SPEC

Spec No.	
Date	

TYPE : T-55343GD035JU-LW-AJN

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
DONGGUAN SHILONG KYOCERA Co., Ltd.
DISPLAY DIVISION

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	Checked	Approved

Warning

This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

1) We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.

2) We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.

3) We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.

4)When the product is in CFL models, CFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.

5) We cannot accept responsibility for intellectual property of a third party, which may arise through the application of our product to your assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.

6) We will not be held responsible for any quality guarantee issue for defect products judged As KYOCERA-origin in 2 (two) years from our production or 1(one) year from KYOCERA Group delivery whichever is shorter.
However, priority is given to the contents of the "part (product) basic contract document" concluded in both.

Revision record

Date	Designed by : Engineering dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved

Rev. No.	Date	Page	Descriptions

1. Application

This specification applies to TFT-LCD module「with Touch Panel」

(T-55343GD035JU-LW-AJN)

2. General Specifications

Screen Size : 3.5 inches (8.9cm) Diagonal

Active Area : 70.08(W) x 52.56(H) mm

Display Format : 320(W) x 3[R.G.B] x 240(H)

Pixel Size : 0.073 x 3[R.G.B](W) x 0.219(H) mm

Pixel Arrangement : RGB-Stripe

Color Depth : 16M colors

Display Mode : Normally White

Viewing Direction : 12 O'clock (1 Angle of Least Color Inversion)

Surface Treatment : AG Coating

Interface : 24-bit Digital RGB interface(8-bit / color)

Outline Dimension : 79.0(W) x 65.0(H) x 4.8Max*(D) mm
*Without FPC and Component Area

Weight : 46.5gmax

Backlight : LED Backlight / White

RoHS regulation : To our best knowledge, this product satisfies material requirement of RoHS regulation.
Our company is doing the best efforts to obtain the equivalent certificate from our suppliers.

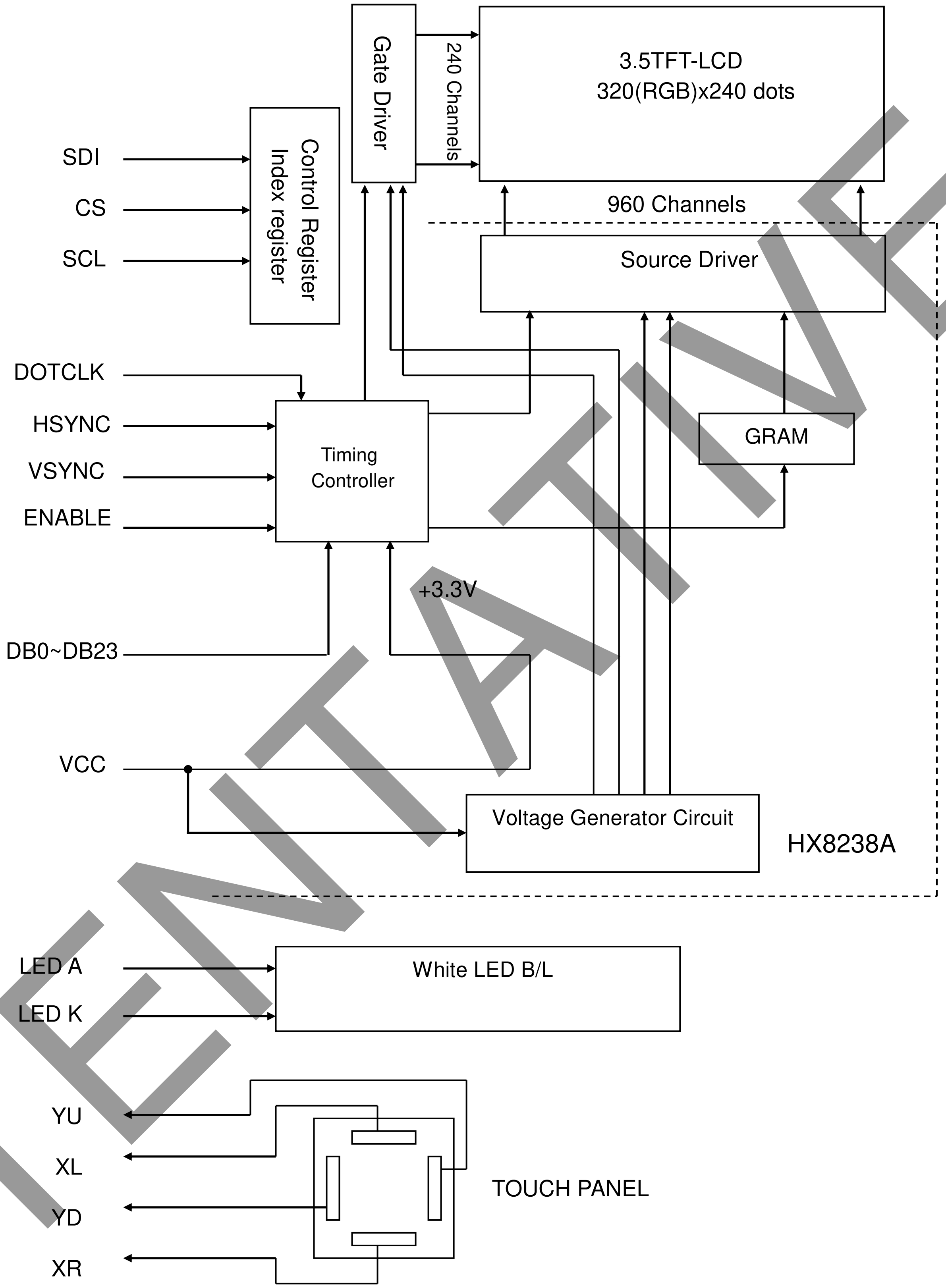
3. Operating Conditions

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


3.5TFT-LCD
320(RGB)x240 dots
Gate Driver
240 Channels
Control Register
Index register
SDI
CS
SCL
960 Channels
Source Driver
DOTCLK
HSYNC
VSYNC
ENABLE
Timing
Controller
GRAM
+3.3V
DB0~DB23
VCC
Voltage Generator Circuit
HX8238A
LED A
LED K
White LED B/L
YU
XL
YD
XR
TOUCH PANEL

5. I/O Terminal

5.1 CN1 Pin Assignment

Used FPC： P0.5mm, 40pin,T=0.3mm
Corresponding Connector： 6240 Series (ELCO)

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)

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	VCC	Power Supply for System
40	VCC	Power Supply for System

5.2. CN2 Pin Assignment

Used FPC：　P0.5mm, 3pin,T=0.2mm
Corresponding Connector：　6298 Series (ELCO)

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 (ELCO)

No.	Symbol	Functional Description
1	YU	Y [TTS- 12o'clock side]
2	XL	X [TTS- left side]
3	YD	Y [TTS- 6o'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	VCC	-	-0.3	4.0	V
Input Voltage	VIN		GND-0.3	4.0	V

