To : _____

Date : August 7, 2012

SPECIFICATIONS (Draft)	
Product Name	ACX453AKC-E

Approval Signature

Accepted by : _____

Date : _____

Japan Display Inc.

Proposed by : M. Okegami

Revision History

Issued No.	2012JDWTTR-xxx
Revision	00
Product Name	ACX453AKC-E (L4F00453T00)
Customer Part No.	

Date/Rev.	Contents of change			Reasons	Remarks
Aug.7.2012 Rev.00			-Initial release		

(C): Changed (A): Appended (D): Deleted (F): Filled in

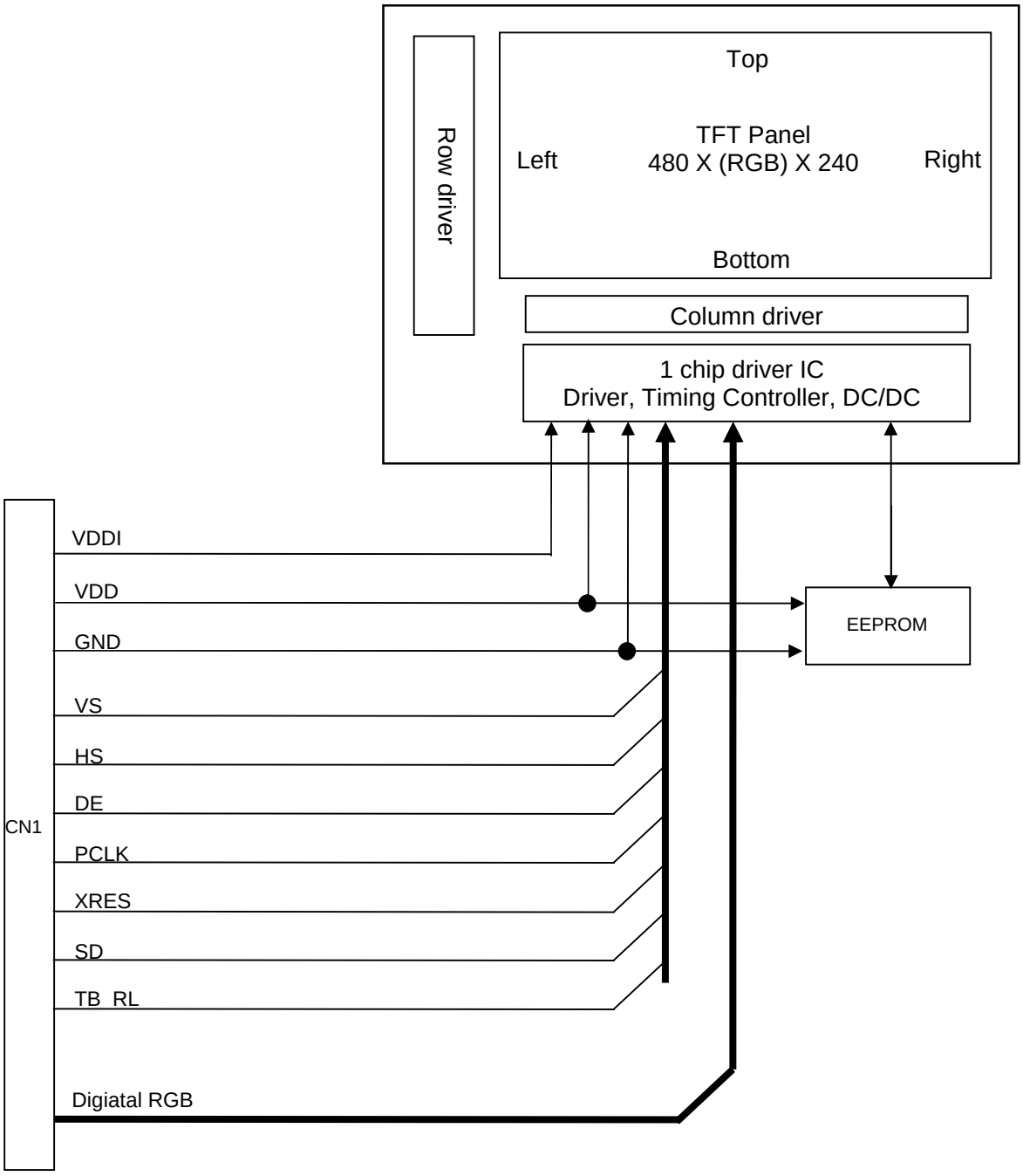
CONTENTS

1 BASIC SPECIFICATIONS

1.1 STRUCTURES

No.	FACTOR	SPECIFICATIONS	UNIT
1	LCD structure	TFT LCD	-
2	Module size (W x H x T)	52.3 x 37.5 x 2.8 (Typical)	mm
3	Weight	10.3 (Typical)	g
4	Active area (W x H)	40.9 x 20.5	mm
5	Viewing area (W x H) Plastic frame side (front) Metal frame side (back)	 43.4 x 23.7 41.1 x 20.7	mm
6	Frame aperture (W x H) Plastic frame side (front) Metal frame side (back)	 44.2 x 24.4 44.3 x 23.9	mm
7	Screen size	1.8inch	
8	Number of dots	480 x RGB (W) x 240 (H)	-
9	Dot pitch (Horizontal x Vertical)	0.0284 x 0.0852	mm
10	Pixel pitch(Horizontal x Vertical)	0.0852 x 0.0852	mm
11	Dot layout	RGB stripe	-
12	Viewing direction	-	-
13	Liquid crystal mode	Vistarich, normally black, transmissive type	-
14	Polarization plate	Glare type	-
15	Other	Products conforming RoHS directive	-

