SPECIFICATIONS No.11TLM004	Issue: Jun. 30, 2011

Specifications for

TFT-LCD Monitor

Version 2.0

MODEL COM57T5M26ZSC

Customer's Approval
Signature:
Name:
Section:
Title:
Date:

ORTUSTECH

ORTUS TECHNOLOGY CO., LTD. Sales Dept. Industrial Application	ORTUS TECHNOLOGY CO., LTD. Product Quality Assurance
Approved by T. Tamura	Approved by H. Konya
Checked by	Checked by E. Takabe
	Prepared by M. Tojo

SPECIFICATIONS No.11TLM004	Issue: Jun. 30, 2011

Version History

Ver.	Date	Page	Description		
1.0	May. 19, 2011	-	-	First issue	
2.0	Jun. 30,2011	P.5	Correct	Dot pitch	
	△A ×9	P.8	Correct	Recommended connector	
		P.10	Add	Recommended Operating Conditions	Note1,2
		P.11	Correct	Schmitt Threshold voltage	Condition
					Applicable terminal
		P.16	Add	Power ON/OFF Sequence	
		P.17	Correct	Condition: VLCD	
		P.19	Correct	Signal condition	
		P.28,29	Correct	VLCD	

Contents

1. Application

This Specification is applicable to 14.4cm (5.7 inch) TFT-LCD monitor for non-military use.

◎ ORTUS TECHNOLOGY makes no warranty or assume no liability that use of this Product and/or any information including drawings in this Specification by Purchaser is not infringing any patent or other intellectual property rights owned by third parties, and ORTUS TECHNOLOGY shall not grant to Purchaser any right to use any patent or other intellectual property rights owned by third parties. Since this Specification contains ORTUS TECHNOLOGY's confidential information and copy right, Purchaser shall use them with high degree of care to prevent any unauthorized use, disclosure, duplication, publication or dissemination of ORTUS TECHNOLOGY'S confidential information and copy right.

◎ If Purchaser intends to use this Products for an application which requires higher level of reliability and/or safety in functionality and/or accuracy such as transport equipment (aircraft, train, automobile, etc.), disaster-prevention/security equipment or various safety equipment, Purchaser shall consult ORTUS TECHNOLOGY on such use in advance.

◎ This Product shall not be used for application which requires extremely higher level of reliability and/or safety such as aerospace equipment, telecommunication equipment for trunk lines, control equipment for nuclear facilities or life-support medical equipment.

◎ ORTUS TECHNOLOGY assumes no liability for any damage resulting from misuse, abuse, and/or miss-operation of the Product deviating from the operating conditions and precautions described in the Specification.

◎ If any issue arises as to information provided in this Specification or any other information, ORTUS TECHNOLOGY and Purchaser shall discuss them in good faith and seek solution.

◎ ORTUS TECHNOLOGY assumes no liability for defects such as electrostatic discharge failure occurred during peeling off the protective film or Purchaser's assembly process.

◎ This Product is compatible for RoHS directive.

Object substance	Maximum content [ppm]
Cadmium and its compound	100
Hexavalent Chromium Compound	1000
Lead & Lead compound	1000
Mercury & Mercury compound	1000
Polybrominated biphenyl series （PBB series）	1000
Polybrominated biphenyl ether series （PBDE series）	1000

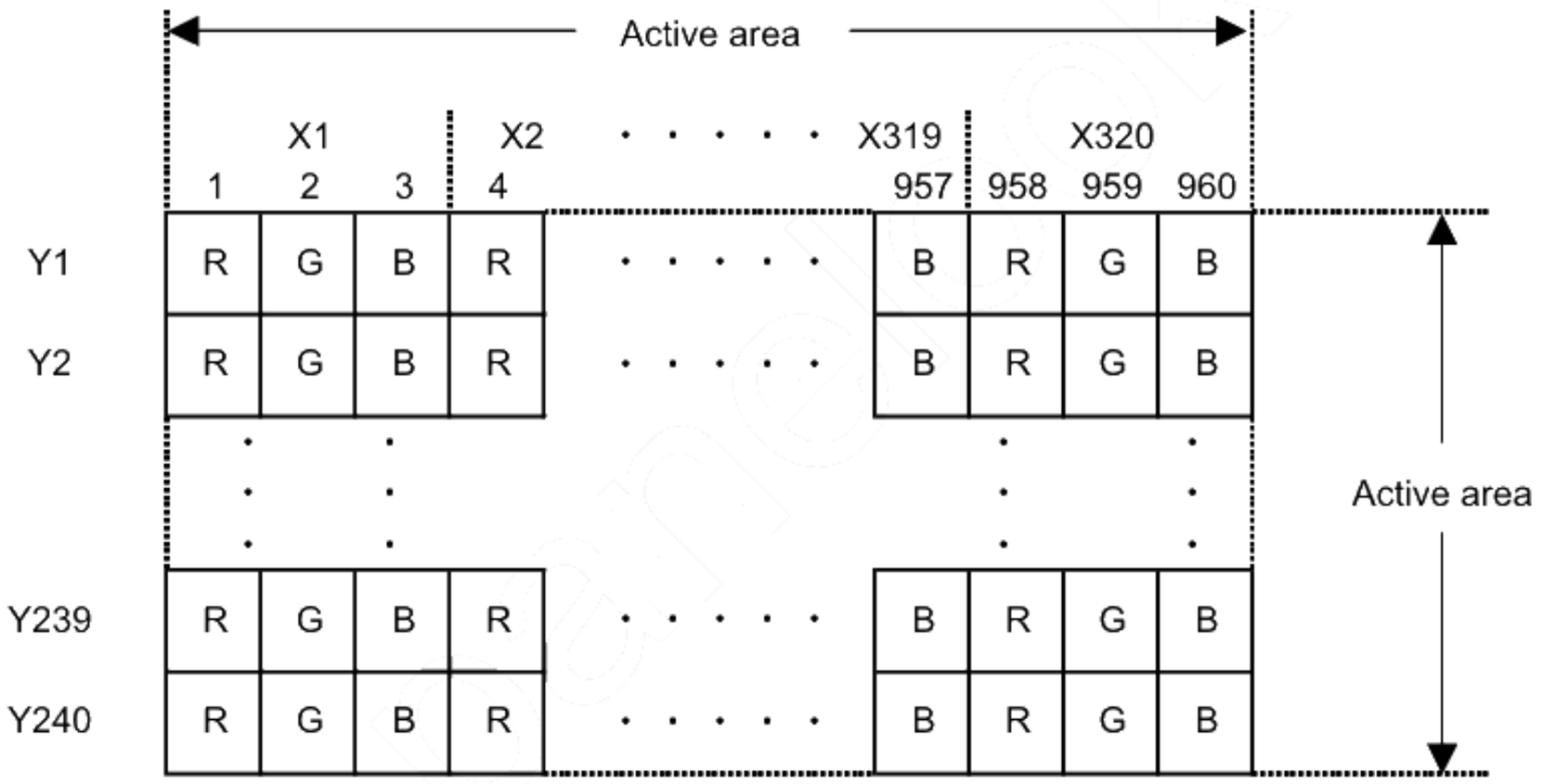
2. Outline Specifications

2.1 Features of the Product

- 5.7 inch diagonal display, 960 [H] x 240 [V] dots.
- RGB 6-bit / 262,144 colors.
- 3.3V voltage single power source.
- Timing generator [TG], Counter-electrode driving circuitry, Built-in power supply circuit.
- Long life & High bright white LED back-light.
- All-in-one type monitor with lead-free mounting(Response to RoHS Phase 3A).

2.2 Display Method

Items	Specifications	Remarks
Display type	TN type 262,144 colors Transmissive type, Normally white	
Driving method	a-Si TFT Active matrix. Line-scanning, Non-interlace.	
Dot arrangement	RGB stripe arrangement.	Refer to "Dot arrangement"
Signal input method	6-bit RGB ,parallel input.	
Backlight type	Long life & High bright white LED.	



Dot arrangement (Serial label placed down)

3. Dimensions and Shape

3.1 Dimensions

Items	Specifications	Unit	Remarks
Outline dimensions	130.32[H] × 101.20[V] ×5.13[D]	mm	outline of frame
Active area	115.20[H] × 86.40[V]	mm	14.4cm diagonal
Number of dots	960[H] × 240[V]	dot	
Dot pitch	120.00[H] × 360.00[V]	μm	
Surface hardness of the polarizer	3	H	Load:2.0N
Weight	119	g	Include FPC cable

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3. 2 Outward Form

EC No.	REV. No.	REVISE	DATE (Y.M.D)	APPROVED	CHECKED	PREPA

(6/29)
11TLM004
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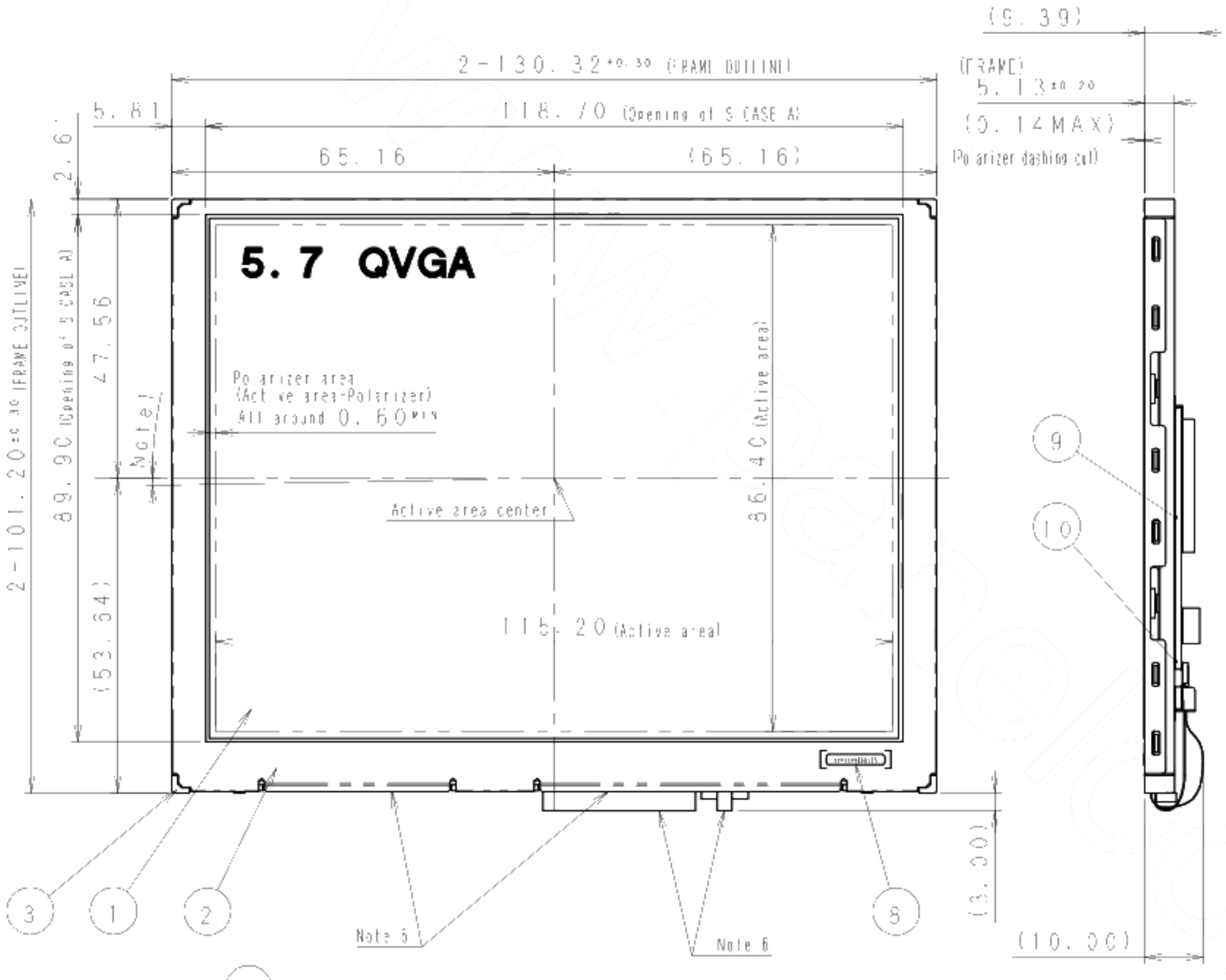