6.2 DC Characteristics

Ta=-20~70°C, GND=0V

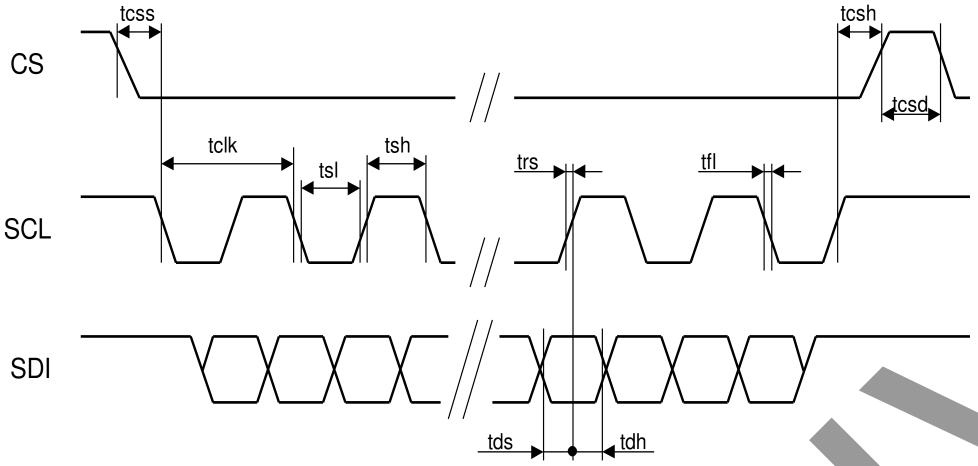
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage for System	VCC	-	3.0	3.3	3.6	V
"High" Level Input Voltage	VIH	-	0.8VCC	-	VCC	V
"Low" Level Input Voltage	VIL	-	0	-	0.2VCC	V
High Level Output Voltage	VOH	-	0.9VCC	-	VCC	V
Low Level Output Voltage	VOL	-	0	-	0.1VCC	V
Opeating mode Current	ICC	VCC-GND=3.3V	-	11.0	16.5	mA

6.3 AC Characteristics

6.3.1 Serial Interface Timing Characteristics

Ta=-20~70°C, GND=0V

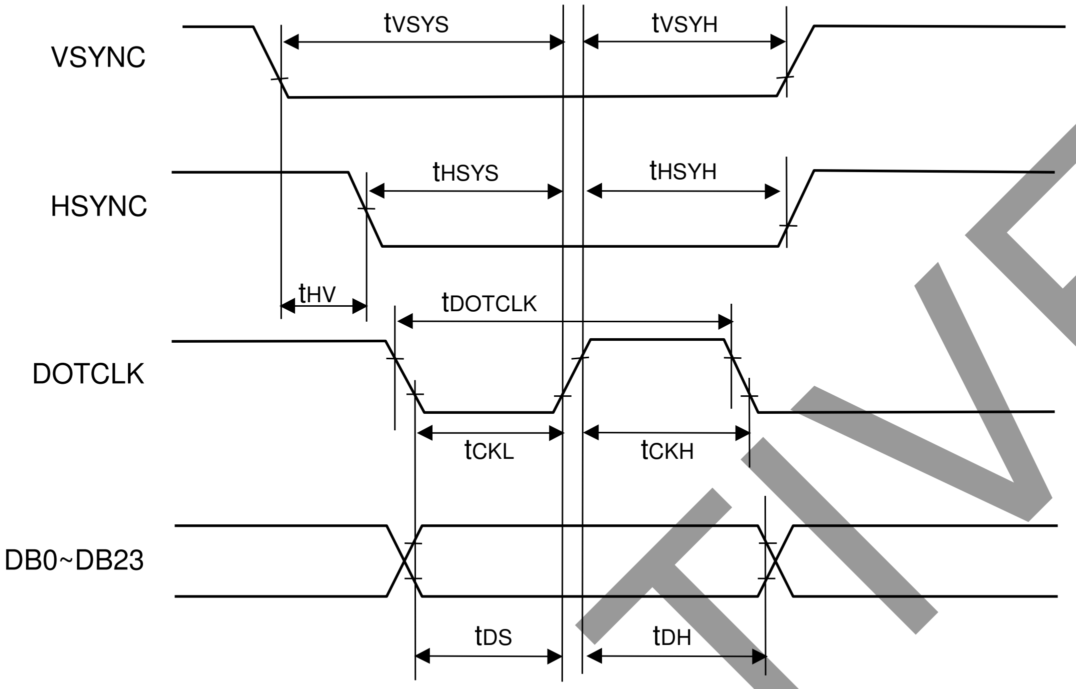
Parameter	Symbol	Min.	Typ.	Max.	Units
Serial Clock Cycle Time	tclk	50	-	-	ns
Clock Low Width	tsl	25	-	-	ns
Clock High Width	tsh	25	-	-	ns
Clock Rising Time	trs	-	-	30	ns
Clock falling Time	tfl	-	-	30	ns
Chip Select Setup Time	tcss	0	-	-	ns
Chip Select Hold Time	tcsh	10	-	-	ns
Chip Select High Delay Time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



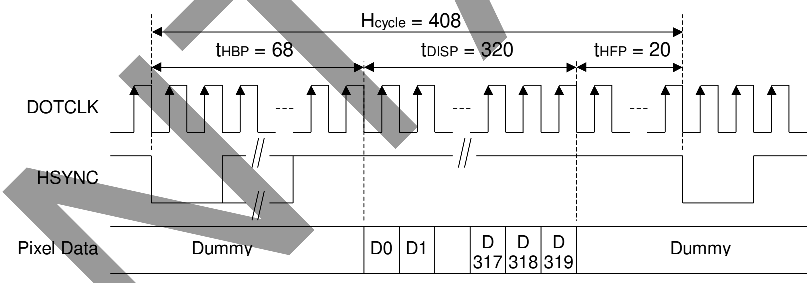
6.3.2 Digital RGB Interface Timing Characteristics

Ta=--20~70°C, GND=0V

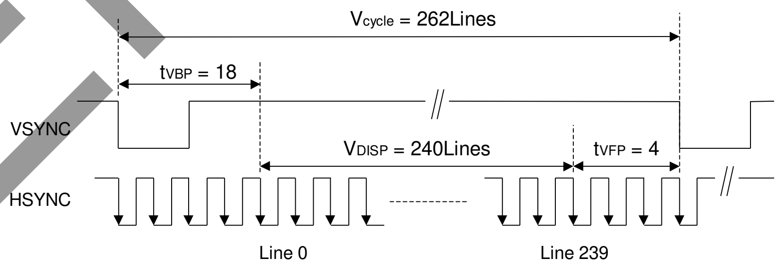
Parameter	Symbo	Min.	Typ.	Max.	Units
DOTCLK Frequency	f_{DOTCLK}	-	6.5	10	MHz
DOTCLK Cycle Time	t_{DOTCLK}	100	154	-	ns
Vertical Sync Setup Time	t_{VSYS}	20	-	-	ns
Vertical Sync Hold Time	t_{VSYH}	20	-	-	ns
Horizontal Sync Setup Time	t_{HSYS}	20	-	-	ns
Horizontal Sync Hold Time	t_{HSYH}	20	-	-	ns
Phase 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


