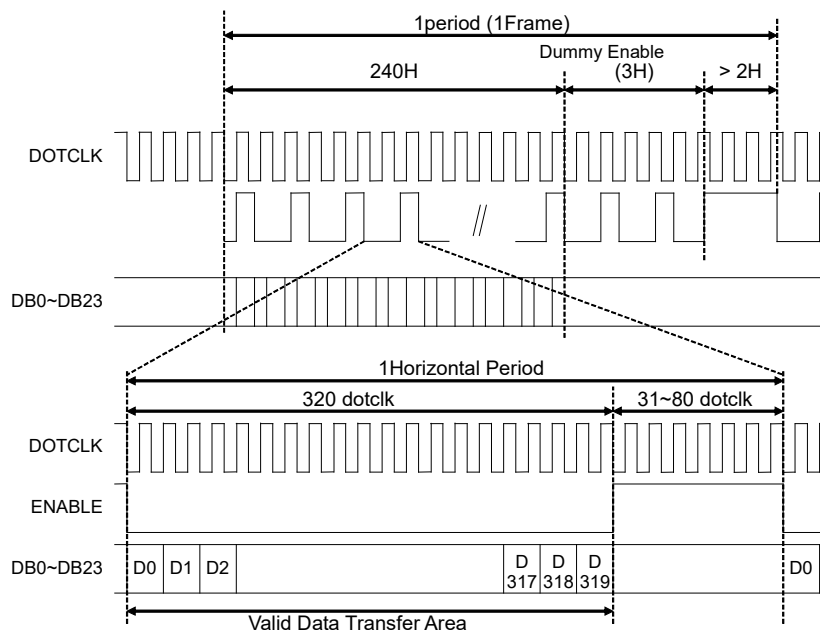


a) Horizontal Data Transaction Timing



b) Vertical Data Transaction Timing

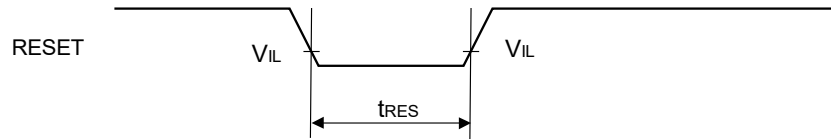
6.3.4 Data Transaction Timing in Parallel RGB Interface (ENABLE Mode)



6.3.5 Reset Timing Characteristics

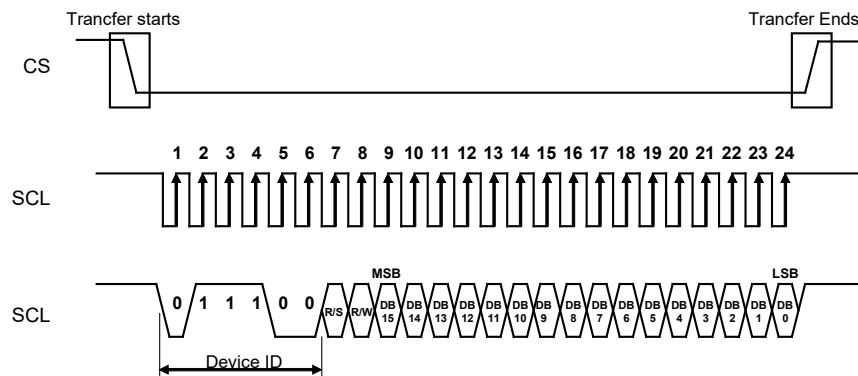
Ta=-20~70°C, GND=0V

Parameter	Symbol	Min.	Typ.	Max.	Units
Reset "L" Pulse Width	t_{RES}	10	-	-	μs

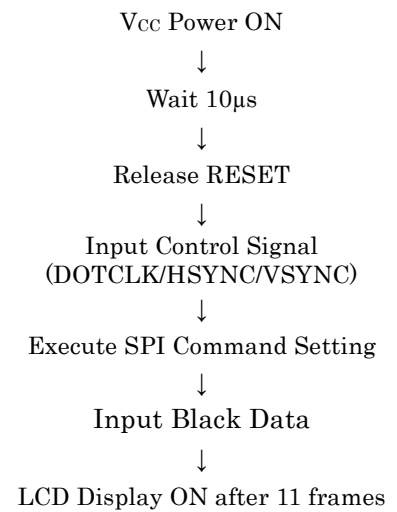
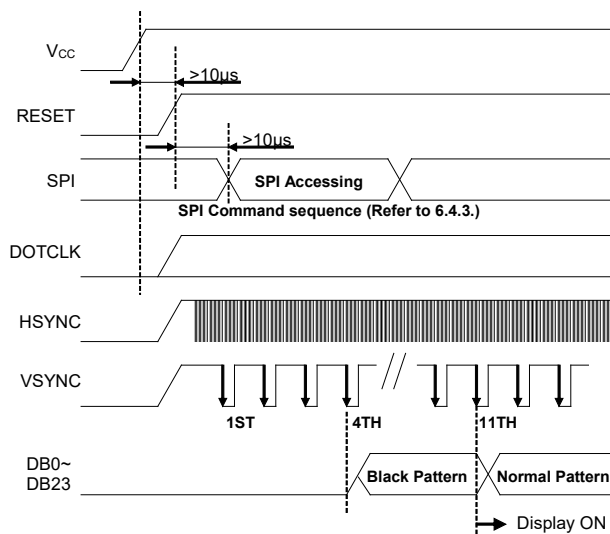


6.4 Power ON Sequence

6.4.1 Data Transfer of SPI



6.4.2 Power ON Procedure (Recommended Sequence)



6.4.3 Command List for Power ON (Recommended Setting)

Setting Item	Index	Value
Driver Output	0001 h	6300 h
LCD Driver AC Control	0002 h	0200 h
Power Control (1)	0003 h	6064 h
Data and Color Filter Control	0004 h	0447 h
Function Control	0005 h	B084 h
Contrast/ Brightness Control	000A h	4008 h
Frame Cycle Control	000B h	D400 h
Power Control (2)	000D h	423D h
Power Control (3)	000E h	3140 h
Gate Scan Starting Position	000F h	0000 h
Horizontal Porch	0016 h	9F80 h
Vertical Porch	0017 h	2212 h
Power Control (4)	001E h	00DB h
Gamma Control 1	0030 h	0000 h
Gamma Control 2	0031 h	0607 h
Gamma Control 3	0032 h	0006 h
Gamma Control 4	0033 h	0307 h
Gamma Control 5	0034 h	0107 h
Gamma Control 6	0035 h	0001 h
Gamma Control 7	0036 h	0707 h
Gamma Control 8	0037 h	0703 h
Gamma Control 9	003A h	0C00 h
Gamma Control 10	003B h	0006 h