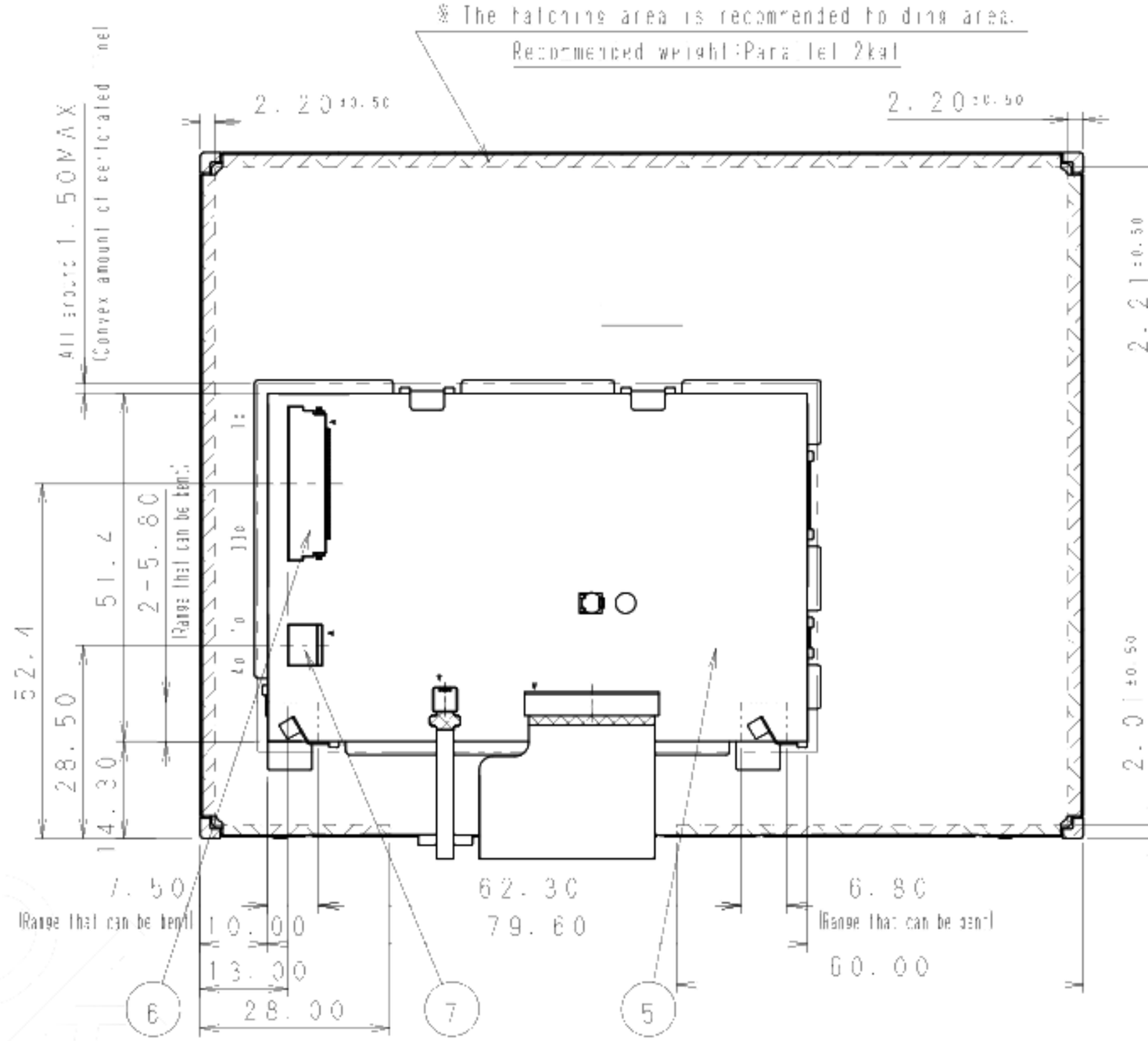

PART NAME	ITEM	MATERIAL GRADE	REMARK
W TAPE	10	No.7641, #25 TERAOKA	(76.60×14.00×0.100t)
I TAPE	9	PET#100(A) PANTAKYU (LINTEC)	(83.60×55.35×0.115t)
S LABEL	8		(10×1.85×0.075t)
CONNECTOR	7	SM04B-SHSS-G-1B(LS1)	pitch1.0×4pin
CONNECTOR	6	34 6740 033 022 946+(KYOCERA (ICO))	pitch0.5×33pin
PCB	5		(79.60×51.35×0.8t)
S CASE C	4	SUS	
FRAME	3	PC	
S CASE A	2	SUS	
11" TFT LCD PANEL	1	Glass substrate thickness=0.5t	

Note 1 Angular deviation of LCD cell from the TFT-LCD monitor's reference axis shall be less than [±50'].

Note 2 S label is affixed the area shown in the drawing.
The thickness of the S label will be added to that of S case's surface.

Note 3 Protective film is affixed on front surface of the screen
Local in tolerance of the protective film shall be ±1.5 mm
to the polarizing film.

Note 4. Exercise care not to apply any forces to the PCB.

Note 5. Exercise care not to apply any forces to the cable holder of the S case A.

Note 6. Exercise care not to apply any forces to the cable.

Note 7. Refer to "10.CRITERIA OF JUDGMENT" about the appearance specification of a polarizer.

APPROVED Hashizume	GENERAL TOLERANCE ±0.0	SCALE 1/1	UNIT mm
CHECKED Hirenobu	ISSUE (YMD) 11:04:28	MODEL COM57T5M26Z***	
CHECKED	NAME		
DESIGN Ide	OUTLINE-D5M26		
DRAW Ide			

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DRAWING No.	REV	SHEET
RJD522024D301		

3.3 SERIAL LABEL (S-LABEL)

1) Display Items

S-label indicates the least significant digit of manufacture year (1digit), manufacture month with below alphabet (1letter), model code (5characters), serial number (6digits).

* Contents of Display

*	*	*****	******
a	b	c	d

	Contents of display			
a	The least significant digit of manufacture year			
b	Manufacture month	Jan-A Feb-B Mar-C Apr-D	May-E Jun-F Jul-G Aug-H	Sep-I Oct-J Nov-K Dec-L
c	Model code	57CNC (Made in Japan) 57CPC (Made in Malaysia) 57CQC (Made in China)		
d	Serial number			

* Example of indication of Serial label (S-label)

・Made in Japan

1B57CNC000125

means "manufactured in Feb. 2011, 5.7" CN type, C specifications, serial number 000125"

・Made in Malaysia

1B57CPC000125

means "manufactured in Feb. 2011, 5.7" CP type, C specifications, serial number 000125"

・Made in China

1B57CQC000125

means "manufactured in Feb. 2011, 5.7" CQ type, C specifications, serial number 000125"

2) Location of Serial Label (S-label)

Refer to 3.2 "Outward Form".

4. Pin Assignment

4.1 Display Module Part

No.	Symbol	Function
1	GND	GND.
2	CLK	Clock signal.Latching data at the falling edge.
3	HSYNC	Horizontal sync signal input.(negative polarity)
4	VSYNC	Vertical sync signal input.(negative polarity)
5	GND	GND.
6	R 0	Display data input for (R). 00h for black display R0 :LSB R5 :MSB Driver IC carries out gamma conversion internally.
7	R 1	
8	R 2	
9	R 3	
10	R 4	
11	R 5	
12	GND	GND.
13	G 0	Display data input for (G). 00h for black display G0 :LSB G5 :MSB Driver IC carries out gamma conversion internally.
14	G 1	
15	G 2	
16	G 3	
17	G 4	
18	G 5	
19	GND	GND.
20	B 0	Display data input for (B). 00h for black display B0 :LSB B5 :MSB Driver IC carries out gamma conversion internally.
21	B 1	
22	B 2	
23	B 3	
24	B 4	
25	B 5	
26	GND	GND.
27	ENAB	Input data effective signal. (It is effective for the period of "Hi")
28	VDD	Power supply input.
29	VDD	Power supply input.
30	RL_UD	Right/Left & Up/Down Display reverse. (L:Normal display , H: Reverse display)
31	NC1	OPEN
32	NC2	OPEN
33	GND	GND.

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- Recommended connector : KYOCERA ELCO 6240 series [04 6240 033 023 846+]
- Please refer to the section "3.2 Outward Form" for pin terminal order.
- The corrosion phenomenon by the different kind metal uniting is generated according to the system requirements, and there is a possibility of becoming a loose connection.
  Please select very carefully, and design the FPC cable used.

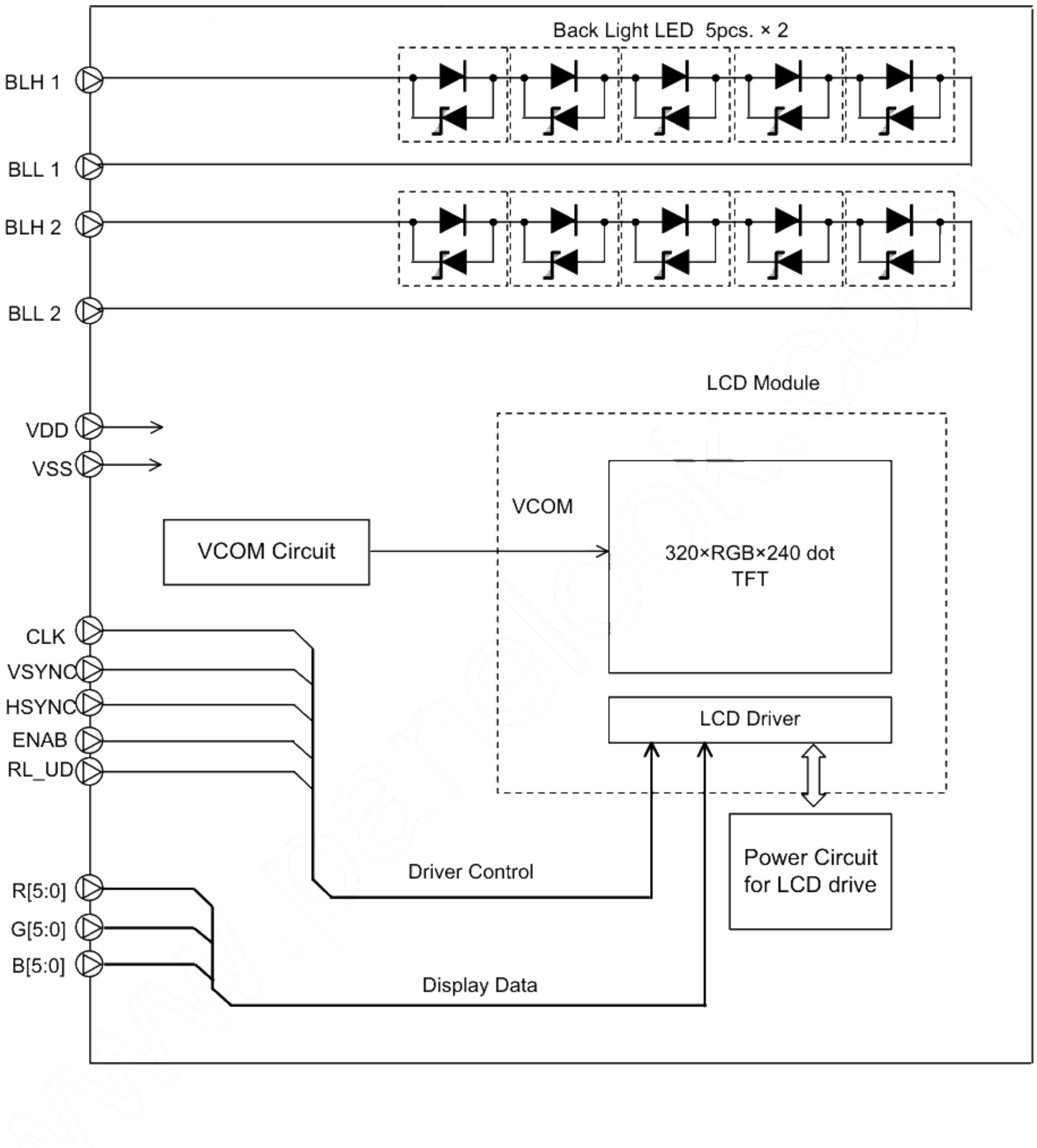
4.2 Backlight Part

No.	Symbol	Function
1	BLL2	Backlight drive 2 (cathode side).
2	BLL1	Backlight drive 1 (cathode side).
3	BLH2	Backlight drive 2 (anode side).
4	BLH1	Backlight drive 1 (anode side).

- Recommended connector: JST [SM04B-SRSS-G-TB(LF)(SN)]
- Please refer to the section "3.2 Outward Form" for pin terminal order.
- The corrosion phenomenon by the different kind metal uniting is generated according to the system requirements, and there is a possibility of becoming a loose connection.
  Please select very carefully, and design the conect used.

5. Block Diagram

Each arrow shows signal flow.