VSYNC
tVSYS
tVSYH
HSYNC
tHSYS
tHSYH
tHV
tDOTCLK
DOTCLK
tCKL
tCKH
DB0~DB23
tDS
tDH

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

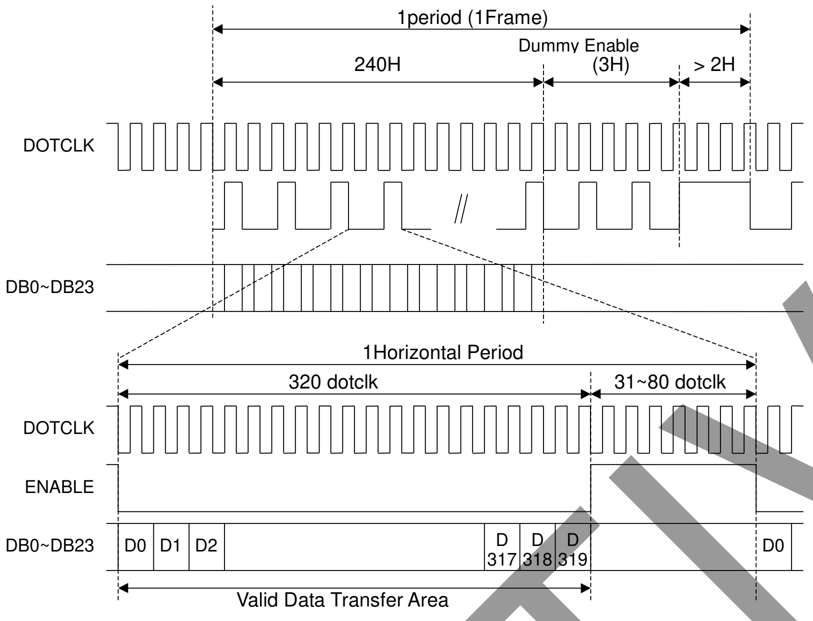

H_{cycle} = 408
t_{HBP} = 68
t_{DISP} = 320
t_{HFP} = 20
DOTCLK
HSYNC
Pixel Data
Dummy
D0
D1
D 317
D 318
D 319
Dummy

a) Horizontal Data Transaction Timing


V_{cycle} = 262Lines
t_{VBP} = 18
VSYNC
V_{DISP} = 240Lines
t_{VFP} = 4
HSYNC
Line 0
Line 239

b) Vertical Data Transaction Timing

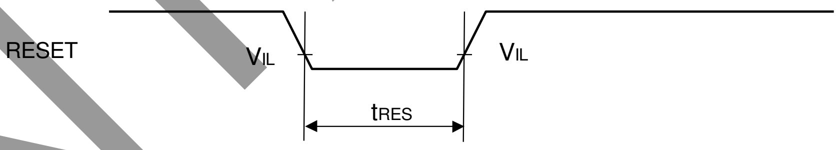
6.3.4 Data Transaction Timing inParallel RGB Interface (ENABLE Mode)


1period (1Frame)
240H
Dummy Enable (3H)
> 2H
DOTCLK
//
DB0~DB23
1Horizontal Period
320 dotclk
31~80 dotclk
DOTCLK
ENABLE
DB0~DB23
D0
D1
D2
D 317
D 318
D 319
D0
Valid Data Transfer Area

6.3.5 Reset Timing Characteristics

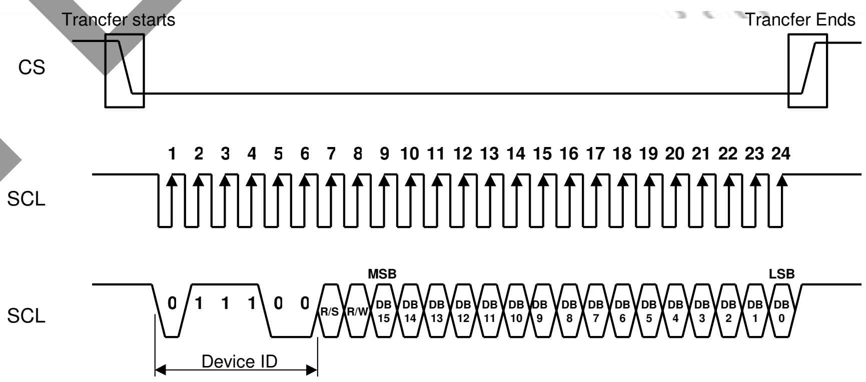
Ta=-20~70°C, GND=0V

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

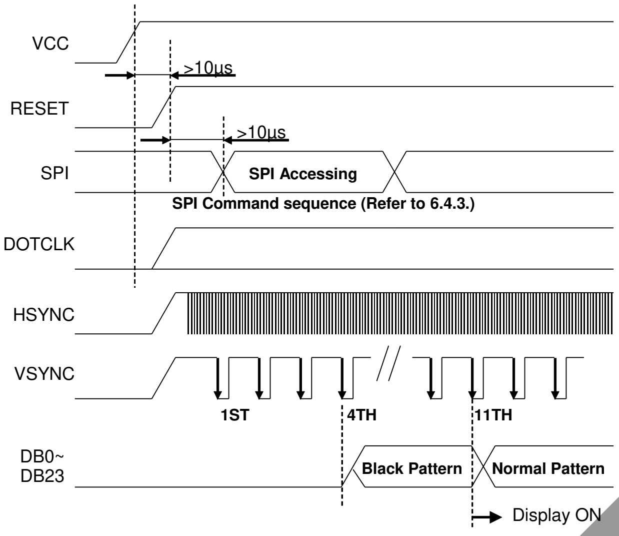

RESET
VIL
VIL
tRES

6.4 Power ON Sequence

6.4.1 Data Transfer of SPI


Trancfer starts
Trancfer Ends
CS
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
SCL
MSB
LSB
SCL
0 1 1 1 0 0
R/S
R/W
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
Device ID

6.4.2 Power ON Procedure (Recommended Sequence)


VCC
RESET
SPI
DOTCLK
HSYNC
VSYNC
DB0~
DB23
>10µs
>10µs
SPI Accessing
SPI Command sequence (Refer to 6.4.3.)
1ST
4TH
11TH
Black Pattern
Normal Pattern
Display ON

VCC Power ON

↓

Wait 10µsec~

↓

Release RESET

↓

Input Control Signal

(DOTCLK/HSYNC/VSYNC)

↓

Execute SPI Command Setting

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
Virtical 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 Asignment

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

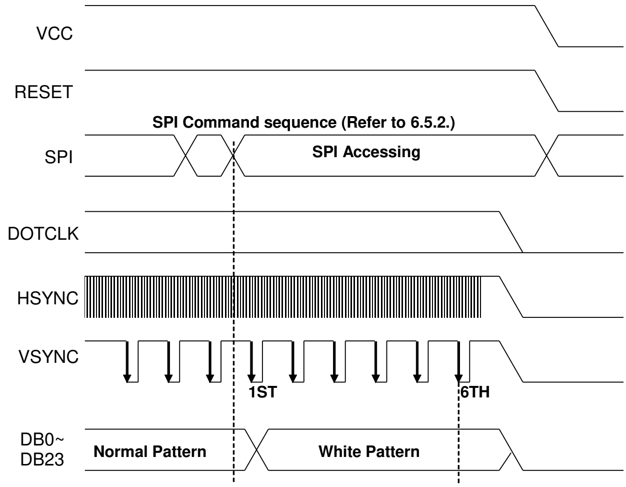
Color (n) --- n indicates gray scale level.
Higher n means brighter level.