6.4.4 Color Data Assignment

1) 8-bit / color

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		MSB(DB23)				LSB(DB16)				MSB(DB15)				LSB(DB8)				MSB(DB7)				LSB(DB0)			
		DB 23	DB 22	DB 21	DB 20	DB 19	DB 18	DB 17	DB 16	DB 15	DB 14	DB 13	DB 12	DB 11	DB 10	DB 9	DB 8	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	DB 0
BASIC COLOR	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 (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
	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
	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
	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
RED	RED (0)	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 (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
GREEN	GREEN (0)	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 (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
BLUE	BLUE (0)	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 (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) Definition of gray scale

Color (n) --- n indicates gray scale level.

Higher n means brighter level.

2) Data 1: High, 0: Low

2) 6-bit / color

COLOR	INPUT DATA	R DATA						G DATA						B DATA					
		MSB(DB23)			LSB(DB18)			MSB(DB15)			LSB(DB10)			MSB(DB7)			LSB(DB2)		
		DB23	DB22	DB21	DB20	DB19	DB18	DB15	DB14	DB13	DB12	DB11	DB10	DB7	DB6	DB5	DB4	DB3	DB2
BASIC COLOR	BLACK	0	0	0	0	0	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
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	BLUE (63)	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
RED	RED (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	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 (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
GREEN	GREEN (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	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 (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
BLUE	BLUE (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	1
	BLUE (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
																		
	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) Definition of gray scale

Color (n) --- n indicates gray scale level.

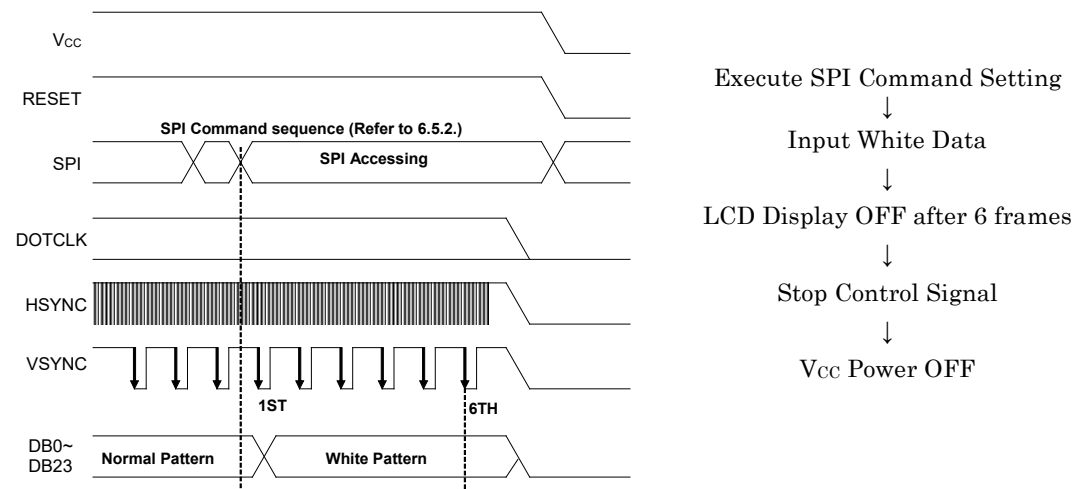
Higher n means brighter level.

2) Data 1: High, 0: Low

3) In case of 6bit / color Lower 2bit at each color (DB17, DB16, DB9, DB8, DB1, DB0) must be connected to GND.

6.5 Power OFF Sequence

6.5.1 Power OFF Procedure (Recommended Sequence)



6.5.2 Command List for Power OFF (Recommended Setting)

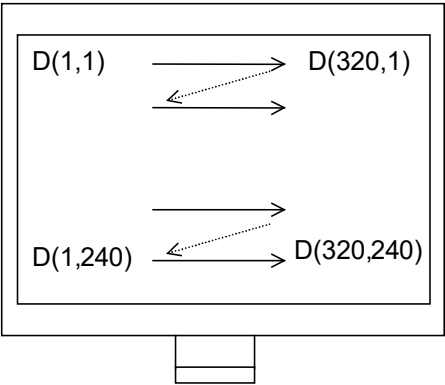
Setting Item	Index	Value
Power Control (1)	0003 h	0100 h

6.6 Inverted Scan Capability

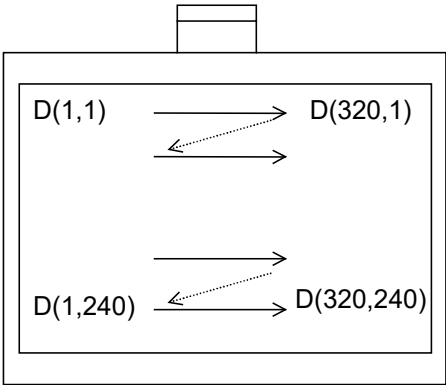
This module has the capability of inverting scan direction by signaling from controller.
Note: Scan direction cannot be changed during operation.

The following drawing shows the relationship between the viewing direction and the scan direction.

Normal scan (TB: H RL: H)



Reverse scan (TB: L RL: L)



6.7 Lighting Specifications

6.7.1 Absolute Maximum Ratings

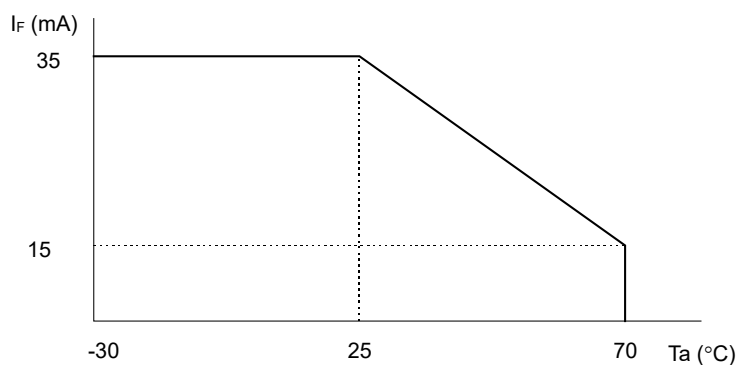
$T_a=25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Forward Current	I_F	Note 2	-	-	35	mA
Allowable Reverse Current	I_R	-	-	-	-	μA
LED Power Dissipation	P_D	-	-	-	0.64	W

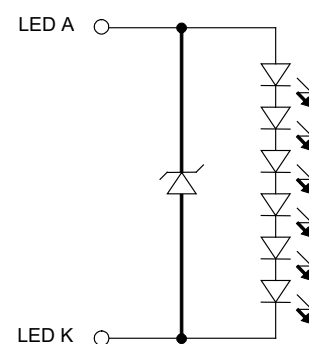
Note 1 : This value is for each 1 line.