6. Absolute Maximum Rating

GND=0V

Item	Symbol	Condition	Rating		Unit	Applicable terminal
			MIN	MAX		
Supply voltage	VDD	Ta=25°C	-0.3	6.0	V	VDD
Input voltage for logic	VI		-0.3	VDD+0.3	V	CLK,VSYNC,HSYNC,ENAB R[5:0],G[5:0],B[5:0],RL_UD
LED forward current	IL		--	70	mA	BLH1-BLL1,BLH2-BLL2
Storage temperature range	Tstg		-30	80	°C	
Storage humidity range	Hstg	Non condensing in an environmental moisture at or less than 40°C90%RH.				

7. Recommended Operating Conditions

GND=0V

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Supply voltage	VDD		3.0	3.3	3.6	V	VDD
Input voltage for logic	VI	VDD=3.0~3.6V	0	--	VDD	V	CLK,VSYNC,HSYNC, ENAB,RL_UD R[5:0],G[5:0],B[5:0]
Operational temperature range	Top	Note1,2	-20	25	70	°C	Panel surface temperature
Operating humidity range	Hop	Ta≦30°C	20	--	80	%	
		Ta>30°C	Non condensing in an environmental moisture at or less than 30°C80%RH.				

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Note1: The temperature within the display will increase due to the heat radiated from the back light while in operation. Necessary measures have to be taken in the product design to make sure that the display has proper ventilation so that temperature on any surface of this display should not exceed 70 °C.

Note2: This monitor is operatable in this temperature range. With regard to optical characteristics, refer to Item "10. CHARACTERISTICS".

8. DC/AC Characteristics

8.1 DC Characteristics

A 8.1.1 Display Module

(Unless otherwise noted, Ta=25°C,VDD=3.3V,GND=0V)

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Schmitt Threshold voltage	VP	VDD=3.0~3.6V	0.47×VDD	0.60×VDD	0.73×VDD	V	CLK,VSYNC,HSYNC, ENAB,RL_UD R[5:0],G[5:0],B[5:0]
	VN		0.30×VDD	0.43×VDD	0.56×VDD	V	
	VH		0.08×VDD	0.17×VDD	0.27×VDD	V	
Operating Current	DD	fCLK=6.75MHz Color bar display	--	12.6	25.3	mA	VDD

8.1.2 Backlight

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
Forward current	IL	Ta=25° C	--	50	70	mA	BLH1 — BLL1
Forward voltage	VL	Ta=25° C, IL= 50 mA	--	15.0	17.0	V	BLH2 — BLL2
Estimated Life of LED	LL	Ta=25° C, IL= 50 mA Note	--	70,000	--	hr	

Note: - The lifetime of the LED is defined as a period till the brightness of the LED decreases to the half of its initial value.
- This figure is given as a reference purpose only, and not as a guarantee.
- This figure is estimated for an LED operating alone. As the performance of an LED may differ when assembled as a monitor together with a TFT panel due to different environmental temperature.
- Estimated lifetime could vary on a different temperature and usually higher temperature could reduce the life significantly.

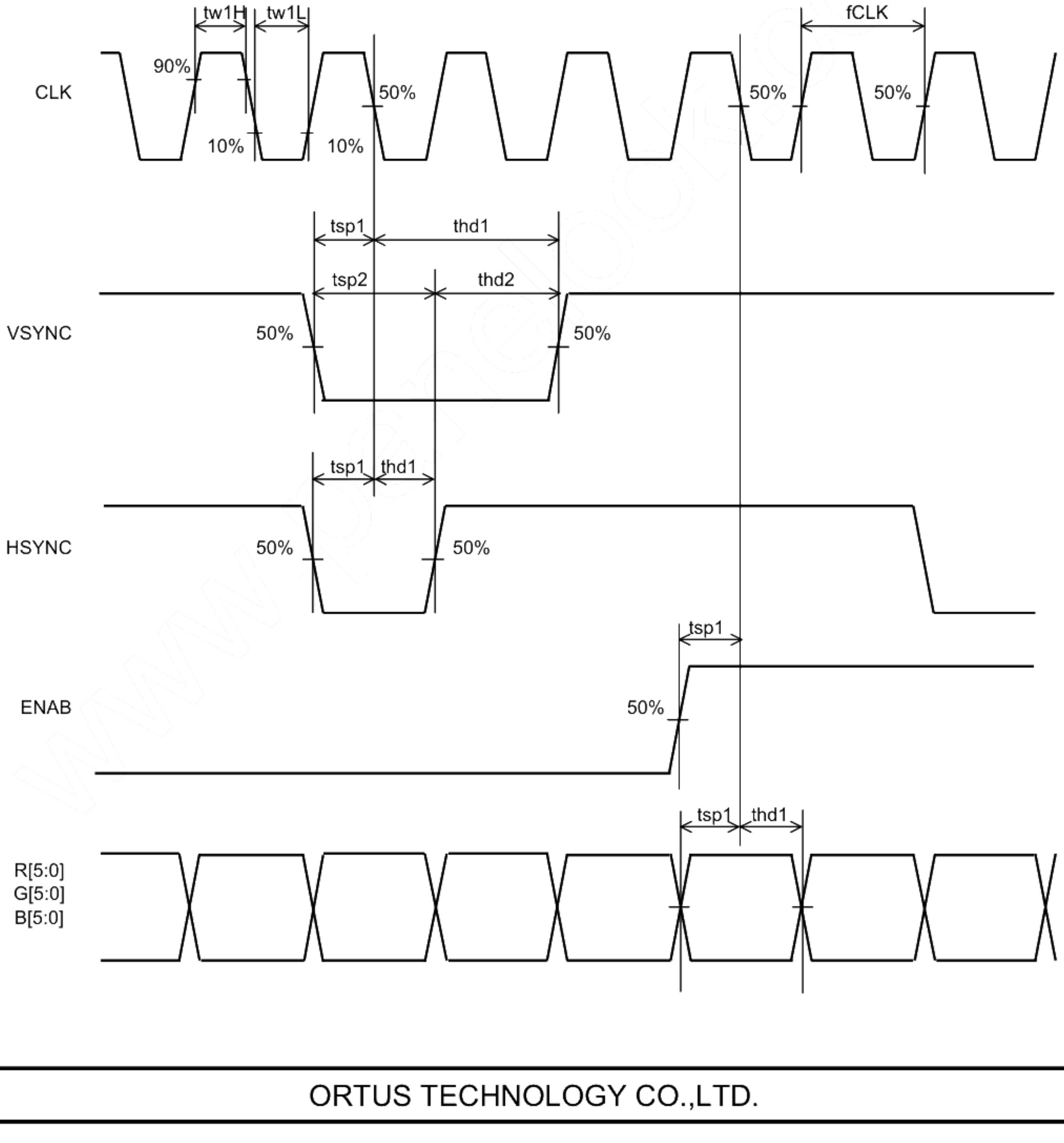
8.2 AC Characteristics

8.2.1 Display Module

(Unless otherwise noted, Ta=25°C,VDD=3.3V,GND=0V)

Item	Symbol	Condition	Rating			Unit	Applicable terminal
			MIN	TYP	MAX		
CLK Low period	tw1L	0.1×VDD or less	20	--	--	ns	CLK
CLK High period	tw1H	0.9×VDD or more	20	--	--	ns	
Setup time 1	tsp1		10	--	--	ns	CLK,VSYNC,HSYNC, ENAB, R[5:0],G[5:0],B[5:0]
Hold time 1	thd1		10	--	--	ns	
Setup time 2	tsp2		2	--	--	CLK	VSYNC,HSYNC
Hold time 2	thd2		2	--	--	CLK	
CLK frequency	fCLK		--	6.75	9.0	MHz	CLK

Switching Waveform Characteristics



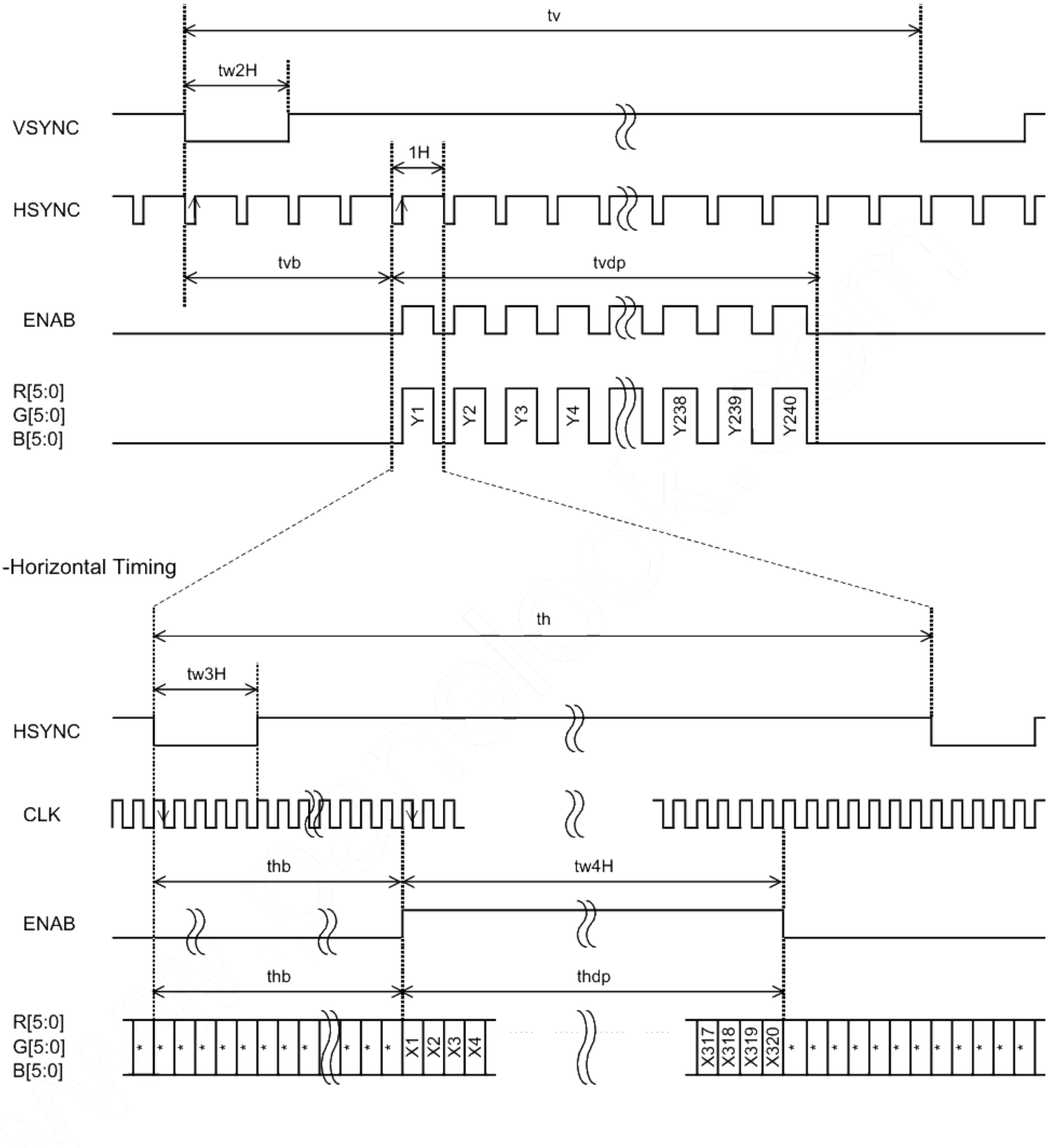
8.3 Input Timing Characteristics

Item	Symbol	Rating			Unit	Applicable terminal
		MIN	TYP	MAX		
CLK frequency	fCLK	--	6.75	9.0	MHz	CLK
VSYNC Frequency Note1	fVSYNC	54	60	66	Hz	VSYNC
Number of Frame Line	tv	--	262	291	H	VSYNC,HSYNC
VSYNC Pulse Width	tw2H	4CLK	3H	--		VSYNC,CLK
Vertical Back Porch	tvb	0 Note2	6	21 Note3	H	VSYNC,HSYNC,ENAB
Vertical Display Period	tvdp	--	240	--	H	R[5:0],G[5:0],B[5:0]
HSYNC frequency	fHSYNC	--	15.7	--	kHz	HSYNC
HSYNC Cycle	th	--	429	573	CLK	HSYNC,CLK
HSYNC Pulse Width	tw3H	2CLK	--	20µs		
Horizontal Back Porch	thb	5	42	77 Note3	CLK	HSYNC,CLK,ENAB R[5:0],G[5:0],B[5:0]
DE Pulse Width	tw4H	--	320	--	CLK	ENAB,CLK
Horizontal Display Period	thdp	--	320	--	CLK	CLK,R[5:0],G[5:0],B[5:0]

Note1: This is recommended spec to get high quality picture on display. It is customer's risk to use out of this frequency.
Note2: When Vertical Back Porch is "0", please use odd number for the setting of the total number of lines that compose one field.
Note3: When DE keeps "Lo" for 21H and 77CLK or longer, start capturing data automatically from "22H and 78CLK".