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)


VCC
RESET
SPI Command sequence (Refer to 6.5.2.)
SPI
SPI Accessing
DOTCLK
HSYNC
VSYNC
1ST
6TH
DB0~
DB23
Normal Pattern
White Pattern

Execute SPI Command Setting
↓
Input White Data
↓
LCD Display OFF after 6 frames
↓
Stop Control Signal

6.5.2 Command List for Power OFF (Recommended Setting)

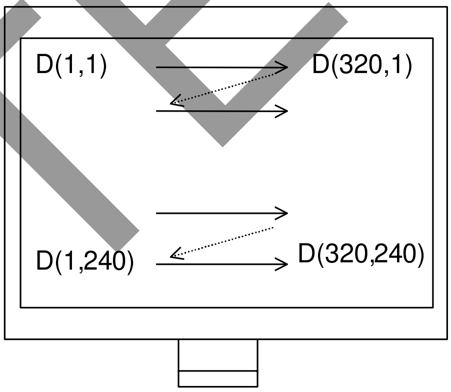
Setting Item	Index	Value
Power Control (1)	0003 h	0100 h

6.6 Inverted Scan Capability

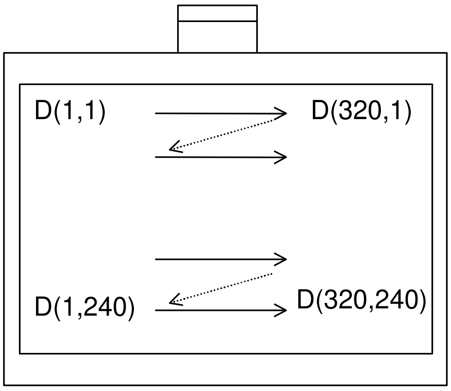
This module has the capability of inverting scan direction by signaling from controller.
Note: Scan direction cannot be changed during operation.

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

Normal scan (TB: H RL: H)


D(1,1)
D(320,1)
D(1,240)
D(320,240)

Reverse scan (TB: L RL: L)


D(1,1)
D(320,1)
D(1,240)
D(320,240)

6.7 Lighting Specifications

6.7.1 Absolute Maximum Ratings

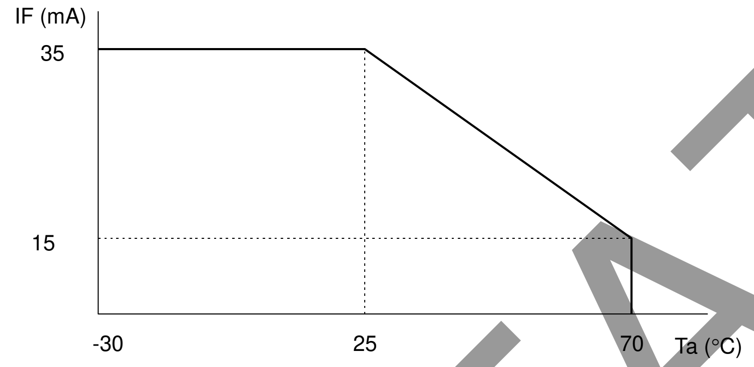
Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Forward Current	I_F	Note 2	-	-	35	mA
Allowable Reverse Current	I_R	-	-	-	50	μA
LED Power Dissipation	P_D	-	-	-	123	mW

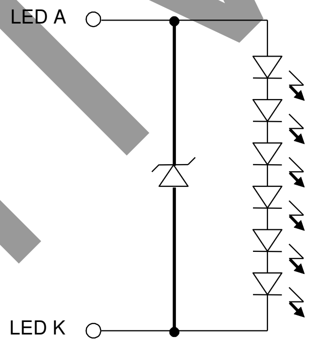
Note 1 : This value is for each 1 line.

Note 2: Refer to the forward current derating curve.

【Forword Current Derating Curve】



【LED Circuit】



6.7.2 Operating Characteristics

Ta=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Forwrad Current	I_F	Note1	-	-	20	mA
Forward Voltage	V_F	I_F=20mA / 1 line	-	19.2	-	V
Power	PL				0.39	W

Note1: Current of LED par chip must be lower than 15mA at 70 degC.
The current of LED must be tuned to satisfy as Forword 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

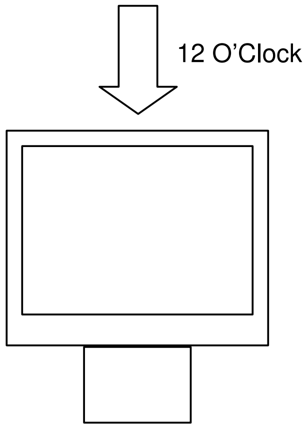
7. Optical Specifications

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°		-	320		Cd/m²	(Fig.1)	Note1
(2)Contrast		CR	Optimum Viewing Angle			400	700	-	-		
(3)Color Coordinates	Red	Rx	0°	0°		-	0.547	-			
		Ry	0°	0°		-	0.375	-			
	Green	Gx	0°	0°		-	0.347	-			
		Gy	0°	0°		-	0.595	-			
	Blue	Bx	0°	0°		-	0.149	-			
		By	0°	0°		-	0.101	-			
	White	Wx	0°	0°		-	0.322	-			
		Wy	0°	0°		-	0.358	-			
(4)Brightness Uniformity		-	0°	0°		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	τr	0°	0°		-	8	-	ms	(Fig.4)	
	Decay	τd	0°	0°		-	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 Device

TOPCON BM-5, Measuring Field: 1°

（2） Measuring Point

Center of Display　θ=0°, ϕ=0°

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

（3） Method of Measuring

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

The distance between BM-5's front lens to surface panel is 500mm.
Measured after backlight has been lit for more than 30 minutes.

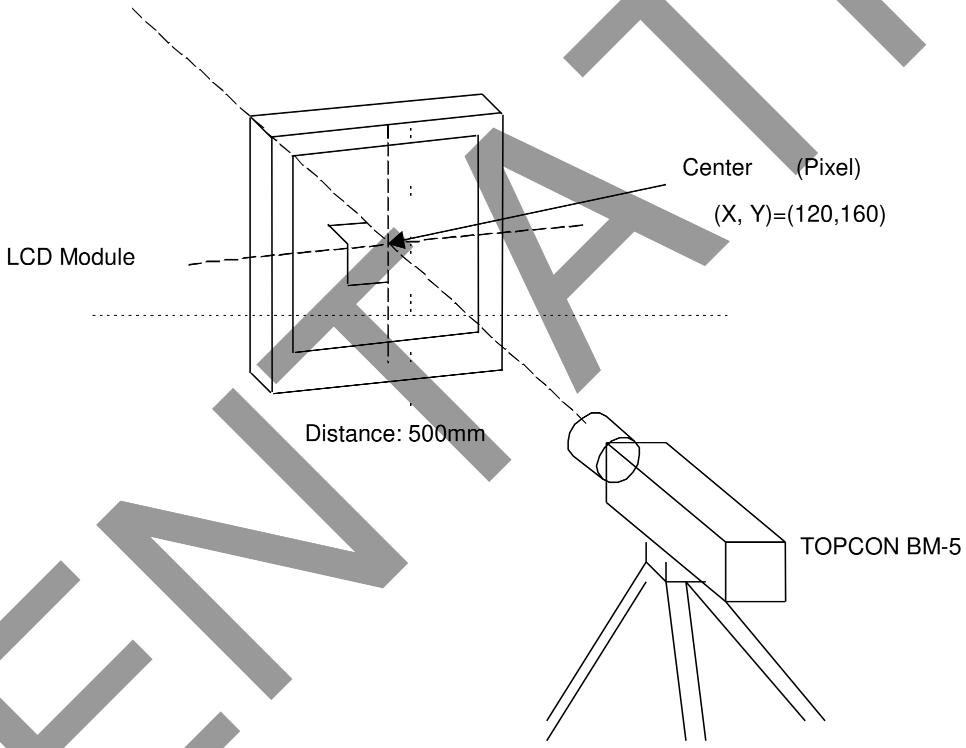


Fig. 1

◆ Method of Contrast Measurement (Fig.1)