1.2 BLOCK DIAGRAM



1.3 I/O PINS

Interface Connections: CN1

PIN NO.	SYMBOL	FUNCTION	I/O	REMARKS
1	GND	GND	P	
2	NC	N.C.	-	
3	NC	N.C	-	
4	NC	N.C.	-	
5	GND	GND	P	
6	TB_RL	Selection for scanning direction	I	Note 1)
7	SD	ON/OFF Control signal	I	

8	XRES	Reset signal	I	
9	GND	GND	P	
10	R5	RED Digital pixel data (MSB)	I	
11	R4	RED Digital pixel data	I	
12	R3	RED Digital pixel data	I	
13	R2	RED Digital pixel data	I	
14	R1	RED Digital pixel data	I	
15	R0	RED Digital pixel data (LSB)	I	
16	GND	GND	P	
17	G5	GREEN Digital pixel data (MSB)	I	
18	G4	GREEN Digital pixel data	I	
19	G3	GREEN Digital pixel data	I	
20	G2	GREEN Digital pixel data	I	
21	G1	GREEN Digital pixel data	I	
22	G0	GREEN Digital pixel data (LSB)	I	
23	GND	GND	P	
24	B5	BLUE Digital pixel data (MSB)	I	
25	B4	BLUE Digital pixel data	I	
26	B3	BLUE Digital pixel data	I	
27	B2	BLUE Digital pixel data	I	
28	B1	BLUE Digital pixel data	I	
29	B0	BLUE Digital pixel data (LSB)	I	
30	GND	GND	P	
31	PCLK	Data Clock	I	
32	GND	GND	P	
33	DE	Data Enable	I	
34	GND	GND	P	
35	HS	Horizontal sync signal	I	
36	GND	GND	P	
37	VS	Vertical sync signal	I	
38	GND	GND	P	
39	VDD	Power supply (3.3+/-0.15V)	P	
40	GND	GND	P	
41	VDD	Power supply (3.3+/-0.15V)	P	
42	GND	GND	P	
43	VDDI	Power supply (3.3+/-0.15V)	P	
44	GND	GND	P	
45	VDDI	Power supply (3.3+/-0.15V)	P	
46	GND	GND	P	
47	VDDI	Power supply (3.3+/-0.15V)	P	
48	GND	GND	P	
49	VDDI	Power supply (3.3+/-0.15V)	P	
50	GND	GND	P	

I/O: Input/Output terminal, I: Input terminal, O: Output terminal, P: Power line terminal

CN1: FPC (Pitch 0.5mm, Width 25.5mm ± 0.05mm

Suitable matching connector: 9637S-50C-GF(IRISO)

Contact materials: AU plating

Note 1) TB_RL="High" : Normal scanning. (right-to-left, top-to-bottom)
TB_RL="Low" : Invert horizontal and vertical scanning direction. (left-to-right, bottom-to-top)