8.4 Driving Timing Chart

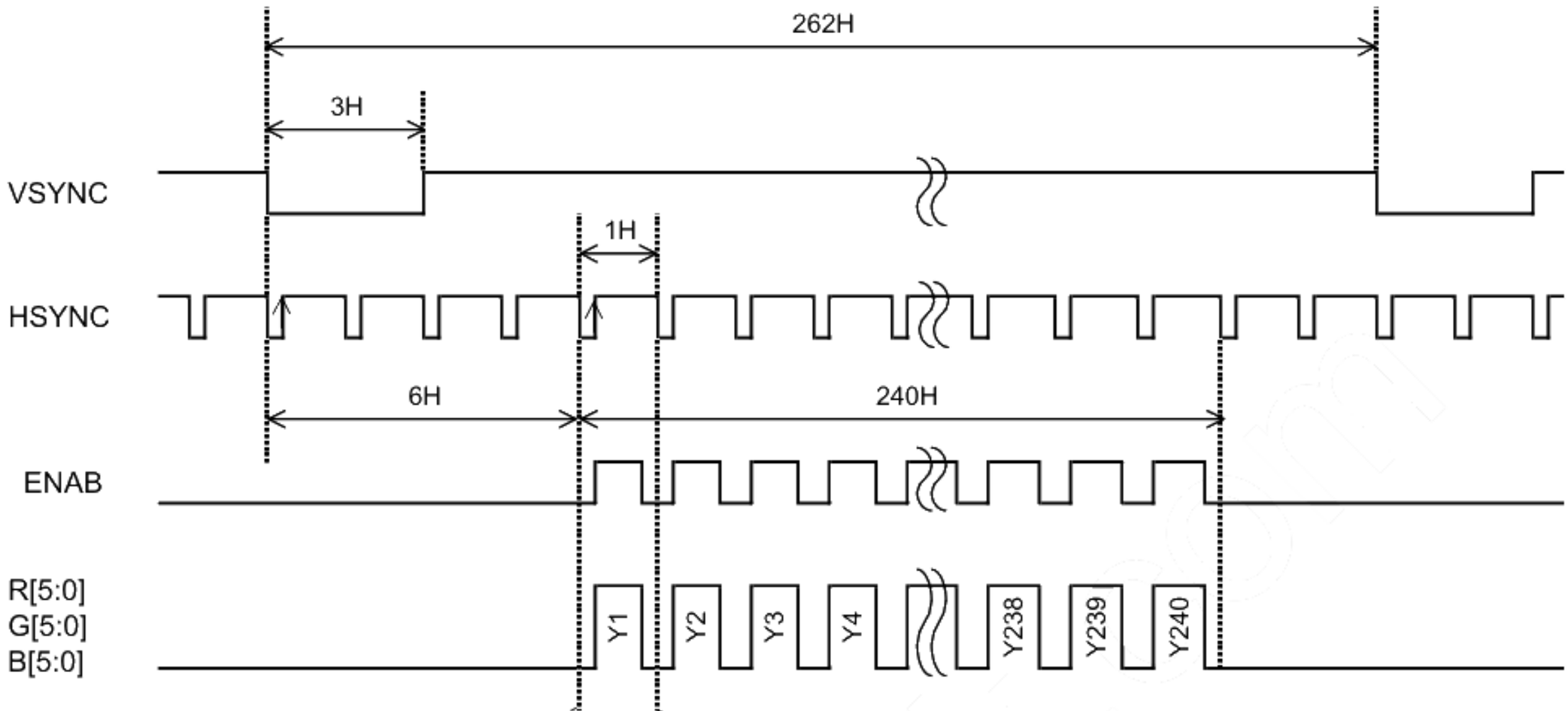
-Vertical Timing



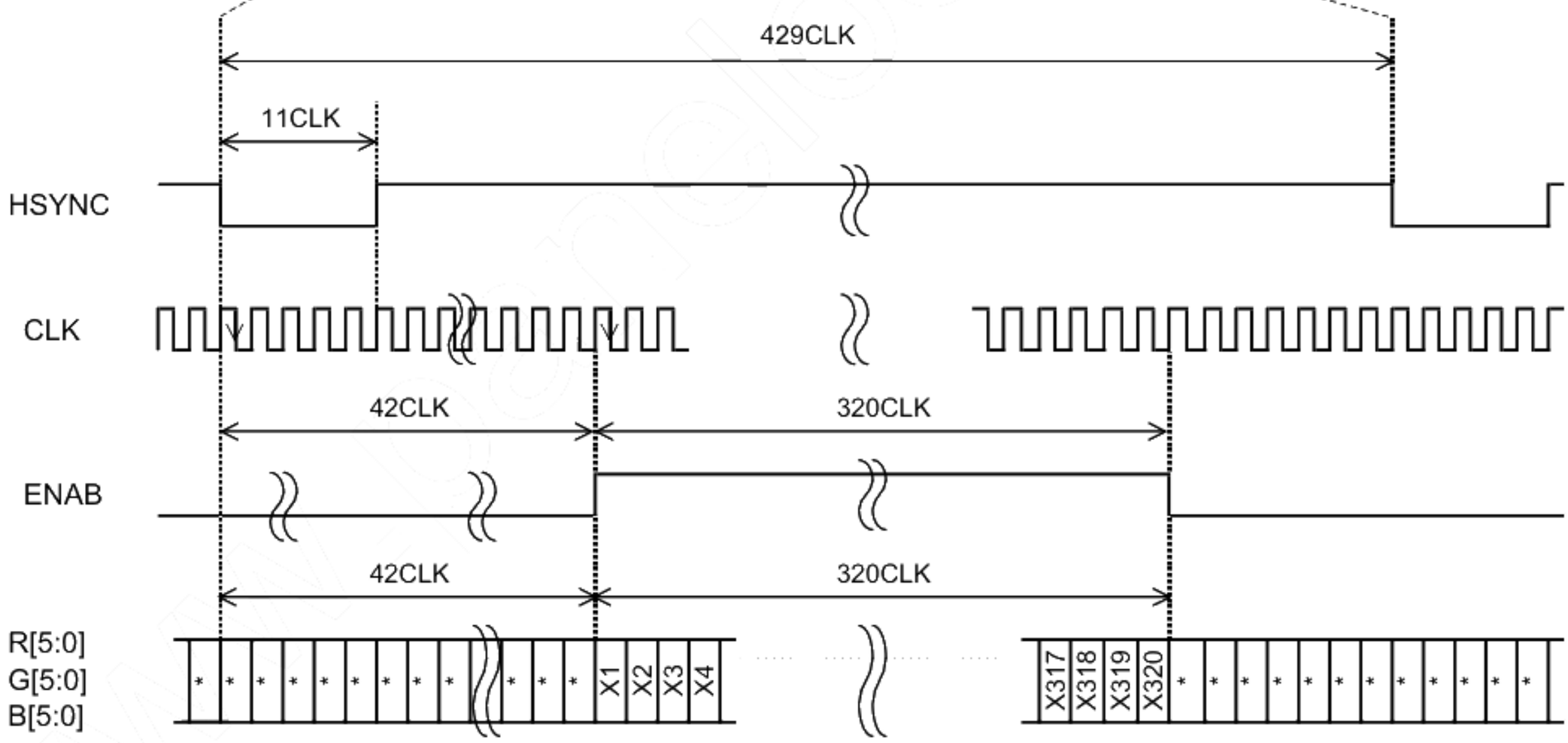
-Horizontal Timing

8.5 Example of Driving Timing Chart

-Vertical Timing

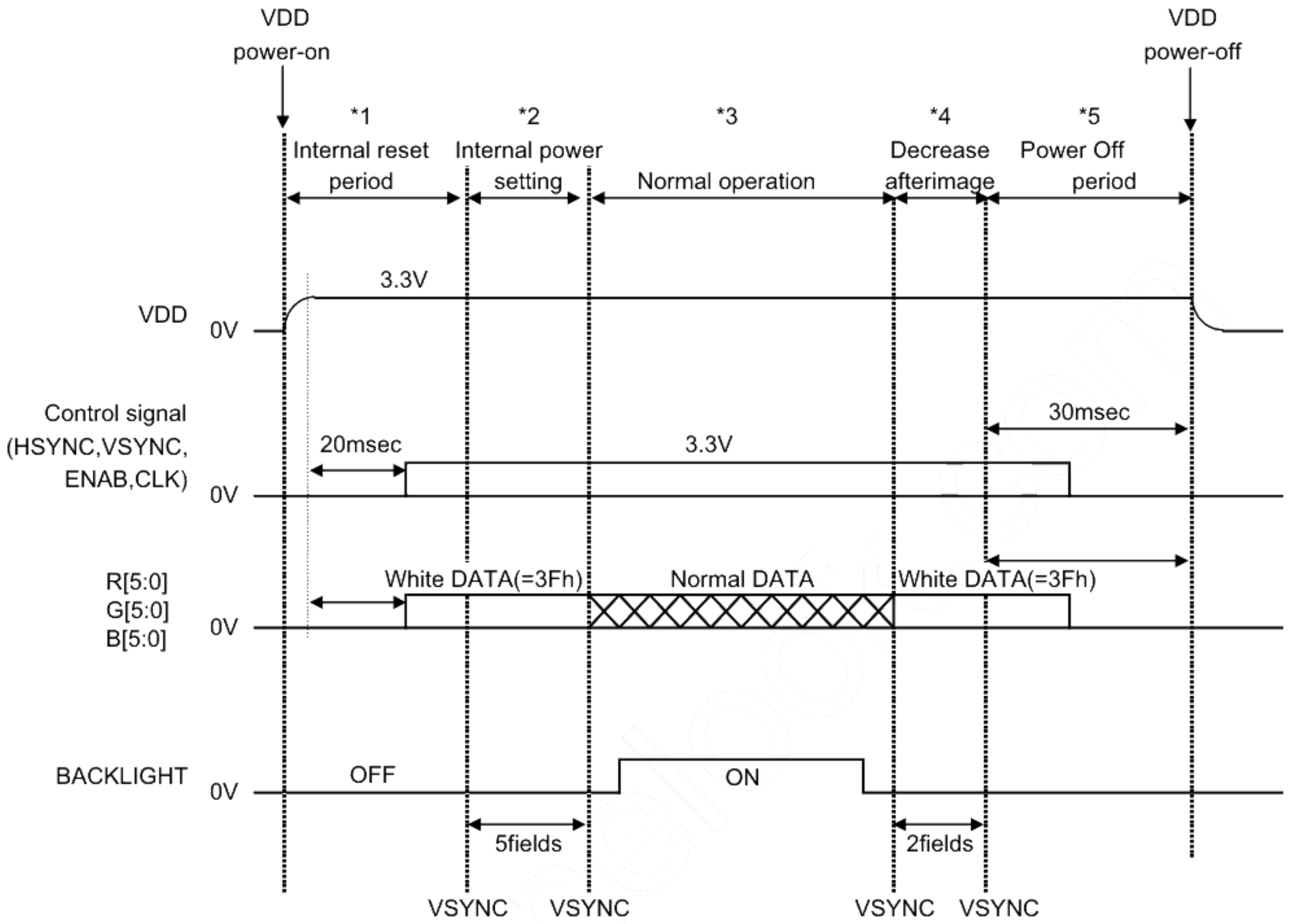


-Horizontal Timing



9.Power ON/OFF Sequence

The following sequences are recommended for decrease of the afterimage and abnormal display at the power on/off.



Power ON Sequence

*1 Internal RESET is executed 20mSec or less from VDD ON.
Please input control signal and image DATA (D *7:*0) after this period.

*2 The control signal is input the period from after 5VSYNC (5 fields) to the first VSYNC becomes the standing up period of the internal LCD power supply and the setting of the register period.
Please input DATA(=3Fh) that becomes a white screen from image DATA (D *7:*0) for this period.

*3 After 5VSYNC, begin to input be normal image DATA. Afterwards, please turn on the backlight.

Power OFF Sequence

*3 Please turn off the backlight from the driven state usually. Afterwards, please set image DATA to white screen (=3Fh).

*4 For the decrease afterimage , please display a white screen at 2VSYNC (two fields) period.(=3Fh)

*5 Please stop the input control signal and image DATA after 2VSYNC, and turn off VDD promptly since 30mSEC.

Voltage values shown in this chart are typical values, not fixed values.