(1) Measuring Device

TOPCON BM-5, Measuring Field: 1°

(2) Measuring Point

Center of display: same as Method of Brightness Measurement

(3) Method of Measuring

- Set LCD module to θ=0°, ϕ=0°.

- Change signal voltage to measure maximum brightness Y1 and minimum brightnessY2.

- 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.

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

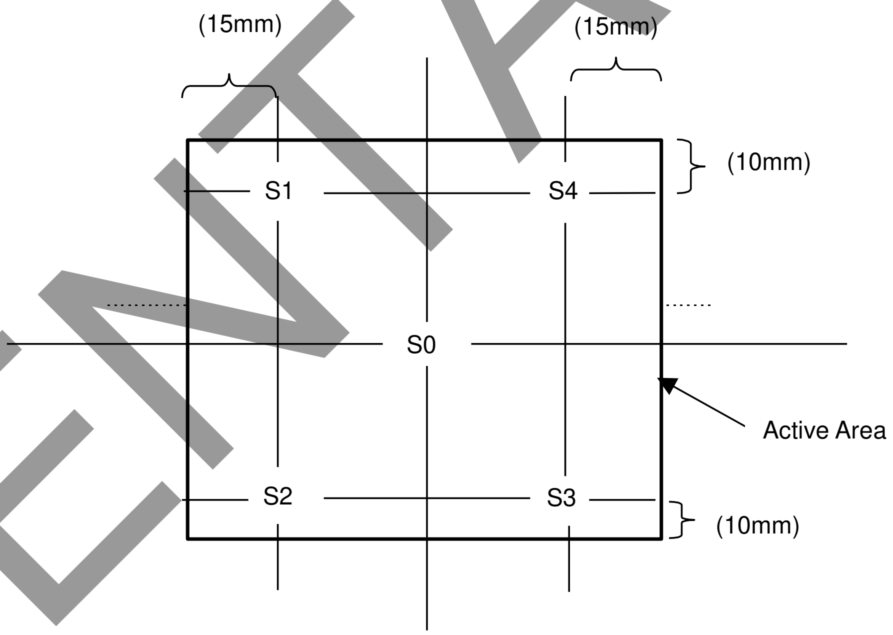


Fig. 2

◆ Method of Viewing Angle Measurement (Fig.3)

（1） Measuring Device

ELDIM EZ : CONTRAST

（2） Measuring Point

Center of display: Same as Method of Brightness Measurement

（3） Angle of Measuring

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

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

（4） Method of Measuring

Set the module on the rotation table and measure a vertical axis direction in the state that fixed φ=0 degrees horizontal axis direction to θ=90degrees.
(Viewing angle is measured automatically by EZ CONTRAST).

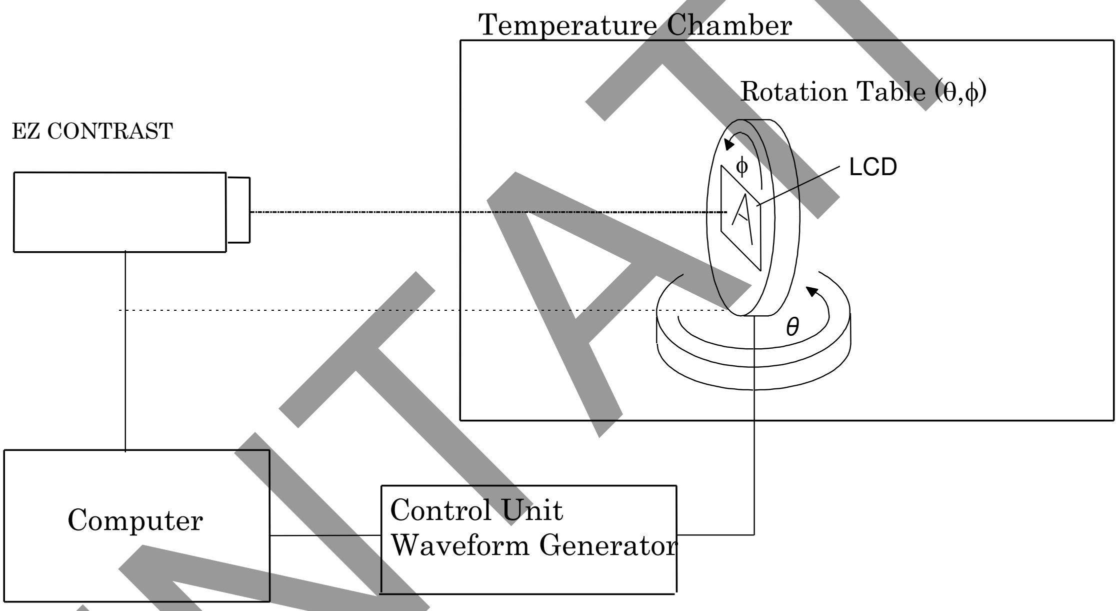

Temperature Chamber
Rotation Table (θ,ϕ)
EZ CONTRAST
ϕ
LCD
θ
Computer
Control Unit
Waveform Generator

Fig. 3

◆ Measuring Response Time (Fig.4)

（1） Measuring Device

TOPCON BM-5 , Measuring Field: 1°
Tektronix Digital Oscilloscope

（2） Measuring Point

Center of display, same as Method of Brightness Measurement

（3） Method of Measuring

- Set LCD panel toθ=0°, and ϕ=0°.
- 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 τr is optical response time during the change from 90% to 10% immediately after rise of signal voltage, and τd is optical response time during the change from 10%to 90% immediately after decay of signal voltage.