Note 2 : Refer to the forward current derating curve.

【Forward Current Derating Curve】



【LED Circuit】



6.7.2 Operating Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Forward Current	I_F	Note1	-	20	-	mA
Forward Voltage	V_F	$I_F=20\text{mA} / 1 \text{ line}$	15.3	17.1	18.6	V
Power	PL	-	-	0.34	0.37	W

Note1: Current of LED per chip must be lower than 15mA at 70°C.

The current of LED must be tuned to satisfy as Forward Current Derating Curve mentioned relationship.

6.8 Touch Panel Specifications

6.8.1. Touch Panel Characteristics

Ta=-20~70°C

Parameter		Min.	Typ.	Max.	Units	Conditions
Max Voltage		-	-	5	V	-
Resistor between Terminals	XL-XR	200	-	1000	Ω	-
	YU-YD	200	-	500	Ω	
Line Linearity		-	-	±1.5	%	Initial Value
Insulation Resistance		20	-	-	MΩ	At DC25V
Operation Force		10	-	100	g	Initial Value

7. Optical Specifications

7.1 Optical Characteristic

Item		Symbol	Conditions			Standard Value			Unit	Method of Measure	Remark	
			θ	ϕ	C	Min.	Typ.	Max.				
(1)Brightness		B	0°	0°	<div></div>	330	480	-	Cd/m ²	(Fig.1)	Note1	
(2)Contrast		CR	Optimum Viewing Angle		<div></div>	400	700	-	-			
(3)Color Coordinates	Red	Rx	0°	0°	<div></div>	-	0.547	-	-			
		Ry	0°	0°	<div></div>	-	0.375	-	-			
	Green	Gx	0°	0°	<div></div>	-	0.347	-	-			
		Gy	0°	0°	<div></div>	-	0.595	-	-			
	Blue	Bx	0°	0°	<div></div>	-	0.149	-	-			
		By	0°	0°	<div></div>	-	0.101	-	-			
	White	Wx	0°	0°	<div></div>	-	0.322	-	-			
		Wy	0°	0°	<div></div>	-	0.358	-	-			
(4)Brightness Uniformity		-	0°	0°	<div></div>	70	-	-	%	(Fig.2)		
(5)Vertical Viewing Angle	Up	θ_U	-	0°	≥ 5	-	80	-	Degree	(Fig.3)		
	Down	θ_D	-	0°	≥ 5	-	80	-	Degree			
(6)Horizontal Viewing Angle	Left	ϕ_L	0°	-	≥ 5	-	80	-	Degree			
	Right	ϕ_R	0°	-	≥ 5	-	80	-	Degree			
(7)Response Time	Rise	τ_r	0°	0°	<div></div>	-	8	-	ms	(Fig.4)		
	Decay	τ_d	0°	0°	<div></div>	-	15	-	ms			

Note1: Under the condition of maximum brightness

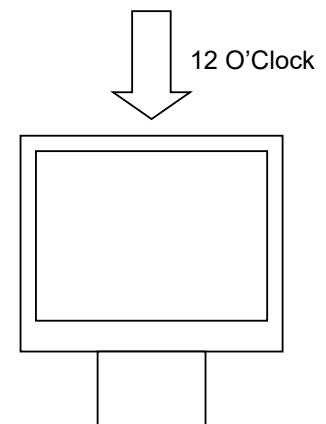
◆ Conditions for Measuring

◇ Environment: Dark room with no light or close to no light.

◇ Temperature: 25±5°C

◇ Humidity: 40~70%RH

◆ Optimal viewing angle (The angle of Least Color Inversion)



◆ Method of Brightness Measurement (Fig.1)

(1) Measuring Point

Center of Display $\theta=0^\circ$, $\phi=0^\circ$

On condition θ : A vertical angle from measuring direction to perpendicular.

ϕ : A horizontal angle from measuring direction to perpendicular.

(2) Method of Measuring

Apply signal voltage (displayed in white) to maximize brightness and measure brightness B (cd/m^2).

The distance between front lens of the measuring device to surface panel is 500mm.

Measured after backlight has been lit for more than 30 minutes.

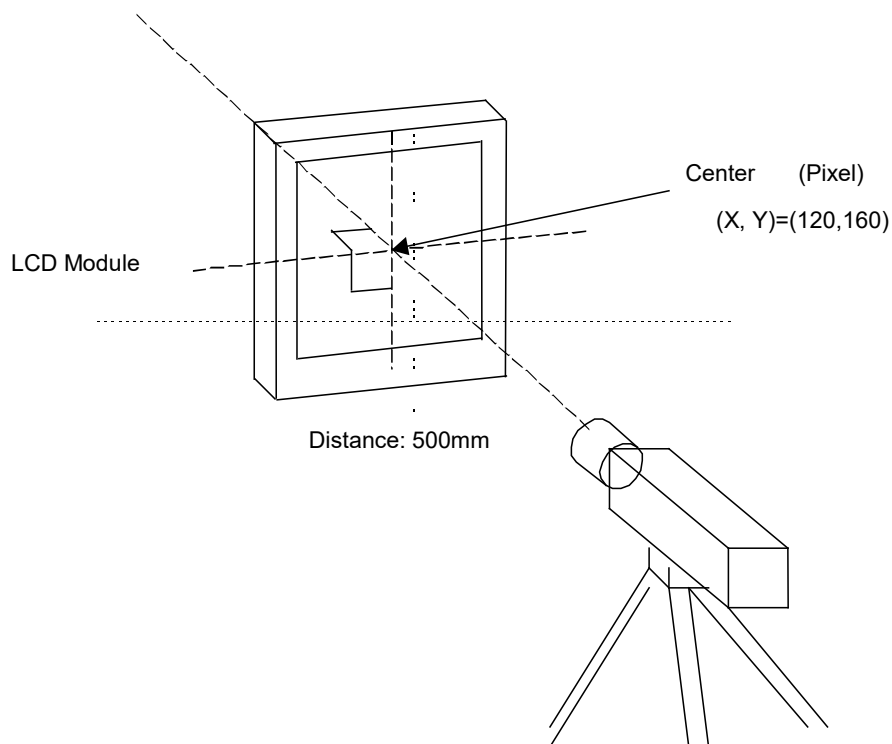


Fig. 1

◆ Method of Contrast Measurement (Fig.1)