10. Characteristics

10.1 Optical Characteristics

< Measurement Condition >

Measuring instruments: CS1000 (KONICA MINOLTA), LCD7000(OTSUKA ELECTRONICS),EZcontrast160D (ELDIM)

Driving condition: VDD = 3.3V,VSS=0V

Backlight: IL=50mA

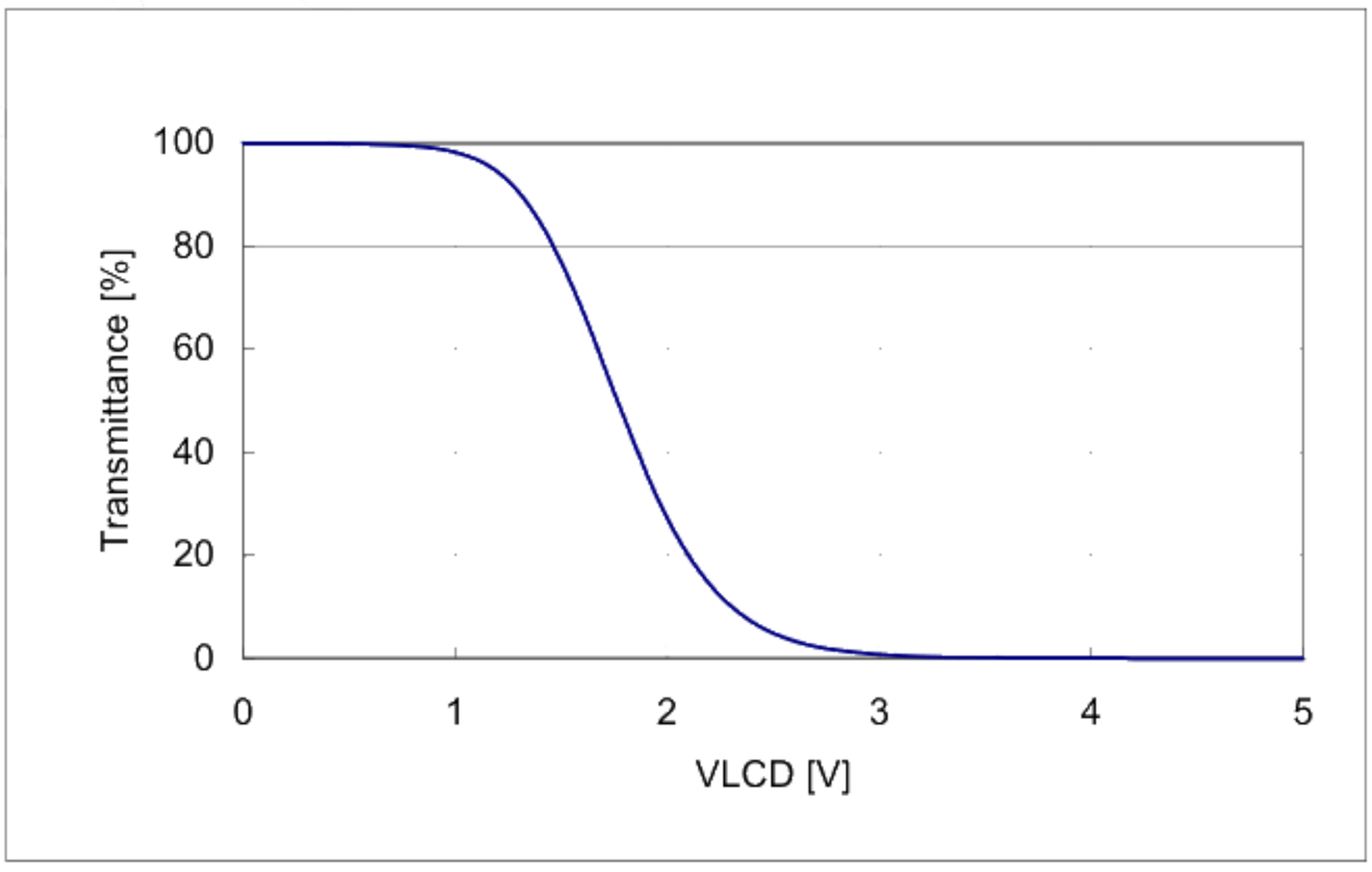
Measured temperature: Ta=25° C

△A

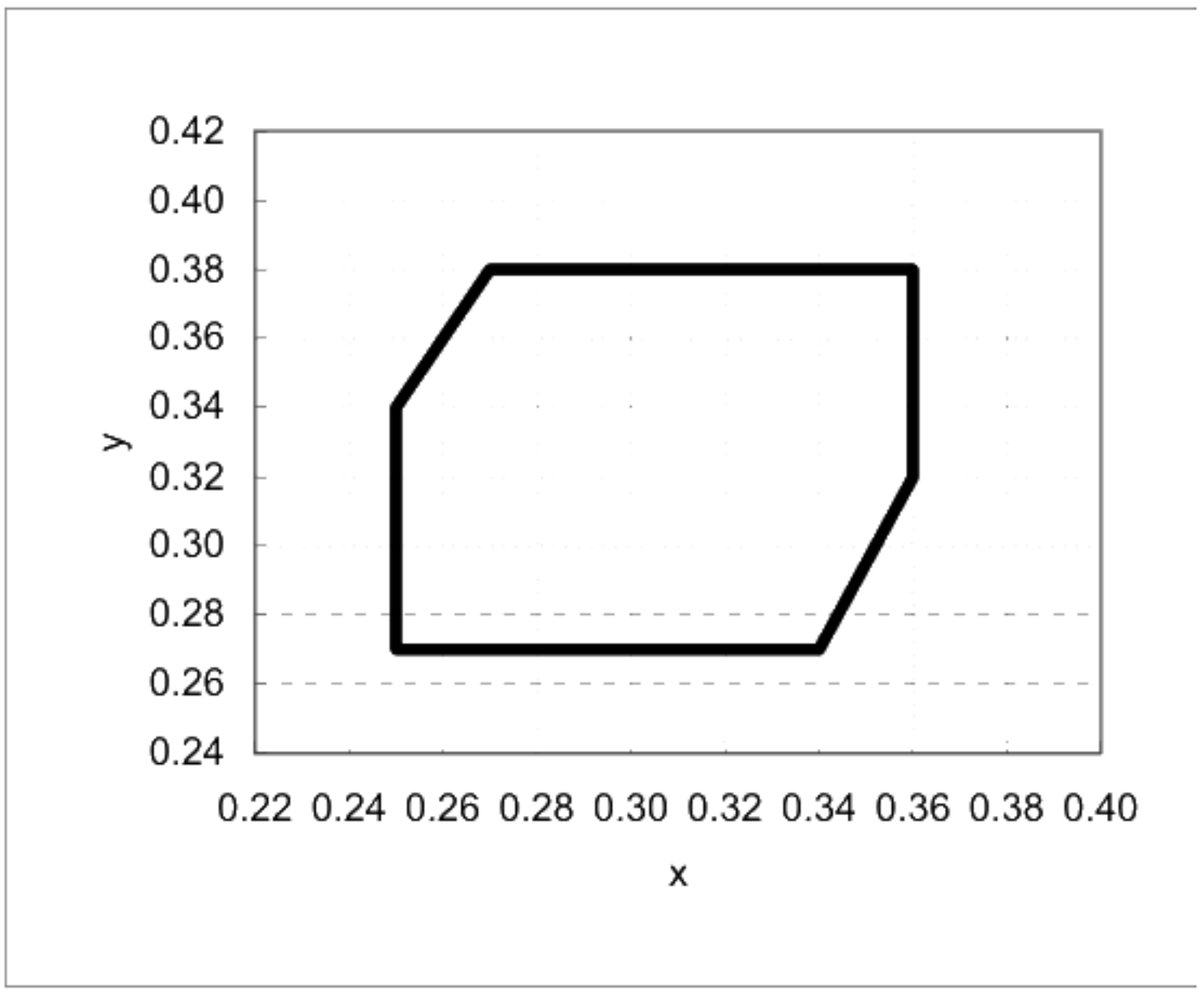
Item		Symbol	Condition	MIN	TYP	MAX	Unit	Note No.	Remark
Response time	Rise time	TON	VLCD= 0.70V→3.87V	—	—	40	ms	1	※
	Fall time	TOFF	VLCD= 3.87→0.70V	—	—	60	ms		
Contrast ratio		CR	VLCD= 0.70V/3.87V	360	600	—		2	
Viewing angle	Left	θL	VLCD= 0.70V/3.87V CR≧10	80	—	—	deg	3	※
	Right	θR		80	—	—	deg		
	Up	φU		60	—	—	deg		
	Down	φD		80	—	—	deg		
V-T threshold voltage		V90		0.9	1.2	1.5	V	4	※
		V50		1.4	1.7	2.0	V		
		V10		1.9	2.2	2.5	V		
White V-T Curve				White V-T Curve					Reference
White Chromaticity		x	VLCD=0.70V	White chromaticity range				5	
		y							
Burn-in				No noticeable burn-in image should be observed after 2 hours of window pattern display.				6	
Center brightness			VLCD=0.70V	420	600	—	cd/m^2	7	
Brightness distribution			VLCD=0.70V	70	—	—	%	8	

* Note number 1 to 8: Refer to the APPENDIX of "Reference Method for Measuring Optical Characteristics".

※ Measured in the form of LCD module.



White V-T Curve



White Chromaticity Range

【White Chromaticity Range】

x	y
0.27	0.38
0.25	0.34
0.25	0.27
0.34	0.27
0.36	0.32
0.36	0.38

10.2 Temperature Characteristics

< Measurement Condition >

Measuring instruments: CS1000 (KONICA MINOLTA), LCD7000(OTSUKA ELECTRONICS),EZcontrast160D (ELDIM)
Driving condition: VDD = 3.3V,VSS=0V
Backlight: IL=50mA
Measured temperature: Ta=25° C

Item			Specification		Remark
			Ta=−10° C	Ta=70° C	
Contrast ratio		CR	40 or more	40 or more	
Response time	Rise time	TON	200 msec or less	30 msec or less	※
	Fall time	TOFF	300 msec or less	50 msec or less	※
Display Quality			No noticeable display defect or ununiformity should be observed.		Use the criteria for judgment specified in the section 11.

※ Measured in the form of LCD module.

11. Criteria of Judgment

11.1 Defective Display and Screen Quality

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Test Condition:	Observed TFT-LCD monitor from front during operation with the following conditions
Driving Signal	Raster Patter (RGB in monochrome, white, black)
Signal condition	0.70V, 1.65V, 3.87V (3steps)
Observation distance	30 cm
Illuminance	200 to 350 lx
Backlight	IL=50mA

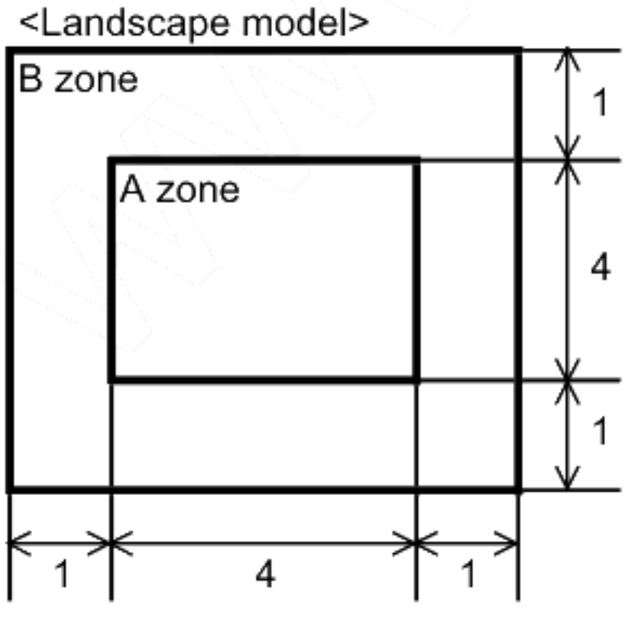
Defect item		Defect content		Criteria
Display Quality	Line defect	Black, white or color line, 3 or more neighboring defective dots		Not exists
	Dot defect	Uneven brightness on dot-by-dot base due to defective TFT or CF, or dust is counted as dot defect (brighter dot, darker dot) High bright dot: Visible through 2% ND filter at VLCD=3.87V Low bright dot: Visible through 5% ND filter at VLCD=3.87V Dark dot: Appear dark through white display at VLCD=1.65V		Refer to table 1
Screen Quality	Dirt	Point-like uneven brightness (white stain, black stain etc)		Invisible through 1% ND filter
	Foreign particle	Point-like	0.25mm<φ	N=0
			0.20<φ≦0.25mm	N≦2
			φ≦0.20mm	Ignored
		Liner	3.0mm<length and 0.08mm<width	N=0
			length≦3.0mm or width≦0.08mm	Ignored
	Others			Use boundary sample for judgment when necessary