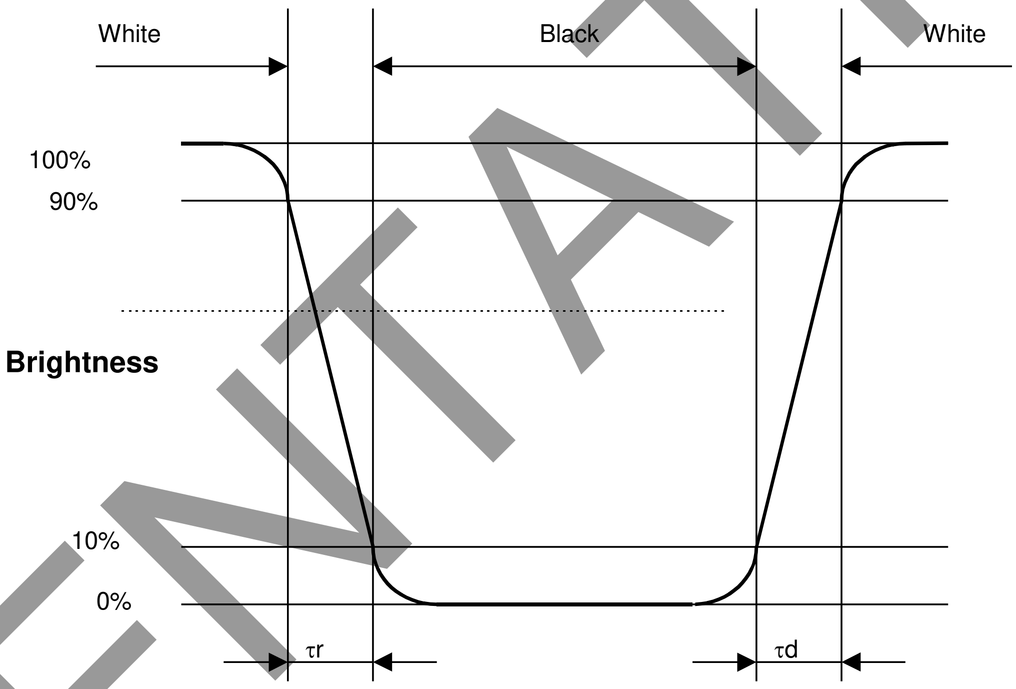
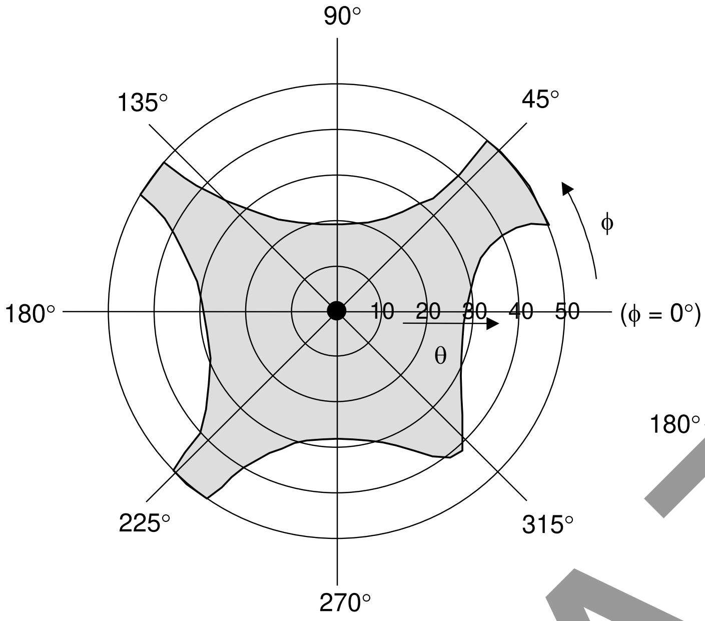
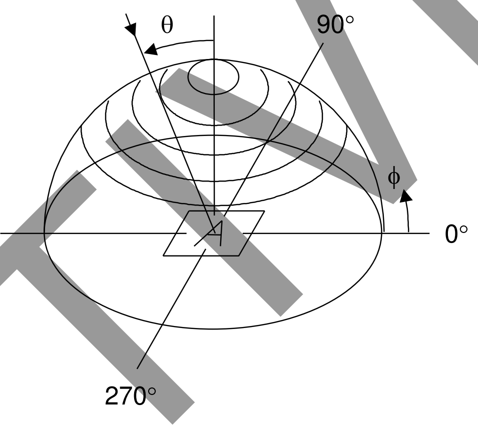


Fig. 4

7.2 Definition of Viewing Angle and Optimum Viewing Area

*Point • shows the point where contrast ratio is measured. : θ= 0°, ϕ= -°
*Driving condition: Ff=60Hz



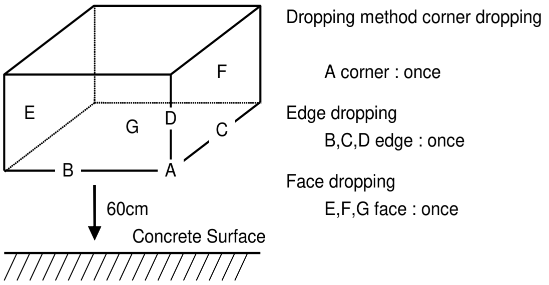


*Area ▨ shows typ. CR≥30

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±5°C
Humidity : 65±5%RH
tests will be not conducted under functioning state.

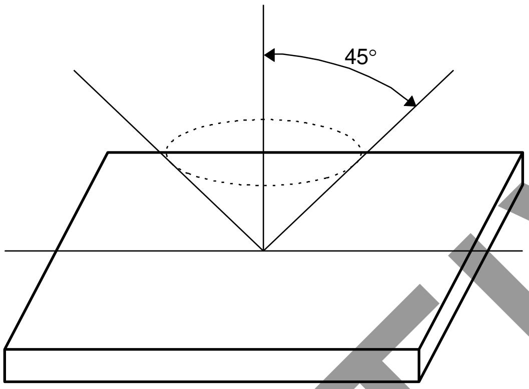
No.	Parameter	Conditions	Notes
1	High Temperature Operating	70°C±2°C, 96hrs (operation state)	
2	Low Temperature Operating	-20°C±2°C, 96hrs (operation state)	1
3	High Temperature Storage	80°C±2°C, 96hrs	2
4	Low Temperature Storage	-30°C±2°C, 96hrs	1,2
5	Damp Proof Test	40°C±2°C,90~95%RH, 96hrs	1,2
6	Vibration Test	Total fixed amplitude: 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X, Y, Z each 15 minutes	3
7	Shock Test	To be measured after dropping from 60cm the concrete surface in packing state.  Dropping method corner dropping A corner : once Edge dropping B,C,D edge : once Face dropping E,F,G face : once E F G D C B A 60cm Concrete Surface	

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.

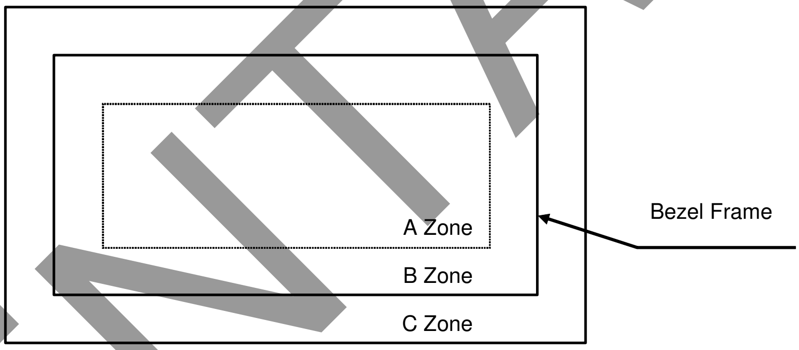
9. Appearance Standards

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.