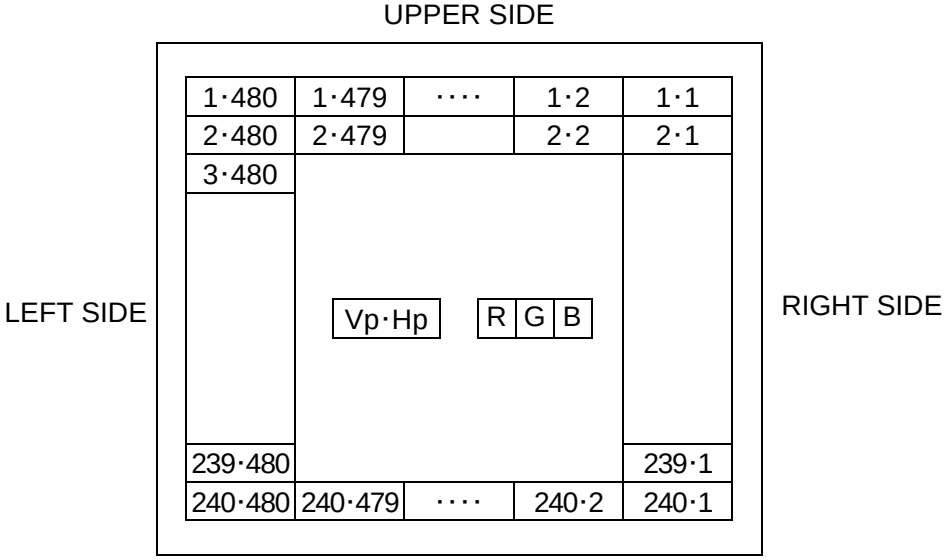
2 FUNCTIONS

2.1 RELATIONSHIP BETWEEN INPUT DATA AND DISPLAY COLOR

DISPLAY COLOR \ INPUT DATA		R DATA						G DATA						B DATA					
		MSB					LSB	MSB					LSB	MSB					LSB
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
BASIC COLOR	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(63)	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L
	GREEN(63)	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L
	BLUE(63)	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H
	CYAN	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H
	MAGENTA	H	H	H	H	H	H	L	L	L	L	L	L	H	H	H	H	H	H
	YELLOW	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L
	WHITE	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
RED	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(1)	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L
	RED(2)	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L
	:	:						:						:					
	:	:						:						:					
	RED(61)	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L
	RED(62)	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L
	RED(63)	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L
GREEN	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	GREEN(1)	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L
	GREEN(2)	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L
	:	:						:						:					
	:	:						:						:					
	GREEN(61)	L	L	L	L	L	L	H	H	H	H	L	H	L	L	L	L	L	L
	GREEN(62)	L	L	L	L	L	L	H	H	H	H	H	L	L	L	L	L	L	L
	GREEN(63)	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L
BLUE	BLACK	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	BLUE(1)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H
	BLUE(2)	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L
	:	:						:						:					
	:	:						:						:					
	BLUE(61)	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	L	H
	BLUE(62)	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	L
	BLUE(63)	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H

Note 1) Color (n) --- 'n' indicates gray scale step.

2.2 RELATIONSHIP BETWEEN INPUT DATA AND DISPLAY POSITION



Note) View from plastic frame side.

3 ABSOLUTE MAXIMUM RATINGS

ITEM		SYMBOL	RATINGS	UNIT	REMARKS
Power supply voltage		VDDI	-0.3 ~ +3.6	V	GND=0V
		VDD	-0.3 ~ +3.5	V	
Digital input voltage		VID	-0.5 ~ VDDI+0.5	V	Note 1)
Ambient temperature	Storage	TST	-40 ~ +95	deg. C	Note 2), 3)
	Operation	TOP	-40 ~ +95		
Humidity		-	90	%RH	No condensation Conditions: Ta=60deg. C Max, Note 4)
Vibration		-	2.9	G	Note 5) Conditions: storage
Shock		-	100	G	XYZ 6ms/direction Conditions: storage

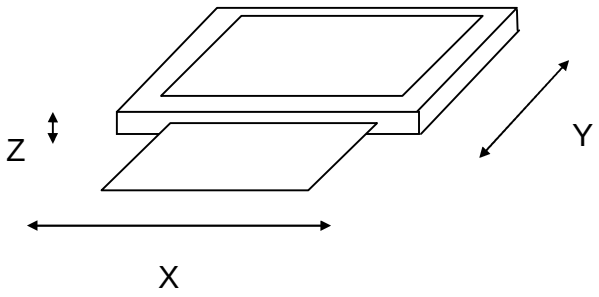
Note 1) VS, HS, DE, PCLK, R0-5, G0-5, B0-5, XRES, SD, TB_RL

Note 2) Care should be taken so that the LCD module may not be subjected to the temperature beyond this specification.

Note 3) Ambient temperature shows temperature on LCD module surface. Module temperature is apt to increase while it's driving due to CFL heat etc. Be sure and design carefully not to exceed +95 degree C on every surface of LCD that should come to contact with any other equipment. Temperature for operation is one which only assures LCD operation. Contrast, response time, or other LCD quality is regulated under condition of Ta=+25 degree C.

Note 4) Be advised that dew condensation level should be less than maximum wet bulb temperature 58degree C. Dew condensation may induce leak current, and also influence LCD performance.

Note 5) Vibration frequency: 8 - 33.3 Hz Displacement: 1.3mm
Vibration frequency: 33.3 - 400Hz
Sweep time: 15 min. /1 sweep
Total test time: X, Z-2Hr Y-4Hr



4 ELECTRICAL SPECIFICATIONS

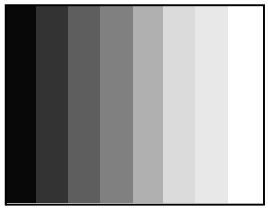
4.1 ELECTRICAL CHARACTERISTICS

VDDI=3.3V, VDD=3.3V, Ta=25deg. C unless otherwise specified

ITEM	SYMBOL	CONDITIONS	RATINGS			UNIT	Application
			Min.	Typ.	Max.		
Power supply voltage	VDDI		3.15	3.3	3.45	V	
	VDD		3.15	3.3	3.45	V	
Power supply current	IDDI	VDDI=3.3V	-	TBD	TBD	mA	Note 1)
	IDD	VDD=3.3V	-	TBD	TBD	mA	
Digital input voltage	VIH	High level	0.8VDDI	-	VDDI	V	Note 2)
	VIL	Low level	0	-	0.3VDDI	V	

Note 1) Display pattern of Typ. value is 64 grayscales.