φ(mm): Average diameter = (major axis + minor axis)/2
Permissible number: N

Table 1

Area	High bright dot	Low bright dot	Dark dot	Total	Criteria
A	0	2	2	3	Permissible distance between same color bright dots (includes neighboring dots): 3 mm or more Permissible distance between same color high bright dots (includes neighboring dots): 5 mm or more
B	2	4	4	6	
Total	2	4	4	7	

<Landscape model>



Division of A and B areas
B area: Active area
Dimensional ratio between A and B areas: 1: 4: 1 (Refer to the left figure)

11.2 Screen and Other Appearance

Testing conditions

Observation distance	30cm
Illuminance	1200～2000 lx

Item		Criteria	Remark
Polarizer	Flaw Stain Bubble Dust Dent	Ignore invisible defect when the backlight is on.	Applicable area: Active area only (Refer to the section 3.2 "Outward form")
S-case		No functional defect occurs	
Connector		No functional defect occurs	

12. Reliability Test

Test item		Test condition	number of failures /number of examinations
Durability test	High temperature storage	Ta=80°C 240H	0／3
	Low temperature storage	Ta=-30°C 240H	0／3
	High temperature & high humidity storage	Ta=60°C, RH=90% 240H non condensing ※	0／3
	High temperature operation	Tp=70°C 240H	0／3
	Low temperature operation	Tp=-20°C 240H	0／3
	High temp & humid operation	Tp=40°C, RH=90% 240H non condensing ※	0／3
	Thermal shock storage	-30←→80°C(30min/30min) 100 cycles	0／3
Mechanical environmental test	Surface discharge test (Non operation)	C=250pF, R=100Ω, V=±12kV Each 5 times of discharge in both polarities on the center of screen with the case grounded.	0／3
	Vibration test	Total amplitude 1.5mm, f=10～55Hz, X,Y,Z directions for each 2 hours	0／3
	Impact test	Use ORTUS TECHNOLOGY original jig (see next page)and make an impact with peak acceleration of 1000m/s2 for 6 msec with half sine-curve at 3 times to each X, Y, Z directions in conformance with JIS 60068-2-27-1995.	0／3
Packing test	Packing vibration-proof test	Acceleration of 19.6m/s^2 with frequency of 10→55→10Hz, X,Y, Zdirection for each 30 minutes	0／1 Packing
	Packing drop test	Drop from 75cm high. 1 time to each 6 surfaces, 3 edges, 1 corner	0／1 Packing

Note:Ta=ambient temperature Tp=Panel temperature

※ The profile of high temperature/humidity storage and High Temperature/humidity operation
(Pure water of over 10MΩ·cm shall be used.)

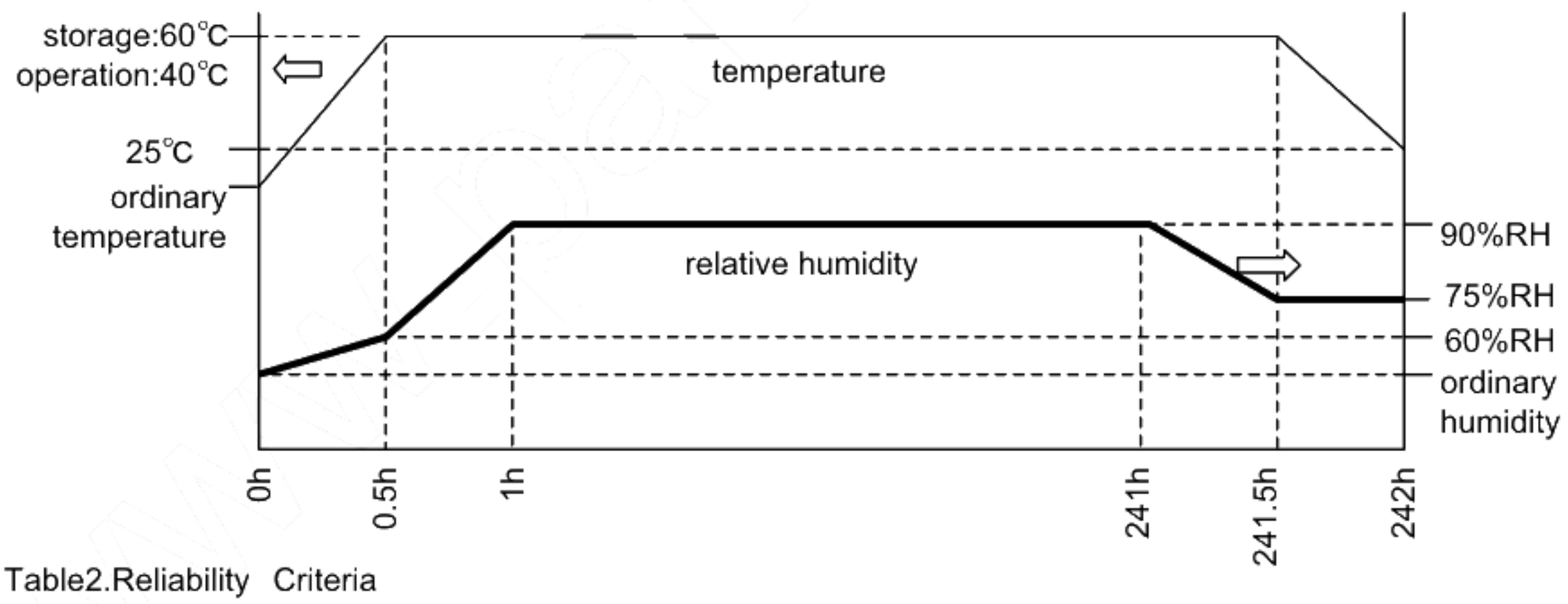
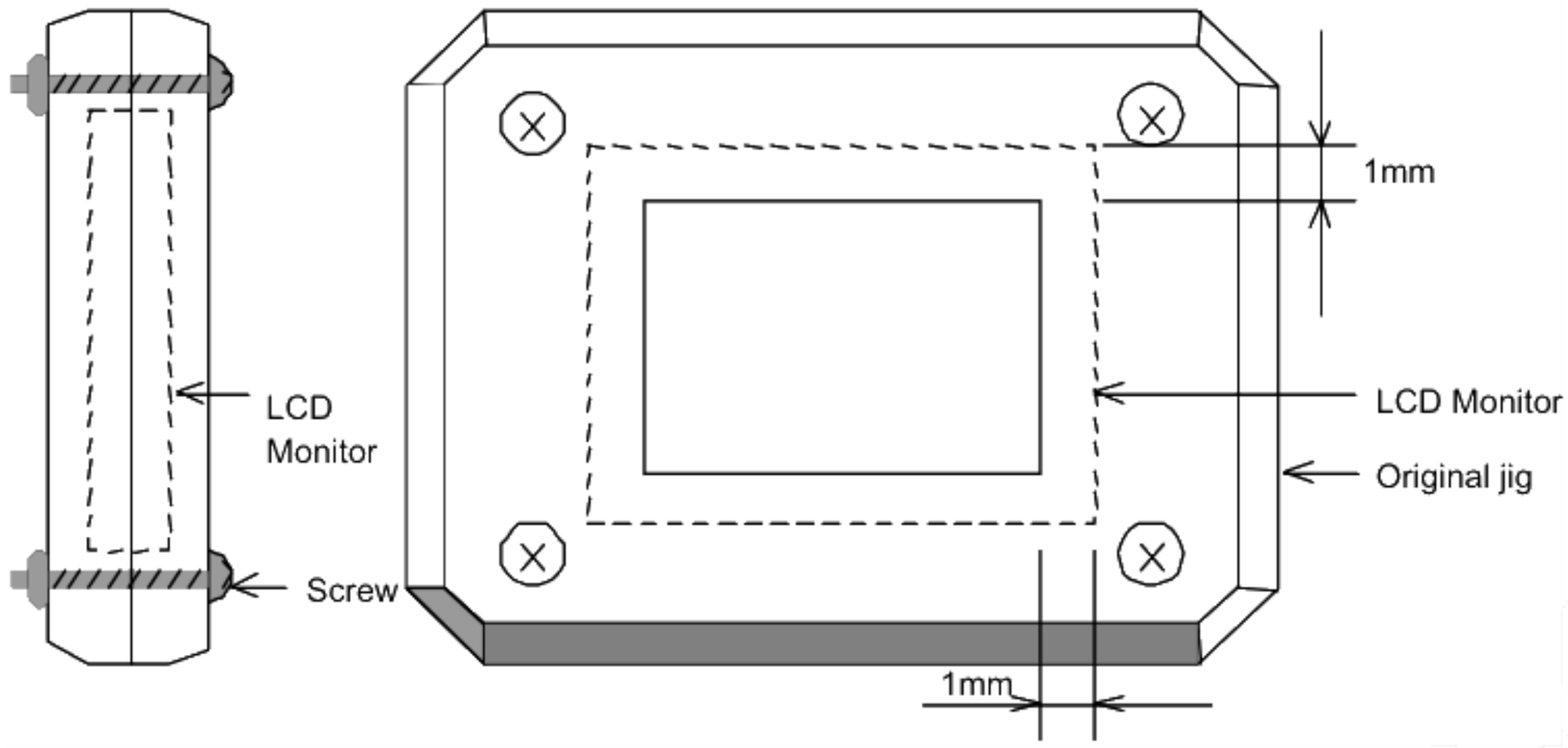


Table2.Reliability Criteria

Measure the parameters after leaving the monitor at the ordinary temperature for 24 hours or more after the test completion.

item	Standard	Remarks
Display quality	No visible abnormality shall be seen.	
Contrast ratio	40 or more	

ORTUS TECHNOLOGY Original Jig



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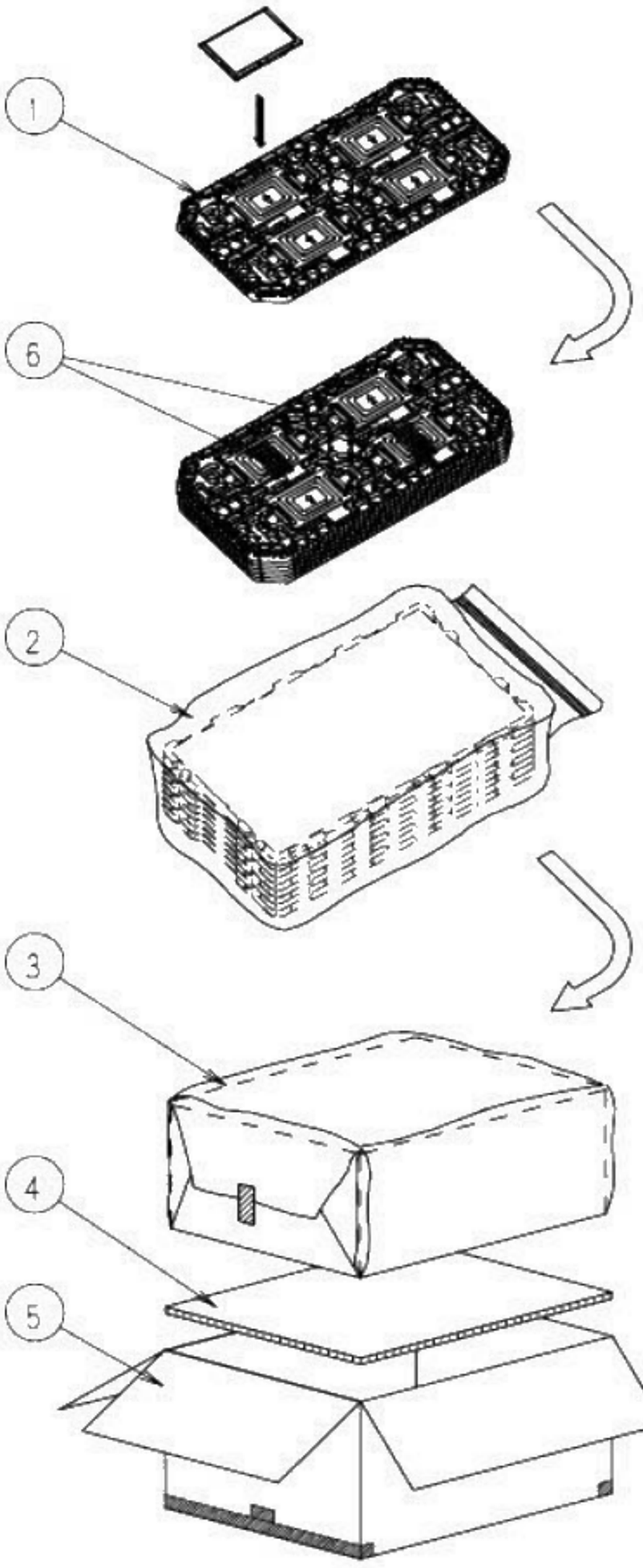
13. Packing Specifications



Step1. Each product is to be placed in one of the cut-outs of the tray with the display surface facing upward.(4products per tray)

Step2. Each tray needs to be same orientation respect to the tray below or above it and the trays be in a stack of 5.
One empty tray is to be put on the top of stack of 5 trays.