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

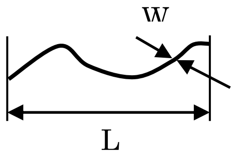
A Zone + B Zone = Validity viewing area

9.3 Standards

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

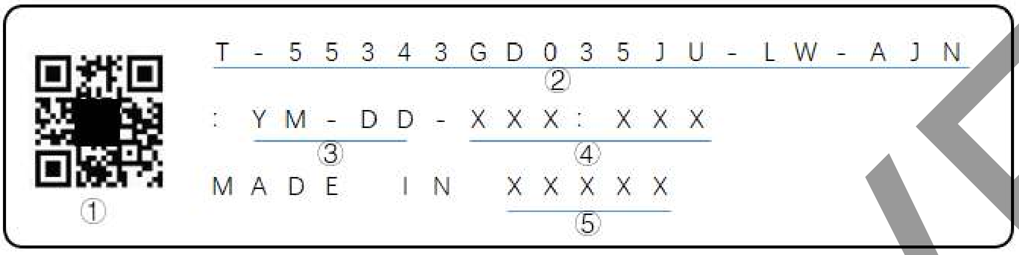
<table>
<tr><th>No.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td>8</td><td>Air Bubbles
(between glass
& polarizer)</td><td>
<table>
<tr><th rowspan="2">Zone
Dimension (mm)</th><th colspan="3">Acceptable Number</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>D ≤0.10</td><td colspan="2">Disregard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

9.4 Standards on Touch panel

No.	Item	Criteria		Note
		Dimension (mm)	Judgement	
1	Dot type foreign material、Dent	D≦0.1	Disregard	D(mm): average diameter=(Long dia.+ short dia.)/2
		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≦2	Distance from any other foreign object >10mm：Ignore <10mm：less than 2pcs	
		0.035<W<0.05 L≦2	Distance from any other foreign object <10mm：less than 2pcs	
		W>0.05mm	Nothing	

10. Lot Number Identification

The lot number shall be indicated on the back of the backlight case of each LCD.



No①. - No⑤. above indicate

①Data matrix(For internal control purpose only)
(The item from parts No. to Version No. is included in data matrix.)
②Module product name
③Manufacturing Date
④Version Number
⑤Country of origin (Japan or China)

③Manufacturing Date：

Year 0~9,for 2020~2029
Month 1~9, X~Z, for Jan. ~ Dec.
Day 01~31,for 1st to 31th

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 CFL:
   1. High voltage of 1000V or greater is applied to the CFL cable connector area. Care should be taken not to touch connection areas to avoid burns.
   2. Protect CFL cables from rubbing against the unit and thus causing the wire jacket to become worn.
   3. The use of CFLs for extended periods of time at low temperatures will significantly shorten their service life.
   4. After storing the product (or LCD) under low temperature and/or in dark atmosphere for a long period of time, CCFL may take longer time to reach its specified brightness.

8) 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.

9) 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.

10) 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.

11) 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.

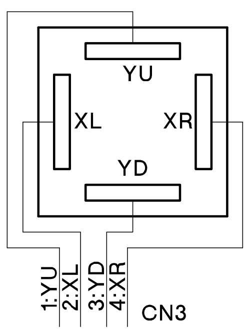
12) In case of acrylic plate is attached to front side of LCD panel, cloudiness (very small cracks) can occur on acrylic plate, being influenced by some components generated from polarizer film.
Please check and evaluate those acrylic materials carefully before use.

13) 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.

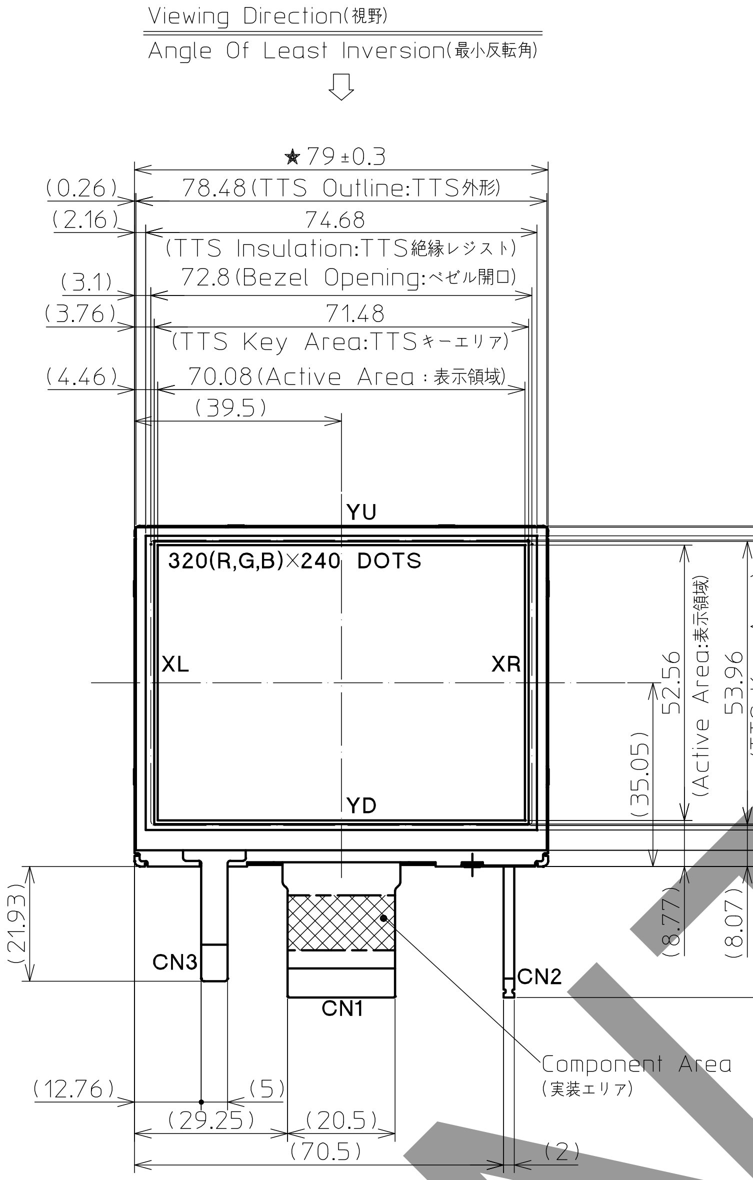
No	Description	Drawn	Checked	Checked	Approved