< 64 grayscales >

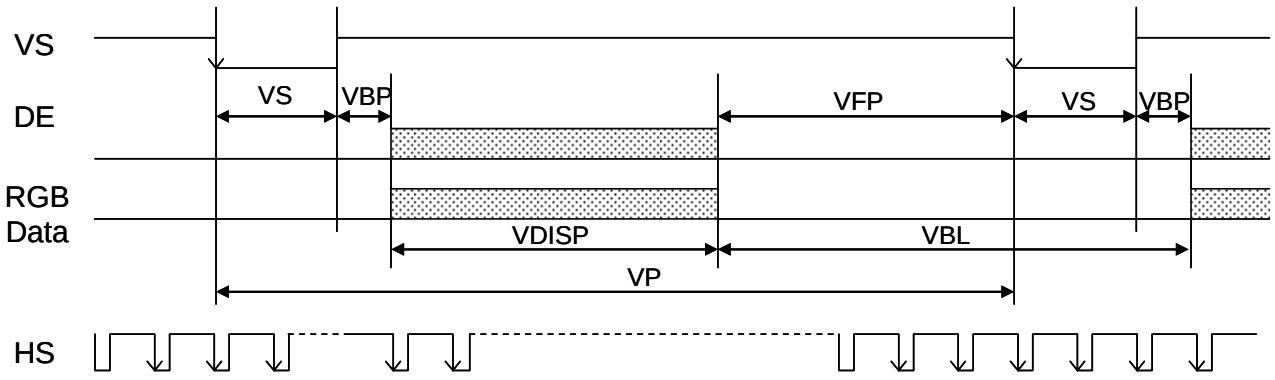


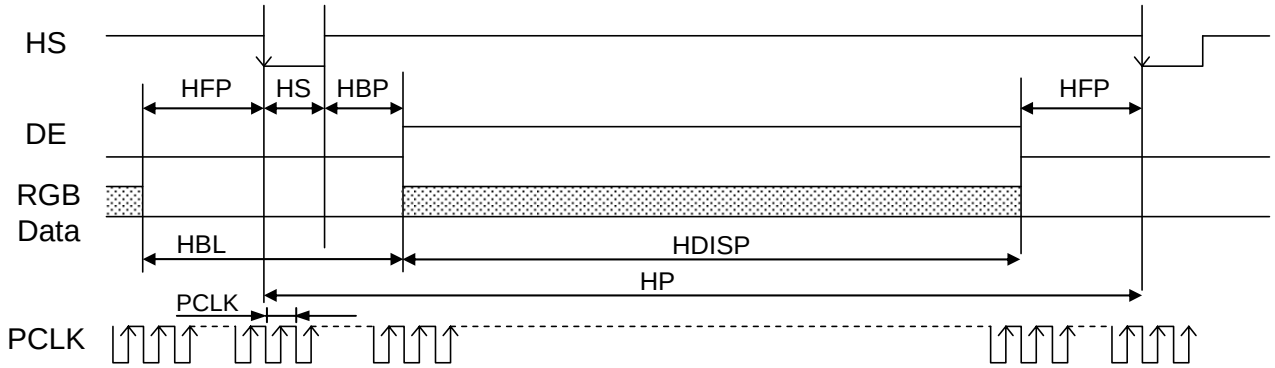
Note 2) Application pin name: VS, HS, DE, PCLK, R0-5, G0-5, B0-5, XRES, SD, TB_RL