Step3. 2 packs of moisture absobers are to be placed on the top tray as shown in the drawing.
Put piled trays into a sealing bag.
Vacuum and seal the sealing bag with the vacuum sealing machine.

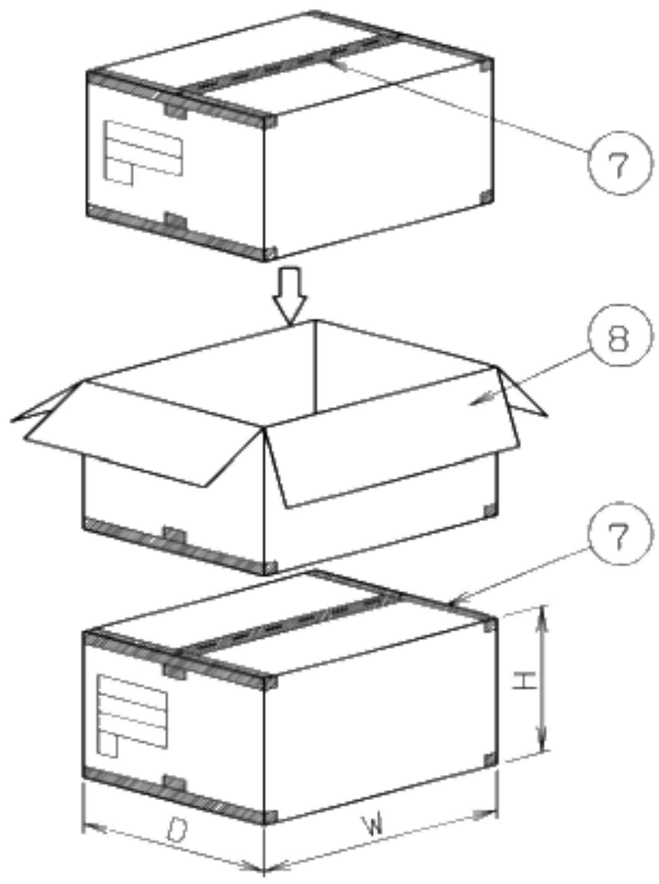
Step4. The piled trays are to be wrapped with a bubble cushioning sheet, and to be fixed with adhesive tape.

Step5. The wrapped trays are to be put in the outer carton.

Step6. The outer carton needs to sealed with packing tape as shown in the drawing.
The model number, quantity of products, and shipping date are to be printed on the outer carton.
If necessary, shipping labels or impression markings are to be put on the outer carton.

Step7. The outer carton is to be inserted into a extra outer carton with same direction.
The extra outer carton needs to sealed with packing tape as shown in the drawing.

Step8. The model number, quantity of products, and shipping date are to be printed on the extra outer carton.
If necessary, shipping labels or impression markings are to be put on the extra outer carton.



Remark: The return of packing materials is not required.

	Packing item name	Specs., Material
①	TRAY	A-PET
②	SEALING BAG	
③	B SHEET A	Anti-static air babble sheet
④	INNER BOARD	Corrugated cardboard
⑤	OUTER CARTON	Corrugated cardboard
⑥	Drier	Moisture absorber
⑦	Packing tape	
⑧	EXTRA OUTER CARTON	Corrugated cardboard

Dimension of extra outer carton	
D : Approx.	(337mm)
W : Approx.	(618mm)
H : Approx.	(179mm)
Quantity of products packed in one carton:	4pcsx5=20pcs
Gross weight : Approx.	5.2Kg

14. Handling Instruction

14.1 Cautions for Handling LCD panels

Caution

(1) Do not make an impact on the LCD panel glass because it may break and you may get injured from it.

(2) If the glass breaks, do not touch it with bare hands.
Fragment of broken glass may stick you or you cut yourself on it.

(3) If you get injured, receive adequate first aid and consult a medial doctor.

(4) Do not let liquid crystal get into your mouth.
If the LCD panel glass breaks, try not let liquid crystal get into your mouth even toxic property of liquid crystal has not been confirmed.

(5) If liquid crystal adheres, rinse it out thoroughly.
If liquid crystal adheres to your cloth or skin, wipe it off with rubbing alcohol or wash it thoroughly with soap. If liquid crystal gets into eyes, rinse it with clean water for at least 15 minutes and consult an eye doctor.

(6) If you scrap this products, follow a disposal standard of industrial waste that is legally valid in the community, country or territory where you reside.

(7) Do not connect or disconnect this product while its application products is powered on.

(8) Do not attempt to disassemble or modify this product as it is precision component.

(9) For protection your circuit, we recommend you to add excess current protection circuit to power supply.

(10) The devices on the PCB are damageable to electrostatic discharge, because the tarminals of the devices are exposed.
Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors.
Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.

Caution **This mark is used to indicate a precaution or an instruction which, if not correctly observed, may result in bodily injury, or material damages alone.**

14.2 Precautions for Handling

1) Wear finger tips at incoming inspection and for handling the TFT monitors to keep display quality and keep the working area clean.
Do not touch the surface of the monitor as it is easily scratched.

2) Wear grounded wrist-straps and use electrostatic neutralization blowers to prevent static charge and discharge when handling the TFT monitors as the LED in this TFT monitors is damageable to electrostatic discharge.
Designate an appropriate operating area, and set equipment, tools, and machines properly when handling this product.

3) Avoid strong mechanical shock including knocking, hitting or dropping to the TFT monitors for protecting their glass parts. Do not use the TFT monitors that have been experienced dropping or strong mechanical shock.

4) Do not use or storage the TFT monitors at high temperature and high humidity environment.
Particularly, never use or storage the TFT monitors at a location where condensation builds up.

5) Avoid using and storing TFT monitors at a location where they are exposed to direct sunlight or ultraviolet rays to prevent the LCD panels from deterioration by ultraviolet rays.

6) Do not stain or damage the contacts of the connector .
FPC cable needs to be inserted until it can reach to the end of connector slot.
During insertion, make sure to keep the cable in a horizontal position to avoid an oblique insertion.
Otherwise, it may cause poor contact or deteriorate reliability of the connector.

7) Peel off the protective film on the TFT monitors during mounting process.
Refer to the section 14.5 on how to peel off the protective film.
We are not responsible for electrostatic discharge failures or other defects occur when peeling off the protective film.

8) The volume attached to the monitor is set to the optimal value at the time of shippment from our factory, so please do not change it.

14.3 Precautions for Operation

1) Since this TFT monitors are not equipped with light shielding for the driver IC, do not expose the driver IC to strong lights during operation as it may cause functional failures.

2) When turning off the power, turn off the input signal before or at the same timing of switching off the power.

3) Do not plug in or out the connector while power supply is switch on.
Plug the connector in and out while power supply is switched off.

4) Do not operate the TFT monitors in the strong magnetic field. It may break the TFT monitors.

5) Do not display a fixed image on the screen for a long time.
Use a screen-saver or other measures to avoid a fixed image displayed on the screen for a long time.
Otherwise, it may cause burn-in image on the screen due the characteristics of liquid crystal.

14.4 Storage Condition for Shipping Cartons

Storage environment

- Temperature: 0 to 40°C
- Humidity: 60%RH or less
  No-condensing occurs under low temperature with high humidity condition.
- Atmosphere: No poisonous gas that can erode electronic components and/or wiring materials should be detected.
- Time period: 3 months
- Unpacking: To prevent damages caused by static electricity, anti-static precautionary measures (e.g. earthing, anti-static mat) should be implemented.
- Maximum piling up: 7 cartons

14.5 Precautions for Peeling off the Protective film

The followings work environment and work method are recommended to prevent the TFT monitors from static damage or adhesion of dust when peeling off the protective films.

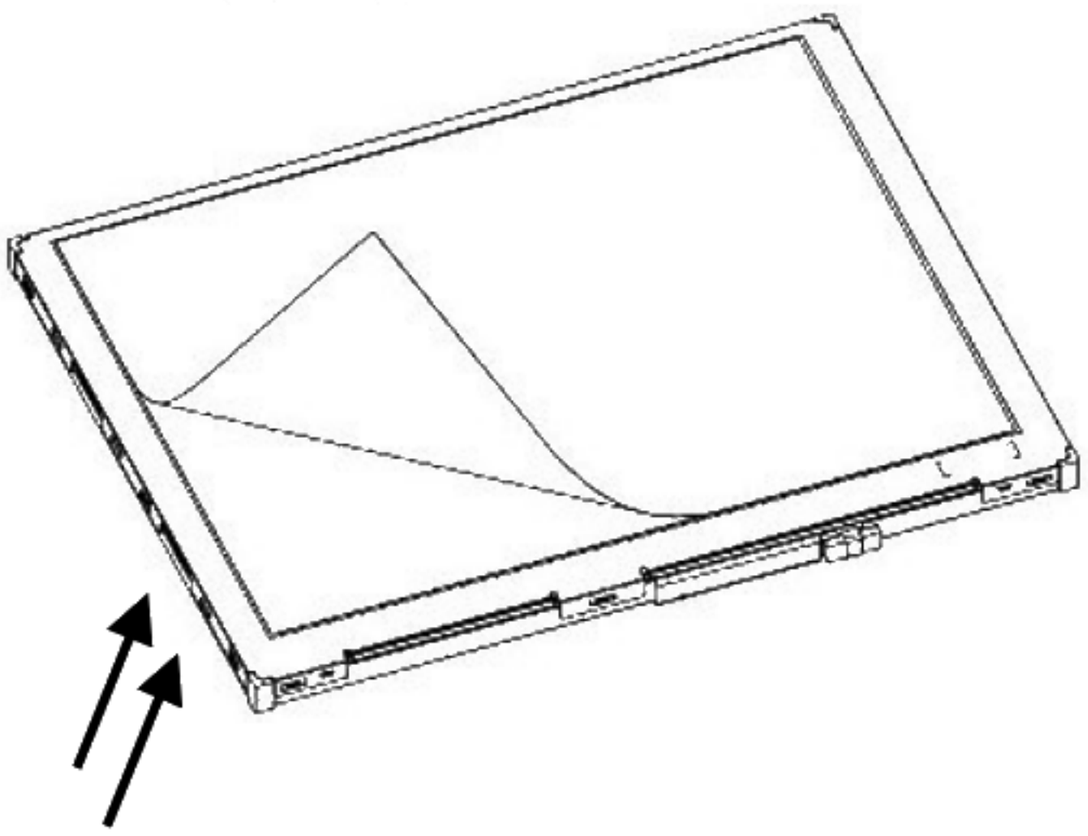
A) Work Environment

a) Humidity: 50 to 70 %RH, Temperature15 to 27°C
b) Operators should wear conductive shoes, conductive clothes, conductive finger tips and grounded wrist-straps. Anti-static treatment should be implemented to work area's floor.
c) Use a room shielded against outside dust with sticky floor mat laid at the entrance to eliminate dirt.

B) Work Method

The following procedures should taken to prevent the driver ICs from charging and discharging.

a) Use an electrostatic neutralization blower to blow air on the TFT monitors to its lower left when "S LABEL" on the front case is placed at the bottom. Optimize direction of the blowing air and the distance between the TFT monitors and the electrostatic neutralization blower.
b) Put an adhesive tape (Scotch tape, etc) at the lower left corner area of the protective film to prevent scratch on surface of TFT monitors.
c) Peel off the adhesive tape slowly (spending more than 2 secs to complete) by pulling it to opposite direction.