(1) Measuring Point

Center of display: same as Method of Brightness Measurement

(2) Method of Measuring

- Set LCD module to $\theta=0^\circ$, $\phi=0^\circ$.
- Change signal voltage to measure maximum brightness Y1 and minimum brightness Y2.
- Contrast is derived from $CR=Y1/Y2$.

◆ Definition of Brightness Uniformity (Fig.2)

Definition is calculated from the 5 points (S0~S4) on the diagram below.

$$\text{Standard value of Brightness Uniformity}[\%] = \frac{(\text{S0} \sim \text{S4}) \text{ MIN}}{(\text{S0} \sim \text{S4}) \text{ MAX}} \times 100\%$$

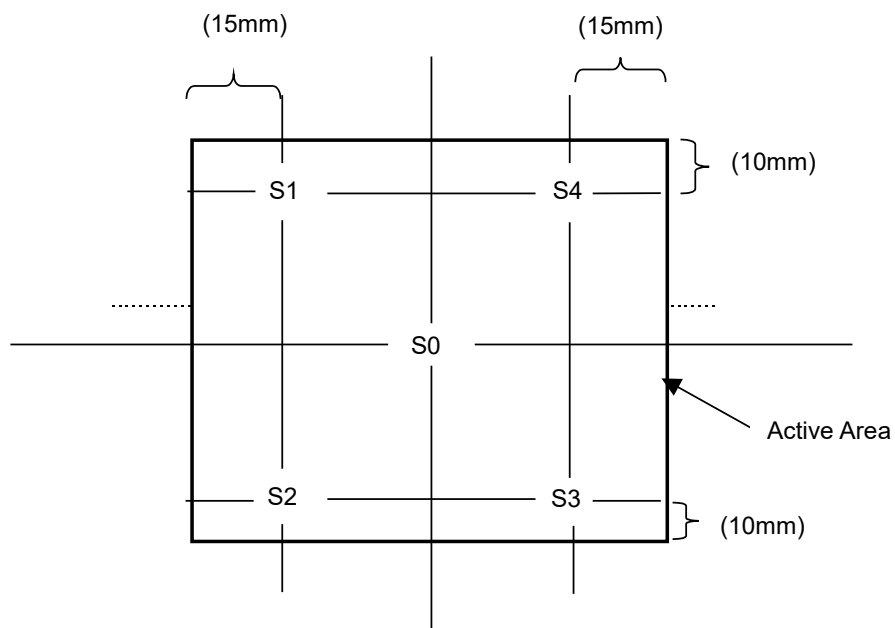


Fig. 2

◆ Method of Viewing Angle Measurement (Fig.3)

(1) Measuring Point

Center of display: Same as Method of Brightness Measurement

(2) Angle of Measuring

θ : An angle vertical to perpendicular line from the viewing direction.

ϕ : An angle horizontal to perpendicular from the viewing direction.

(3) Method of Measuring

Set the module on the rotation table and measure a vertical axis direction in the state that fixed $\phi=0^\circ$ horizontal axis direction to $\theta=90^\circ$.

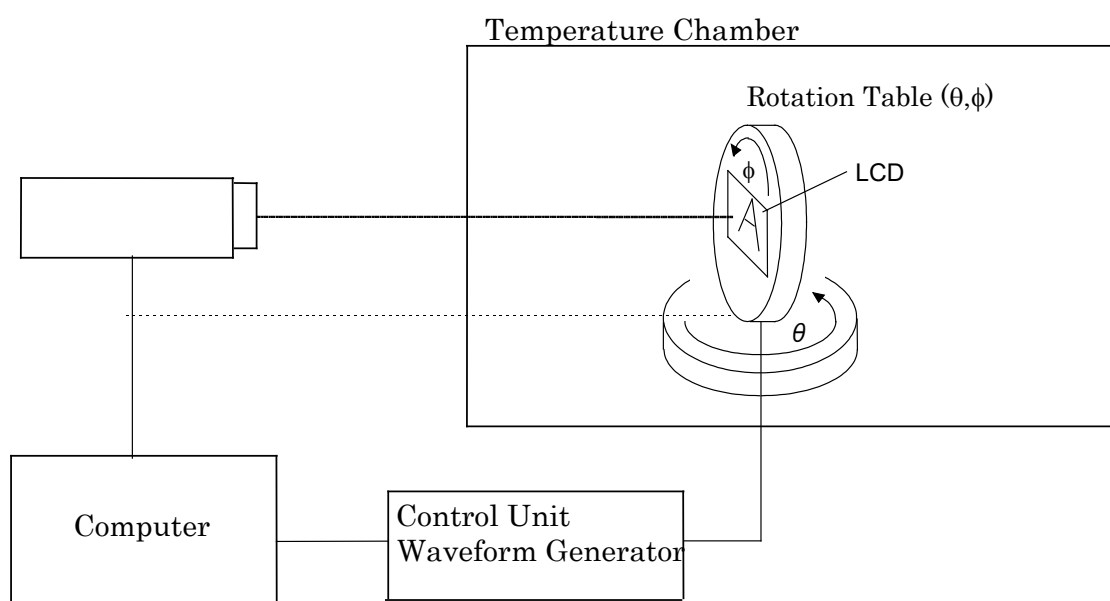


Fig. 3

◆ Measuring Response Time (Fig.4)

(1) Measuring Point

Center of display, same as Method of Brightness Measurement

(2) Method of Measuring

- Set LCD panel to $\theta=0^\circ$, and $\phi=0^\circ$.
- Input white→black→white to display by switching signal voltage.
- If the luminance is 0% and 100% immediately before the change of signal voltage, then τ_r is optical response time during the change from 90% to 10% immediately after rise of signal voltage, and τ_d is optical response time during the change from 10% to 90% immediately after decay of signal voltage.