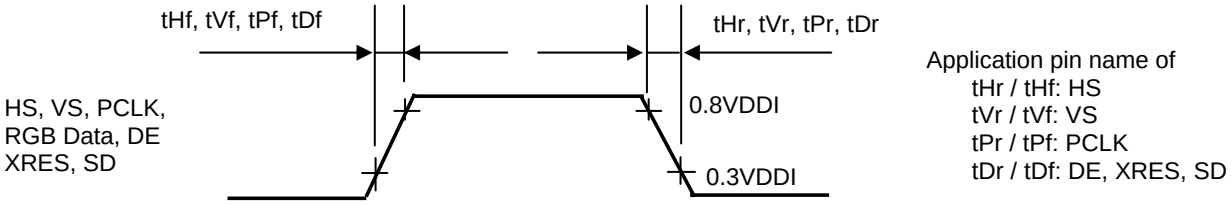
4.2 TIMINGS

4.2.1 INTERFACE TIMING SPECIFICATION

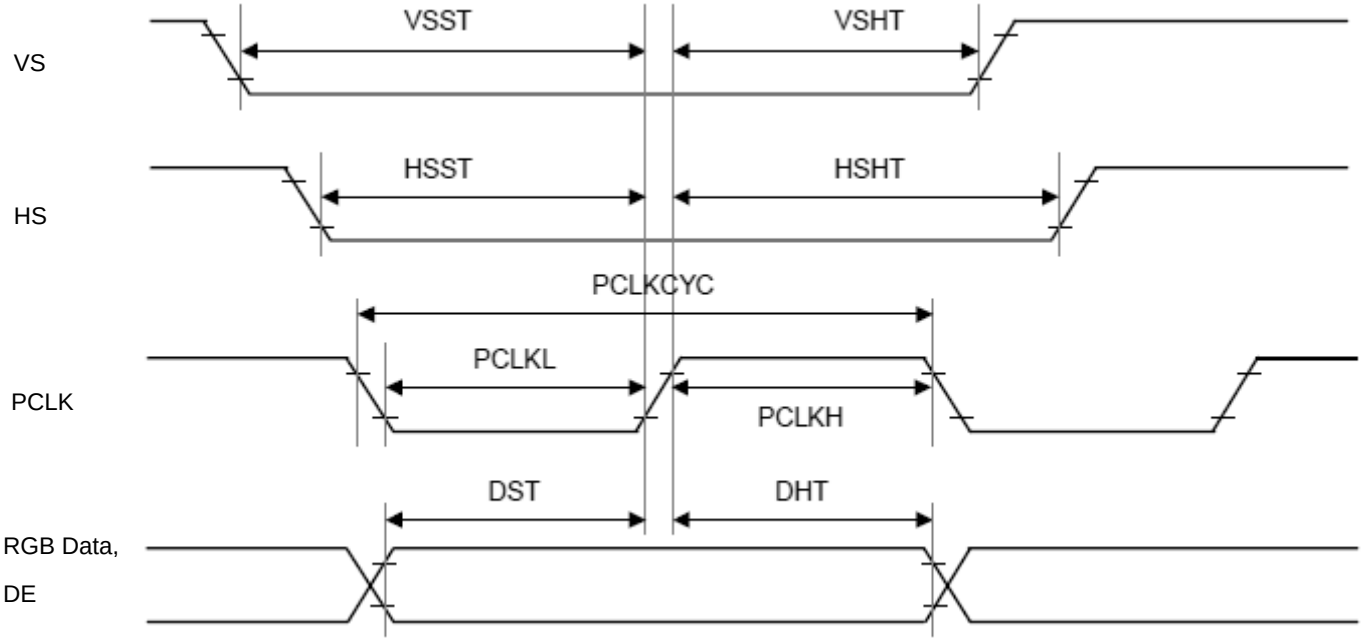
ITEM		Symbol	Condition	Min.	Typ.	Max.	UNIT
Vertical cycle		VP		-	247	-	Line
Vertical low pulse width		VS		-	2	-	Line
Vertical front porch		VFP		-	3	-	Line
Vertical back porch		VBP		-	2	-	Line
Vertical data start point			VS+VBP	-	4	-	Line
Vertical blanking period		VBL	VS+VBP+VFP	-	7	-	Line
Vertical active area		VDISP		240	240	240	Line
Vertical refresh rate		VRR		-	60	-	Hz
Horizontal cycle		HP		-	550	-	PCLK
Horizontal low pulse width		HS		-	20	-	PCLK
Horizontal front porch		HFP		-	35	-	PCLK
Horizontal back porch		HBP		-	15	-	PCLK
Horizontal data start point			HS+HBP	-	35	-	PCLK
Horizontal blanking period		HBL	HS+HBP+HFP	-	70	-	PCLK
Horizontal active area	Total	HDISP		480	480	480	PCLK
Pixel clock frequency when RGB Data is running		PCLK		-	8.2	-	MHz
				-	122	-	nsec
Vertical sync setup time		VSST		TBD	-	-	nsec
Vertical sync hold time		VSHT		TBD	-	-	nsec
Vertical sync rise time / fall time		tVr, tVf		-	-	TBD	nsec
Horizontal sync setup time		HSST		TBD	-	-	nsec
Horizontal sync hold time		HSHT		TBD	-	-	nsec
Horizontal sync rise time / fall time		tHr, tHf		-	-	TBD	nsec
Pixel clock cycle		PCLKCYC		-	122	-	nsec
Pixel clock low time		PCLKL		TBD	-	-	nsec
Pixel clock high time		PCLKH		TBD	-	-	nsec
Pixel clock rise time / fall time		tPr, tPf		-	-	TBD	nsec
Data setup time		DST		TBD	-	-	nsec
Data hold time		DHT		TBD	-	-	nsec
Data rise time / fall time		tDr, tDf		-	-	TBD	nsec