Direction of blowing air
Optimize air direction and the distance)

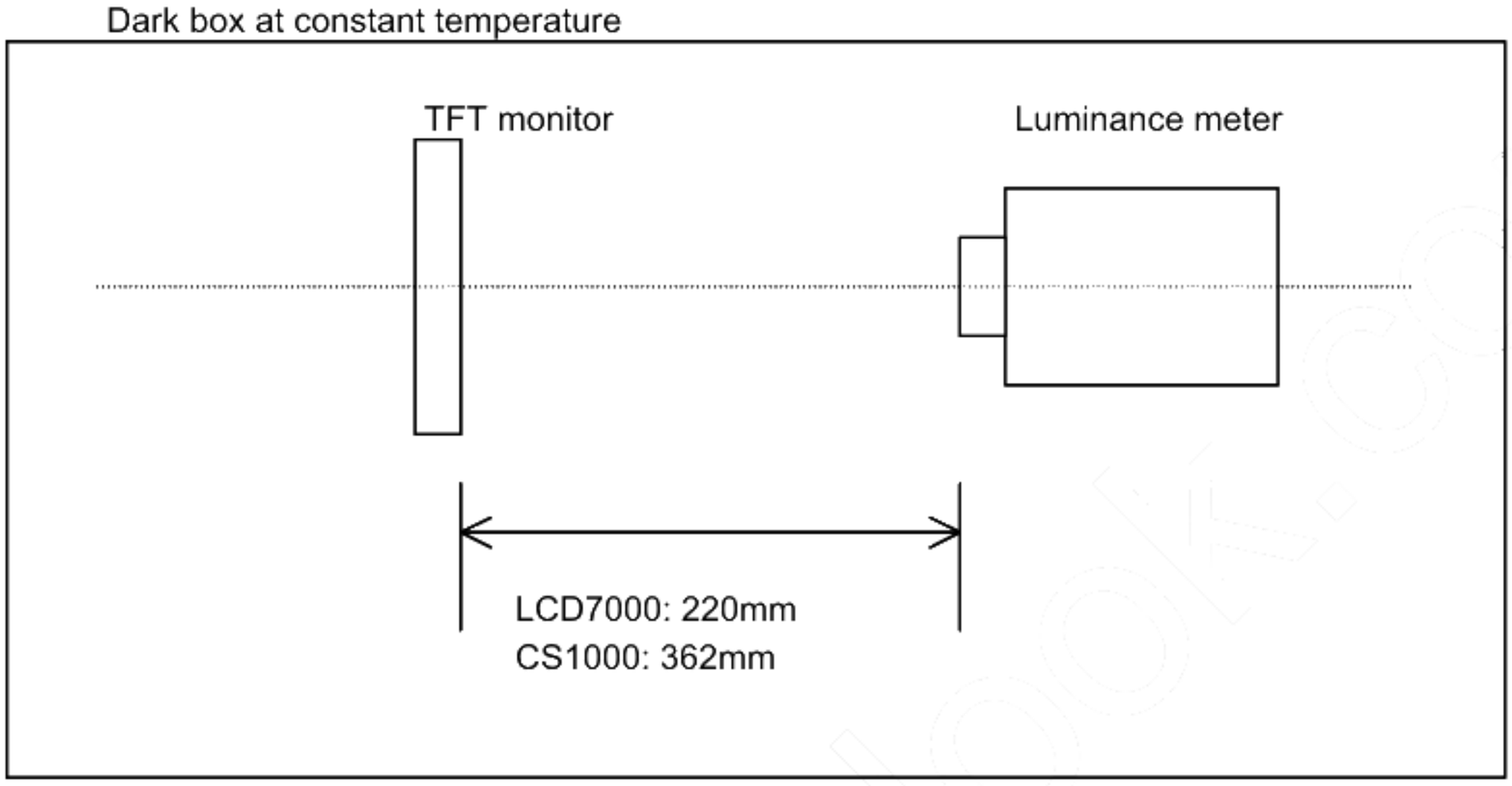
APPENDIX

Reference Method for Measuring Optical Characteristics and Performance

1. Measurement Condition

Measuring instruments: CS1000 (KONICA MINOLTA), LCD7000(OTSUKA ELECTRONICS),EZcontrast160D (ELDIM)
Driving condition: Refer to the section "Optical Characteristics"
Measured temperature: 25°C unless specified
Measurement system: See the chart below. The luminance meter is placed on the normal line of measurement system.
Measurement point: At the center of the screen unless otherwise specified

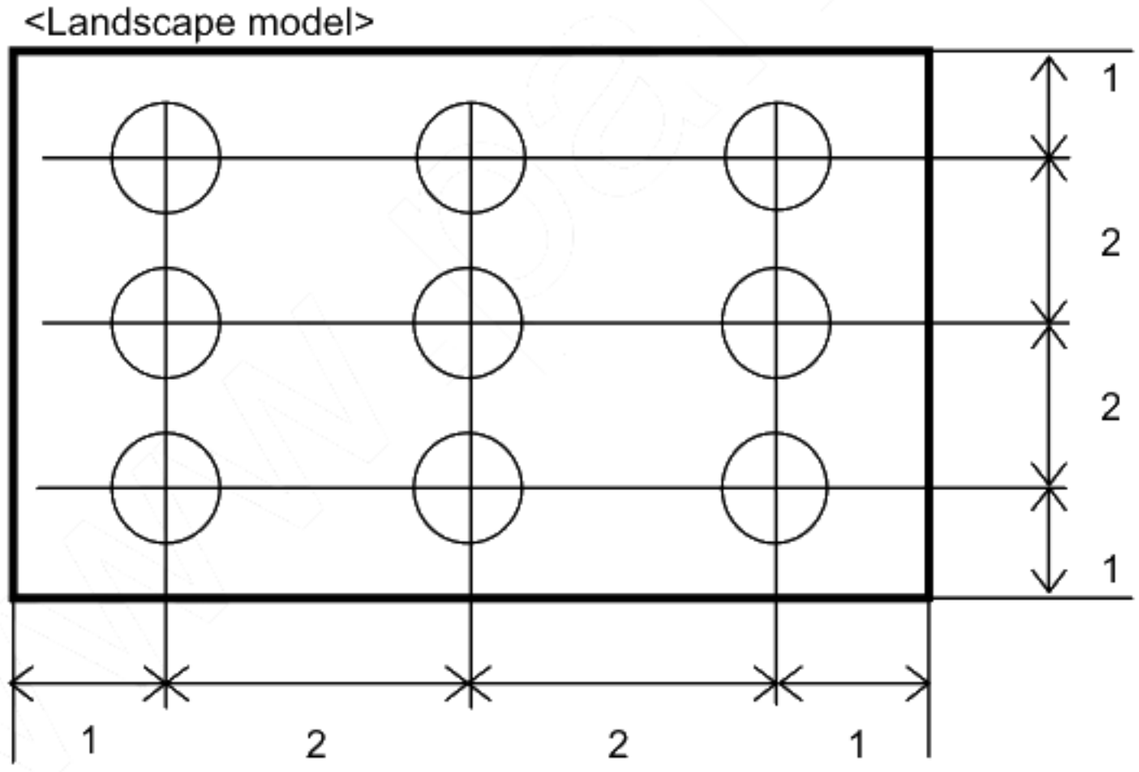
Dark box at constant temperature



Measurement is made after 30 minutes of lighting of the backlight.

Measurement point: At the center point of the screen
Brightness distribution: 9 points shown in the following drawing.

<Landscape model>

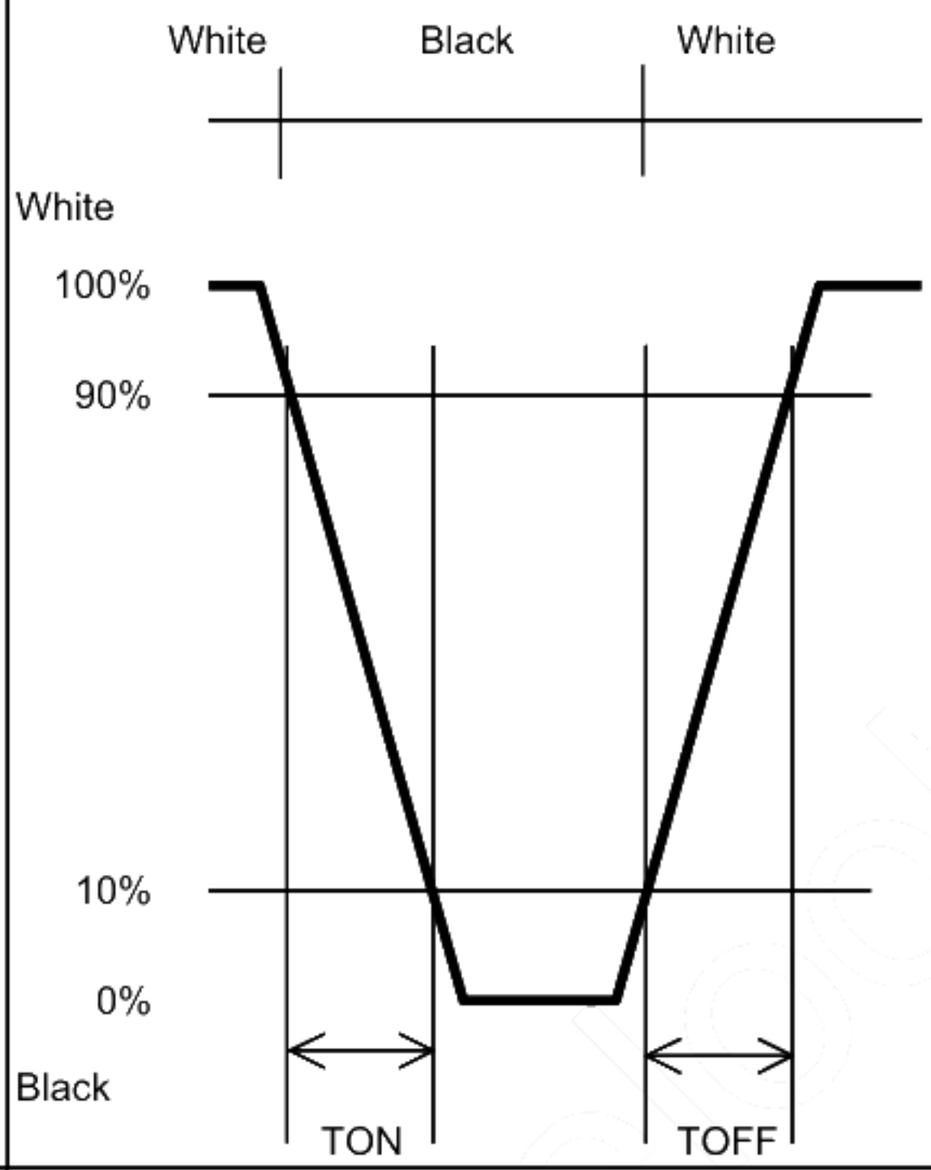
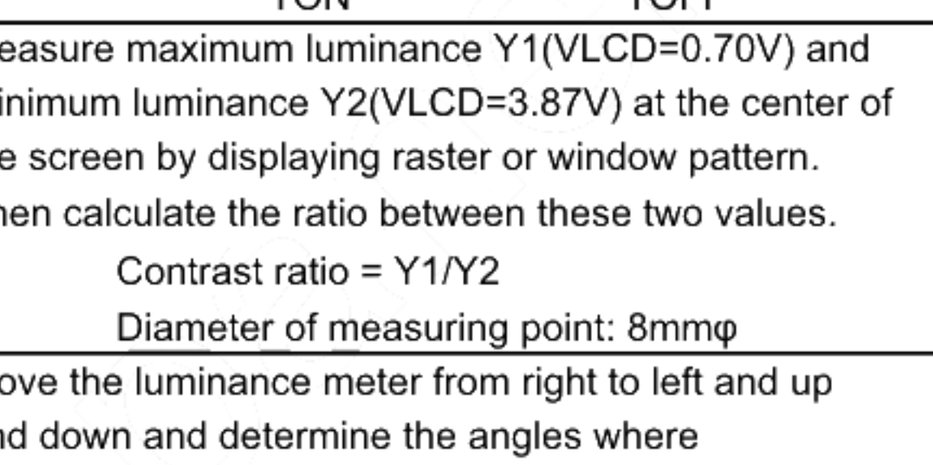


Dimensional ratio of active area

Backlight IL=50mA

2. Test Method

A

Notice	Item	Test method	Measuring instrument	Remark
1	Response time	Measure output signal waveform by the luminance meter when raster of window pattern is changed from white to black and from black to white. 	LCD7000	Black display VLCD=3.87V White display VLCD=0.70V TON Rise time TOFF Fall time
2	Contrast ratio	Measure maximum luminance Y1(VLCD=0.70V) and minimum luminance Y2(VLCD=3.87V) at the center of the screen by displaying raster or window pattern. Then calculate the ratio between these two values. Contrast ratio = Y1/Y2 Diameter of measuring point: 8mmφ	CS1000	
3	Viewing angle Horizontalθ Verticalφ	Move the luminance meter from right to left and up and down and determine the angles where contrast ratio is 10.	EZcontrast160D	
4	V-T threshold value	Change VLCD by 0.1V step and plot the points where the luminance is 90% as V90, 50% as V50 and 10% as V10 of maximum luminance. 	LCD7000	
5	White chromaticity	Measure chromaticity coordinates x and y of CIE1931 colorimetric system at VLCD = 0.70V Color matching faction: 2°view	CS1000	

A	Notice	Item	Test method	Measuring instrument	Remark
	6	Burn-in	Visually check burn-in image on the screen after 2 hours of "window display" (VLCD=0.70V/3.87V).		At optimized VCOMDC
	7	Center brightness	Measure the brightness at the center of the screen.	CS1000	
	8	Brightness distribution	(Brightness distribution) = 100 x B/A % A : max. brightness of the 9 points B : min. brightness of the 9 points	CS1000	