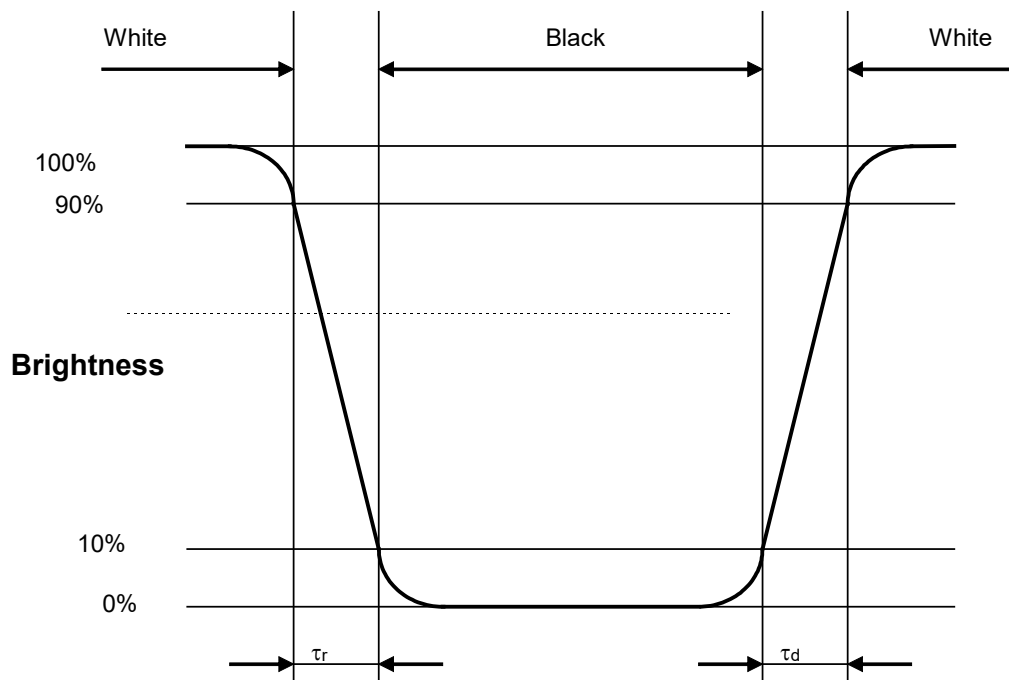
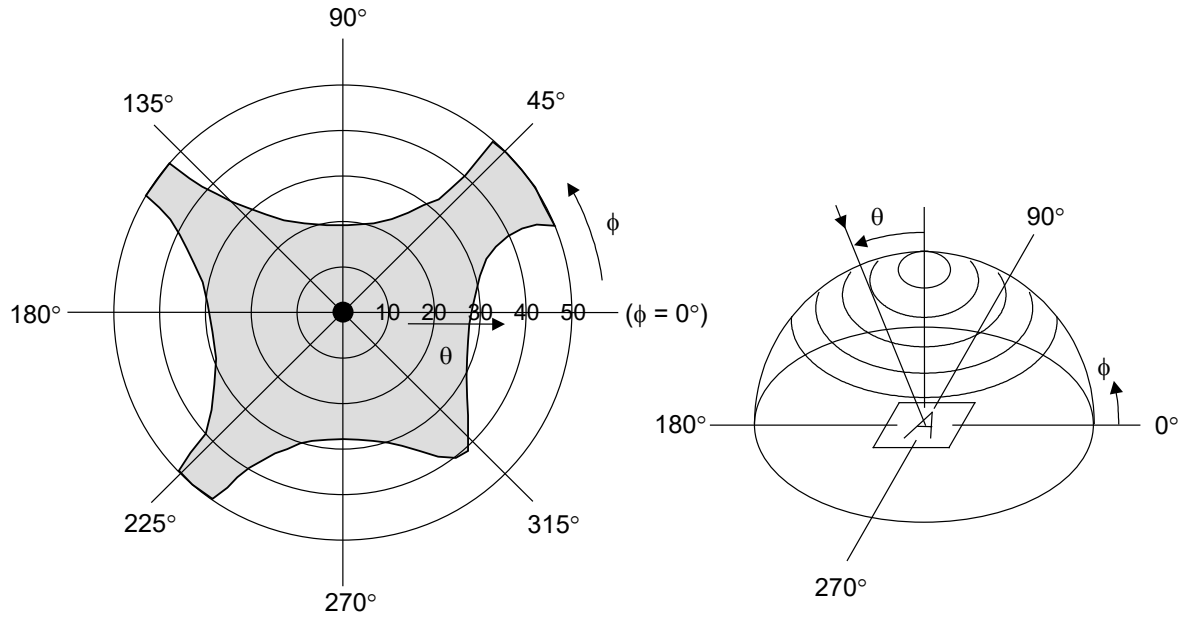


Fig. 4

7.2 Definition of Viewing Angle and Optimum Viewing Area

*Point ● shows the point where contrast ratio is measured.: $\theta = 0^\circ$, $\phi = 0^\circ$

*Driving condition: Ff=60Hz



*Area  shows typ. CR≥30

8. Test

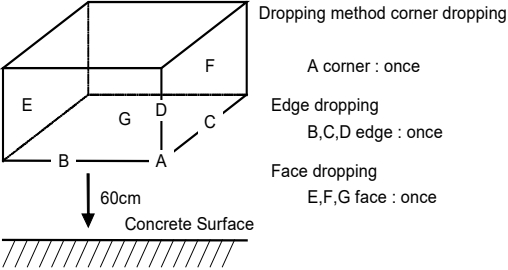
No abnormal function and appearance are found after the following tests.

Conditions: Unless otherwise specified, tests will be conducted under the following condition.

Temperature : $20 \pm 5^{\circ}\text{C}$

Humidity : $65 \pm 5\% \text{RH}$

tests will be not conducted under functioning state.

No.	Parameter	Conditions	Notes
1	High Temperature Operating	$70^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 96hrs (operation state)	
2	Low Temperature Operating	$-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 96hrs (operation state)	1
3	High Temperature Storage	$80^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 96hrs	2
4	Low Temperature Storage	$-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 96hrs	1,2
5	Damp Proof Test	$40^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 90~95%RH, 96hrs	1,2
6	Vibration Test	Total fixed amplitude: 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X, Y, Z for each 15 minutes	3
7	Shock Test	To be measured after dropping from 60cm high on the concrete surface in packing state. 	