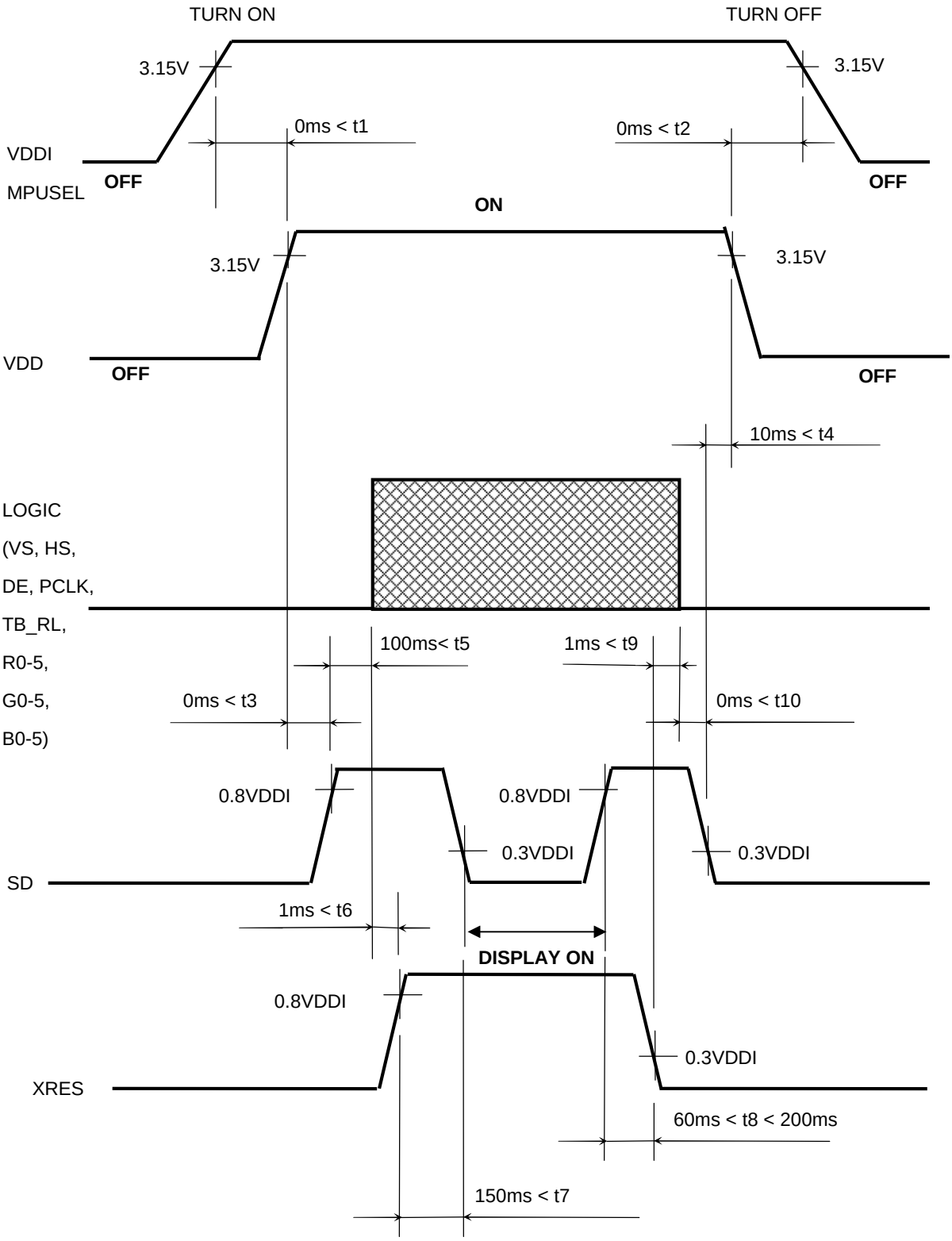


Application pin name of
tHr / tHf: HS
tVr / tVf: VS
tPr / tPf: PCLK
tDr / tDf: DE, XRES, SD



4.3 RECOMMENDED SEQUENCE

< Power ON / OFF sequence requirement>



5 OPTICAL SPECIFICATION

5.1 OPTICAL CHARACTERISTICS

VDDI=3.3V, VDD=3.3V, fV=60Hz, Ta=25deg. C

ITEM		CONDITION	SYMBOL	RATINGS			UNIT	DIFINITION
				Min.	Typ.	Max.		
Contrast ratio		θ= 0 deg.	CR	675	1200	-	-	Note 1, 4, 5)
Chromaticity (white)		θ= 0 deg.	Wx	0.285	0.315	0.345	-	Note 1, 5)
			Wy	0.31	0.34	0.37		
Chromaticity (red)		θ= 0 deg.	Rx	0.58	0.60	0.62	-	Note 1, 5)
			Ry	0.33	0.35	0.37		
Chromaticity (green)		θ= 0 deg.	Gx	0.31	0.33	0.35	-	Note 1, 5)
			Gy	0.50	0.54	0.58		
Chromaticity (blue)		θ= 0 deg.	Bx	0.13	0.15	0.17	-	Note 1, 5)
			By	0.115	0.14	0.165		
Response time	W→B	θ= 0 deg.	tf	-	15	tr+tf=45	msec	Note 1, 3, 5)
	B→W		tr	-	15			
Transmittance		θ= 0 deg.	T	Target 4.9	6.0	-	%	Note 1, 5)
Contrast ratio at Viewing angle range		θB=25deg.	θB	500	950	-	-	Note 1, 2, 4, 5)
		θR=25deg.	θR	350	700	-		
		θT=25deg.	θT	500	950	-		
		θL=25deg.	θL	500	950	-		

5.2 DEFINITION AND CONDITION OF OPTICAL CHARACTERISTICS

Note1) Measurement condition

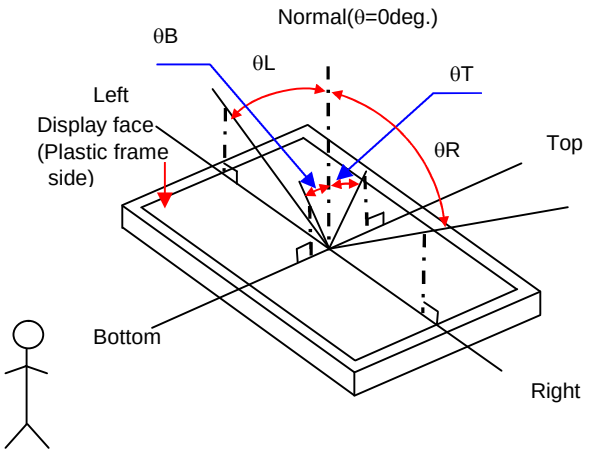
(1) Measurement equipment: BM-5A (TOPCON Corp.) Field=1 degree
or DMS 301 / DMS803 (AUTRONIC MELCHERS GmbH).

(2) The distance of photo detector and LCD panel is 500 ± 50mm.