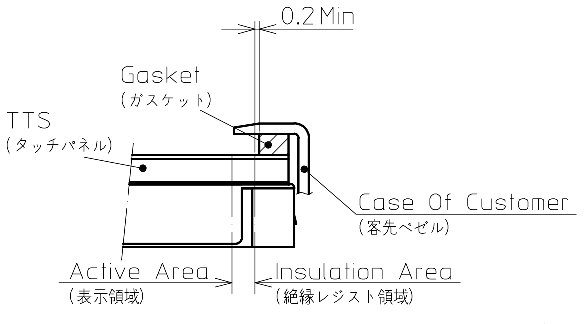
TENTATIVE

It is possible to change some dimensions.
（本図記載の形状・及び寸法値は変更の可能性があります）

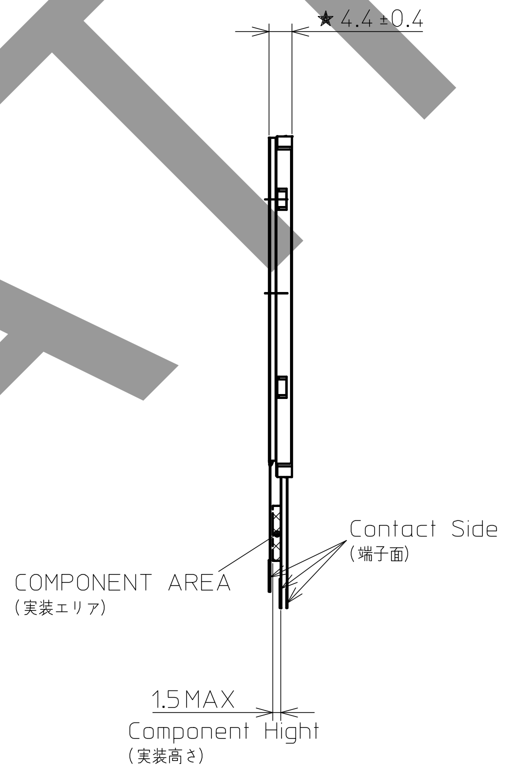

YU
XL
XR
YD
1:YU
2:XL
3:YD
4:XR
CN3

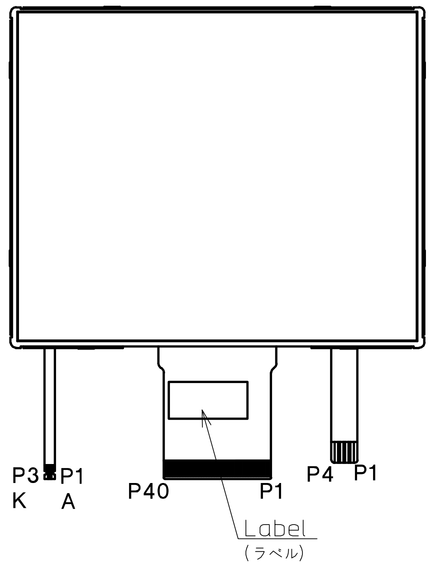
TTS Circuit Diagram
(TTS回路図)

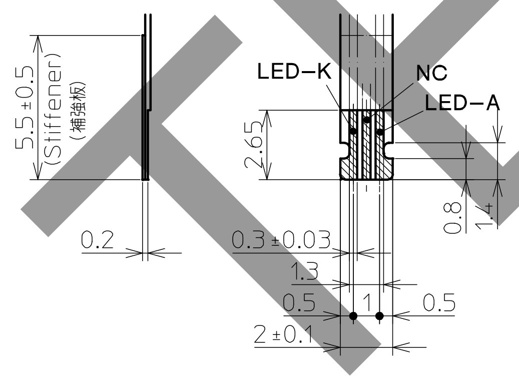

Viewing Direction(視野)
Angle Of Least Inversion(最小反転角)
★79±0.3
(0.26)
78.48(TTS Outline:TTS外形)
(2.16)
74.68
(TTS Insulation:TTS絶縁レジスト)
(3.1)
72.8(Bezel Opening:ベゼル開口)
(3.76)
71.48
(TTS Key Area:TTSキーエリア)
(4.46)
70.08(Active Area:表示領域)
(39.5)
YU
320(R,G,B)×240 DOTS
XL
XR
YD
(35.05)
52.56 (Active Area:表示領域)
53.96 (TTS Key Area) (TTSキーエリア)
54.5 (Bezel Opening:ベゼル開口)
56.16 (TTS Insulation) (TTS絶縁レジスト)
61.66(TTS Outline:TTS外形)
★65±0.3
(21.93)
(8.77)
(8.07)
(7.8)
(3.9)
(3.07)
(25)
CN3
CN1
CN2
Component Area
(実装エリア)
(12.76)
(5)
(29.25)
(20.5)
(70.5)
(2)


0.2Min
Gasket
(ガスケット)
TTS
(タッチパネル)
Case Of Customer
(客先ベゼル)
Active Area
(表示領域)
Insulation Area
(絶縁レジスト領域)

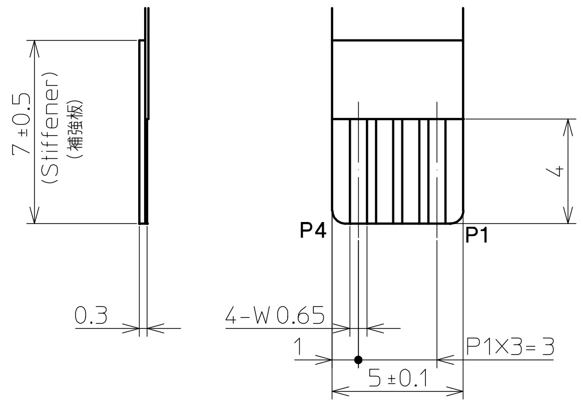
Structure And Area Defintion(NTS)
(構造と領域定義)


★4.4±0.4
Contact Side
(端子面)
COMPONENT AREA
(実装エリア)
1.5MAX
Component Hight
(実装高さ)

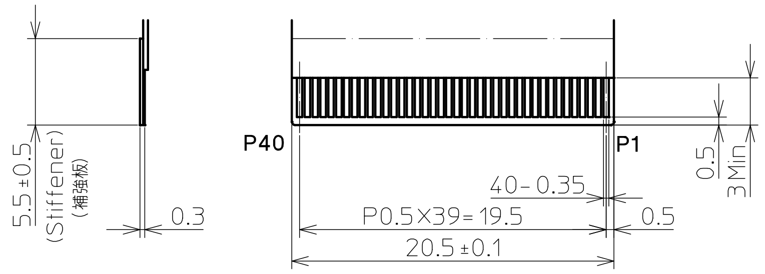

P3
P1
K
A
P40
P1
P4
P1
Label
(ラベル)


5.5±0.5
(Stiffener)
(補強板)
0.2
LED-K
NC
LED-A
2.65
0.8
1.4
0.3±0.03
1.3
0.5
1
0.5
2±0.1

DETAIL CN2 (5:1)


7±0.5
(Stiffener)
(補強板)
0.3
4
P4
P1
4-W0.65
1
P1×3=3
5±0.1

DETAIL CN3 (5:1)


5.5±0.5
(Stiffener)
(補強板)
0.3
P40
P1
40-0.35
P0.5×39=19.5
0.5
20.5±0.1
0.5
3Min

DETAIL CN1 (NTS)

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.Mating Connector(適合コネクター):
CN1:6240 SERIES(ELCO)
CN2:6298 SERIES(ELCO)
CN3:6227 SERIES(ELCO)

TOLERANCE(公差)			
MEASURE(測る)	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	Checked	Checked	Drawn	Scale	Title		Year-Month-Day	Size
		'21.08.23		'21.08.20		1:1(5:1,NTS)	T-55343GD035JU-LW-AJN	KYOCERA	'21.08.19	2
Quantity 製作数	Description; 備考 RoHS	李威		鄭海銘	李倩		Outline Dimensions	Drawing No. 121A9019700		Rev.No