Note 1 :No dew condensation to be observed.

Note 2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after removed from the test chamber.

Note 3 :Vibration test will be conducted to the product itself without putting it in a container.

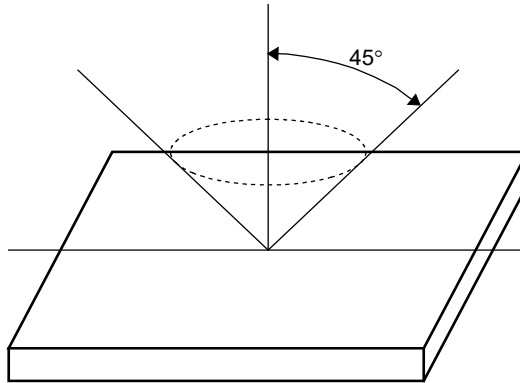
9. Appearance Standards

9.1 Inspection conditions

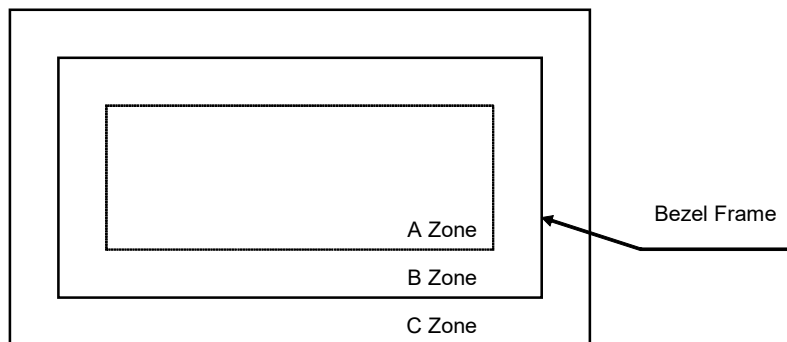
The distance between the eyes and the sample shall be more than 30cm.

All directions for inspecting the sample should be within 45° against perpendicular line.

Luminance: 250 Lux min.



9.2 Definition of applicable Zones



A Zone: Active display area

B Zone: Area from outside of "A Zone" to validity viewing area

C Zone: Rest parts

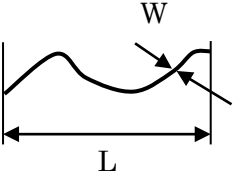
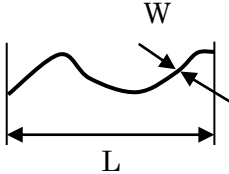
A Zone + B Zone = Validity viewing area

9.3 Standards

No.	Parameter	Criteria																																								
1	G Line	Nothing																																								
2	S Line	Nothing																																								
3	Leak	Nothing																																								
4	Bright and Dark dot	<table><tr><th>Zone</th><th colspan="2">Acceptable Number</th></tr><tr><td rowspan="5">A</td><td>Bright Dot</td><td>2</td></tr><tr><td>Adjacent Bright Dot</td><td>0</td></tr><tr><td>Dark Dot</td><td>3</td></tr><tr><td>Adjacent Dark Dot</td><td>1</td></tr><tr><td>Total</td><td>4</td></tr></table> <p>Definition of Bright dot</p> <p>Anything that can be seen through 10% transmittance ND filter when black signal is inputted.</p> <p>Adjacent Dot: Horizontal and Vertical Continuous Bright dots.</p>	Zone	Acceptable Number		A	Bright Dot	2	Adjacent Bright Dot	0	Dark Dot	3	Adjacent Dark Dot	1	Total	4																										
Zone	Acceptable Number																																									
A	Bright Dot	2																																								
	Adjacent Bright Dot	0																																								
	Dark Dot	3																																								
	Adjacent Dark Dot	1																																								
	Total	4																																								
5	Contrast Variation	Not to be conspicuous defects.																																								
6	Black and White Spots, Foreign Material in Polarizer and LR/AR Coat Bright point	<p>(1) Round Shape</p> <table><tr><th rowspan="2">Zone Dimension(mm)</th><th colspan="3">Acceptable Number</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>D ≤ 0.15</td><td colspan="2">Disregard</td><td rowspan="3">Disregard</td></tr><tr><td>0.15 < D ≤ 0.5</td><td colspan="2">4</td></tr><tr><td>0.5 < D</td><td colspan="2">0</td></tr></table> <p>D = (Long + Short) / 2</p> <p>(2) Line Shape</p> <table><tr><th colspan="2">Zone X(mm) \ Y(mm)</th><th colspan="3">Acceptable Number</th></tr><tr><th colspan="2"></th><th>A</th><th>B</th><th>C</th></tr><tr><td>—</td><td>W ≤ 0.05</td><td colspan="2">Disregard</td><td rowspan="3">Disregard</td></tr><tr><td>0.3 < L ≤ 2.0</td><td>0.05 < W ≤ 0.1</td><td colspan="2">2</td></tr><tr><td>L ≤ 0.3</td><td>—</td><td colspan="2">Disregard</td></tr></table> <p>X : Length Y : Width</p> <p>Total defects shall not exceed 2.</p>	Zone Dimension(mm)	Acceptable Number			A	B	C	D ≤ 0.15	Disregard		Disregard	0.15 < D ≤ 0.5	4		0.5 < D	0		Zone X(mm) \ Y(mm)		Acceptable Number					A	B	C	—	W ≤ 0.05	Disregard		Disregard	0.3 < L ≤ 2.0	0.05 < W ≤ 0.1	2		L ≤ 0.3	—	Disregard	
Zone Dimension(mm)	Acceptable Number																																									
	A	B	C																																							
D ≤ 0.15	Disregard		Disregard																																							
0.15 < D ≤ 0.5	4																																									
0.5 < D	0																																									
Zone X(mm) \ Y(mm)		Acceptable Number																																								
		A	B	C																																						
—	W ≤ 0.05	Disregard		Disregard																																						
0.3 < L ≤ 2.0	0.05 < W ≤ 0.1	2																																								
L ≤ 0.3	—	Disregard																																								
7	Color Variation	Not to be conspicuous defects.																																								