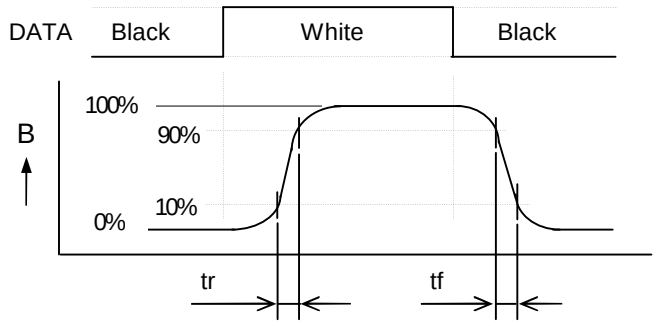
(3) Ambient temperature Ta: 25 ± 2 deg. C

(4) LCD: All pixels are White or Black, VDDI=3.3V, VDD=3.3V, fV=60Hz

(5) Light source: JDI standard LED backlight (x=0.287, y=0.269, B=12570 cd/m^2)



Note 2) Definition of viewing angle



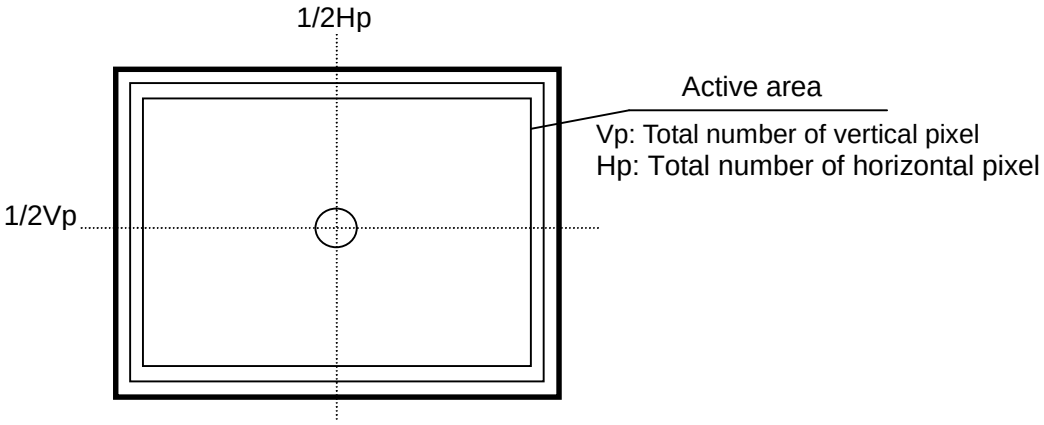
Note 3) Response time

Note 4) Contrast ratio "CR":

$$CR = \frac{\text{Brightness at White}}{\text{Brightness at Black}}$$

Note 5) This shall be measured at center of active area.

Note 6) Measurement points



6 INSPECTION

6.1 QUALITY STANDARD

6.1.1 LOT

Lot means the unit includes all products delivered to your company at one time.

6.1.2 INSPECTION CONDITION

(1) Environmental condition

Under 20 to 25deg. C, 60±15%RH.

Operative inspections are done under 800 to 2000 lx environment.

Especially related to transparence are performed under at most 50 lx environment.

(2) Inspection method

Inspect the screen by naked eye from a distance of about 30cm on a vertical direction front on.

(3) Driving condition

According to the specification

6.1.3 TREATMENT OF DEFECTIVE PRODUCTS

When defective products were found in your company's acceptance inspection and manufacturing process or field, we treat them according to the rules below.

6.1.4 TREATMENT OF DEFECTIVE PRODUCTS IN THE ACCEPTANCE INSPECTION

(1) When a product has failed to pass your company's acceptance inspection, please notify to Japan Display Inc. within 3 weeks from delivery. Otherwise, Japan Display Inc. will regard that it had been accepted.

(2) When a lot has failed to pass your company's acceptance inspection, please return the entire lot to Japan Display Inc.. Japan Display Inc. will investigate the causes of defects and will report both the causes and the responses taken to them. Non-defective products shall be delivered to replace all defective products within nonconforming lots.

(3) Non-defective products shall be delivered to replace all defective products within conforming lots.

6.1.5 TREATMENT OF OTHER PROBLEMS

If any troubles should occur concerns our products that have been assembled at your company's manufacturing processes, both companies shall jointly investigate and resolve the causes.

6.1.6 WARRANTY

Japan Display Inc. warrants this product for a period of 12 months from the date of delivery.

6.2 APPLICATION SCOPE

The application scope is limited to the viewing area.
The product should be judged non-defective if all defects are outside of the viewing area and do not interfere with product quality or the assembly process.
Each "dot" means the smallest display unit for R, G or B.
A set of three adjacent R, G and B dots comprise one pixel.

6.3 DISPLAY APPEARANCE STANDARDS (OPERATION AND NON OPERATION)

If any item is defined with a boundary sample, the boundary sample takes precedence.