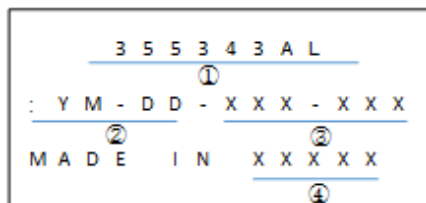
No.	Parameter	Criteria																								
8	Air Bubbles (between glass and polarizer)	<table><tr><th rowspan="2"><div>Zone</div><div>Dimension (mm)</div></th><th colspan="3">Acceptable Number</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td colspan="2">D ≤ 0.10</td><td colspan="2">Disregard</td><td rowspan="4">Disregard</td></tr><tr><td colspan="2">0.10 < D ≤ 0.15</td><td colspan="2">1</td></tr><tr><td colspan="2">0.15 < D ≤ 0.20</td><td colspan="2">1</td></tr><tr><td colspan="2">0.20 < D</td><td colspan="2">0</td></tr></table> <p>The polarizer edge has not floated.</p>	<div>Zone</div> <div>Dimension (mm)</div>	Acceptable Number			A	B	C	D ≤ 0.10		Disregard		Disregard	0.10 < D ≤ 0.15		1		0.15 < D ≤ 0.20		1		0.20 < D		0	
<div>Zone</div> <div>Dimension (mm)</div>	Acceptable Number																									
	A	B	C																							
D ≤ 0.10		Disregard		Disregard																						
0.10 < D ≤ 0.15		1																								
0.15 < D ≤ 0.20		1																								
0.20 < D		0																								
9	Polarizer Scratches	Not to be conspicuous defects.																								
10	Polarizer Dirts	If the stains are removed easily from LCDP surface, the module is not defective.																								

9.4 Standards on Touch panel

No.	Item	Criteria		Note
1	Dot type foreign Material, Dent	Dimension (mm)	Judgement	D(mm): average diameter= (Long dia.+ short dia.)/2
		$D \leq 0.1$	Disregard	
		$0.1 < D < 0.15$	Distance from any other foreign object >10mm : Ignore <10mm : less than 2pcs	
		$D > 0.15$	Nothing	
2	Linear foreign material, Linear scratch	Dimension (mm)	Judgement	
		$W < 0.025$	Disregard	
		$0.025 < W < 0.035, L \leq 2$	Distance from any other foreign object >10mm : Ignore <10mm : less than 2pcs	
		$0.035 < W < 0.05, L \leq 2$	Distance from any other foreign object <10mm : less than 2pcs	
		$W > 0.05$	Nothing	
3	Glass chipping	Corner 1) $X \leq 3.0\text{mm}$, $Y \leq 3.0\text{mm}$, $Z \leq \text{Glass thickness}$: Ignore 2) the chipping on the terminal : Not allowable 3) the chipping on the terminal : Not allowable Without corner 1) $X < 4.0\text{mm}$, $Y < 2.0\text{mm}$, $Z < \text{Glass thickness}$: Ignore 2) the chipping on the terminal : Not allowable 3) the chipping on the terminal : Not allowable		
4	Scratch	Dimension (mm)	Judgement	
		$W < 0.03, L \leq 5$	Disregard	
		$0.03 < W < 0.05, L \leq 5$	Distance from any other scratch object >10mm : Ignore <10mm : Not allowable	
		$0.03 < W < 0.05, L > 5$	Nothing	
		$W > 0.05$	Nothing	
5	Fish eye on film, Dent on film and Air bubble	Dimension (mm)	Judgement	D(mm) : average diameter=(Long dia.+ short dia.)/2
		$D \leq 0.2$	Disregard	
		$0.2 < D \leq 0.4$	Less than 5pcs	
		$0.4 < D \leq 0.5$	Less than 2pcs	
		$D > 0.5$	Nothing	
6	Newton's ring	After assembling with module, no Newton's ring at viewing angle ($\pm 10^\circ$)		
7	Miss matching of film and plastic board	All round of film is inside of plastic board.		

10. Lot Number Identification

The lot number shall be indicated on the FPC of each LCD.



No①. - No④. above indicate

- ① Module Product Number
- ② Manufacturing Date
- ③ Version Number
- ④ Country of Origin

② Year: The last one digit of the year

Month: See below

Day: 01~31

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.
Code	1	2	3	4	5	6

Month	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Code	7	8	9	X	Y	Z

11. Applying Precautions

Please contact us when questions and/or new problems not specified in this Specifications arise.

12. Precautions Relating Product Handling

The Following precautions will guide you in handling our product correctly.

1) Liquid crystal display devices

1. The liquid crystal display panel used in the liquid crystal display module is made of plate glass. Avoid any strong mechanical shock. Should the glass break handle it with care.
2. The polarizer adhering to the surface of the LCD is made of a soft material.
Guard against scratching it.



2) Care of the liquid crystal display module against static electricity discharge.

1. When working with the module, be sure to ground your body and any electrical equipment you may be using. We strongly recommend the use of anti static mats (made of rubber), to protect worktables against the hazards of electrical shock.
2. Avoid the use of work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
3. Slowly and carefully remove the protective film from the LCD module, since this operation can generate static electricity.

3) When the LCD module must be stored for long periods of time:

1. Protect the modules from high temperature and humidity.

Conditions: Temperature : 0°C~40°C

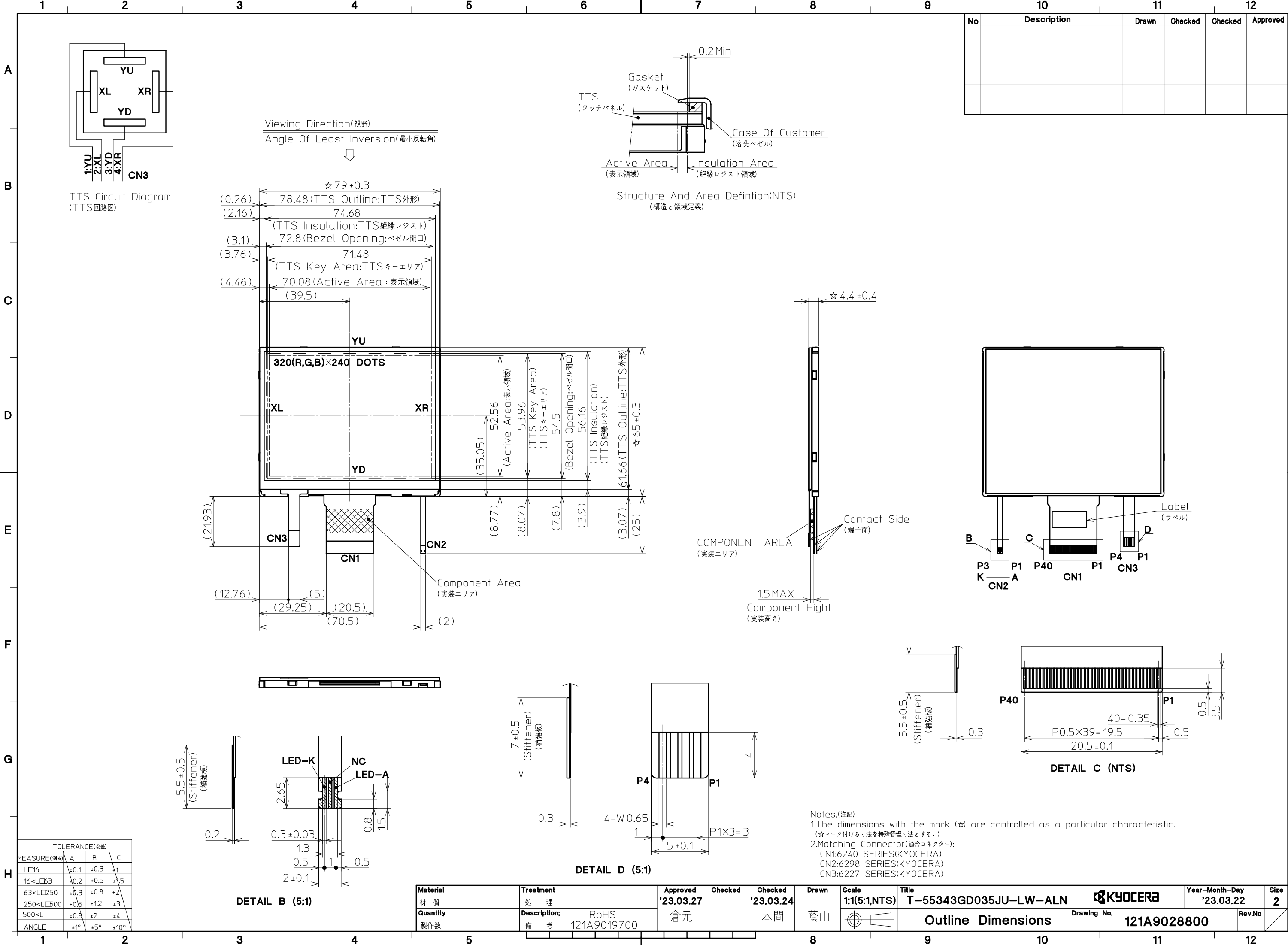
Humidity : Less than 60%RH

No dew condensation to be observed.

2. Keep the modules out of direct sunlight or direct exposure to ultraviolet rays.
 3. Protect the modules from excessive external forces.
 4. After a long period storage of the product (or LCD) under the low temperature and the dark, it might take a longer time to turn on the CCFL than normal.
- 4) Use the module with a power supply that is equipped with an overcurrent protector circuit, since the module is not provided with this protective feature.
- 5) Do not ingest the LCD fluid itself should it leak out of a damaged LCD module. Should hands or clothing come in contact with LCD fluid, wash immediately with soap.
- 6) Conductivity is not guaranteed for models that use metal holders where solder connections between the metal holder and the PCB are not used. Please contact us to discuss appropriate ways to assure conductivity.
- 7) For models which use touch panels:
1. Do not stack up modules since they can be damaged by components on neighboring modules.
 2. Do not place heavy objects on top of the product. This could cause glass breakage.
- 8) For models which use COG, TAB, or COF:
1. The mechanical strength of the product is low since the IC chip faces out unprotected from the rear. Be sure to protect the rear of the IC chip from external forces.
 2. Given the fact that the rear of the IC chip is left exposed, in order to protect the unit from electrical damage, avoid installation configurations in which the rear of the IC chip runs the risk of making any electrical contact.
- 9) Models which use flexible cable, heat seal, or TAB:
1. In order to maintain reliability, do not touch or hold by the connector area.
 2. Avoid any bending, pulling, or other excessive force, which can result in broken connections.

Spec No.	Part No.	Page
CPD-355343AL-01 Rev.01	T-55343GD035JU-LW-ALN	32

- 10) In case of buffer material such as cushion / gasket is assembled into LCD module, it may have an adverse effect on connecting parts (LCD panel-TCP / HEAT SEAL / FPC /etc., PCB-TCP / HEAT SEAL / FPC etc., TCP-HEAT SEAL, TCP-FPC, HEAT SEAL-FPC, etc.,) depending on its materials. Please check and evaluate these materials carefully before use.
- 11) In case of acrylic plate is attached to front side of LCD panel, cloudiness (very small cracks) can occur on acrylic plate, being influenced by some components generated from polarizer film.
Please check and evaluate those acrylic materials carefully before use.
- 12) Flickering due to optical interference may occur by combination of a) LCD driving frame frequency decided by either internal oscillator in driver IC or external clock input by the customer and b) lighting frequency of either backlight or other light sources.
Please evaluate enough at the environment of actual use, and decide the driving condition that does not cause flickering.



No	Description	Drawn	Checked	Checked	Approved

TOLERANCE(公差)			
MEASURE(測定)	A	B	C
L□16	±0.1	±0.3	±1
16<L□63	±0.2	±0.5	±1.5
63<L□250	±0.3	±0.8	±2
250<L□500	±0.5	±1.2	±3
500<L	±0.8	±2	±4
ANGLE	±1°	±5°	±10°

Material 材質	Treatment 処理	Approved '23.03.27	Checked	Checked '23.03.24	Drawn 蔭山	Scale 1:1(5:1,NTS)	Title T-55343GD035JU-LW-ALN	KYOCERA	Year-Month-Day '23.03.22	Size 2
Quantity 製作数	Description; 備考	倉元		本間			Outline Dimensions	Drawing No. 121A9028800	Rev.No	
	RoHS 121A9019700									

Notes.(注記)
1.The dimensions with the mark (☆) are controlled as a particular characteristic.
(☆マーク付ける寸法を特殊管理寸法とする.)
2.Matching Connector(適合コネクタ):
CN1:6240 SERIES(KYOCERA)
CN2:6298 SERIES(KYOCERA)
CN3:6227 SERIES(KYOCERA)