<table>
<tr><th>No.</th><th>ITEM</th><th>CRITERION</th></tr>
<tr><td>1</td><td>Display problems</td><td>Must not include any nonfunctioning or failure to display the correct pattern corresponding to input signal.</td></tr>
<tr><td>2</td><td>Missing lines</td><td>No missing lines permitted.</td></tr>
<tr><td>3</td><td>Dot defects</td><td>Defined allowable ranges should be met for each white, black, R, G, B raster.
The limits apply to the entire display area. *1)
Bright spot in 60% or more of dot aperture is defined as a bright dot defect, less than 60% is permitted.
Black spot in 60% or more of typical pixel aperture is defined as a black dot defect, less than 60% is permitted.
Visible through 5% ND-Filter.</td></tr>
<tr><td>4</td><td>Inconsistent display</td><td>Should not be prominent.
If necessary, boundary samples should be provided.</td></tr>
<tr><td>5</td><td>Refuses and scratches and on polarizer or glass
*2)</td><td><Dot shape>
Allowable range
1. distinctly recognized
<table><tr><th>size d (mm)</th><th>numbers</th></tr><tr><td>d≦0.15</td><td>permitted</td></tr><tr><td>0.15<d≦0.30</td><td>2</td></tr><tr><td>0.30<d</td><td>0</td></tr></table>2. blurred
<table><tr><th>size d (mm)</th><th>numbers</th></tr><tr><td>d≦0.40</td><td>permitted</td></tr><tr><td>0.40<d≦1.00</td><td>2</td></tr><tr><td>1.00<d</td><td>0</td></tr></table>Criterion is applied also to pin-holes.
Defects must not be crowded.
-Distinctly recognized : It appears on raster pattern.
-Blurred : It doesn’t appears on raster pattern.
-Scratches on polarizer : It is treated as blurred.
<Line shape>
<table><tr><th>L: Length (mm)</th><th>W: Width (mm)</th><th>numbers</th></tr><tr><td>L≦1.5</td><td>W≦0.05</td><td>permitted</td></tr><tr><td>L≦1.5</td><td>0.05<W≦0.10</td><td>2</td></tr><tr><td>-</td><td>0.10<W</td><td>Dot shape</td></tr></table></td></tr>
<tr><td>6</td><td>Bubbles in polarizer (display area)
*2)</td><td>Allowable range
<table><tr><th>size d (mm)</th><th>numbers</th></tr><tr><td>d≦0.30</td><td>permitted</td></tr><tr><td>0.30<d≦0.50</td><td>3</td></tr><tr><td>0.50<d≦1.00</td><td>1</td></tr><tr><td>1.00<d</td><td>0</td></tr></table></td></tr>
</table>

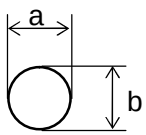
*1: dot defect's allowable range

No.	Item	Bright dot defect	Black dot defect	total
1	Defects counts	0	5	5
2	Combined defects	0	2	
		- Combined defects: arranged crosswise, lengthwise, obliquely. - Two combined defects : count two dots as 1pcs. - Three combined defects : not permitted.		

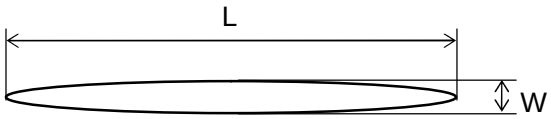
*2: outward of refuses, scratches and bubbles

Dot shape

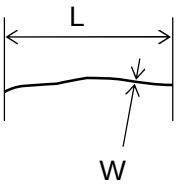
d=(a+b)/2



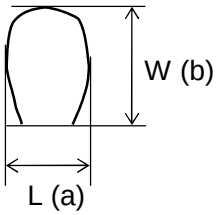
Line shape



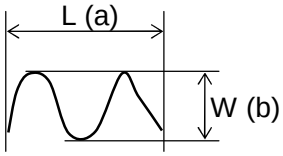
Gentle curve



Curved arch

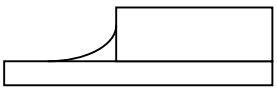


Multiple curves



- Any defect outside the active area can be ignored.
- When viewing with the naked eye, any bent or dot-shaped item must be measured and checked according to the dot shape defect's standard.
- Refer to the following examples of measurement methods.
- The defects that can be cleared by air-blow can be ignored.
- The defects that can not be seen from plastic frame side at operating can be ignored.
- If the trouble which is not predicted, it will be struck up with consultation between both companies.

6.4 EXTERNAL APPEARANCE STANDARDS

No.	ITEM	CRITERION
1	Different specifications	Not permitted.
2	Missing parts	All parts must be complete.
3	Damaged resist on FPC	Copper patterns on FPC must not be visible.
4	Circuit pattern	Must not be peeled or separated from FPC.
5	Conductive refuses	No solder refuses or solder balls easily moving. Fixed conductive refuses over 0.2mmϕ are not permitted. Should not be crowded. (crowded: means gathering more than 5 pcs within ϕ=5mm)
6	Dirt	Should not be prominent. Dirt on backside is permitted.
7	Dirt or scratch on interface pins	Should not be prominent.
8	Plating	Must not be peeled, no rust, no discoloration.
9	Soldering	Solder omissions are not permitted at any solder point. Solder bridges are not permitted. Cold soldering are not permitted.
10	Parts soldering	There must be fillet 

7 DURABILITY

7.1 RELIABILITY TEST ITEM AND TEST CONDITION / METHOD

№	Item	Test method	Check method, Judgment
1	High temperature operating	95±2deg.C(at surface of polarizer),500hr	After 500hours test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
2	Low temperature operating	-40±2deg.C,500hr	After 500hours test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
3	High temperature storage	95±2deg.C,500hr	After 500hours test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
4	Low temperature storage	-40±2deg.C,500hr	After 500hours test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
5	High temperature and high humidity operating	60±2deg.C, 90%RH、500hr	After 500hours test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
6	Resistance UV radiation	Sunshine xenon weather meter BPT=63±2deg.C, 65W/m^2、50%RH, No-shower, 300hr	After 300hours test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
7	Heat shock	-40±2deg.C(30 min)⇔85±2deg.C (30 min), 100cycle	After 100cycles test, and 2 hours storage in normal temperature and normal humidity, the mechanical and electrical defect shall not be occurred. And Item 7.2 shall be achieved.
8	Vibration (No-operating)	SINE Vibration 8-33.3Hz, 2.0mmpp, 33.3-400Hz, 5G, logarithmic frequency sweep :cycle 15mins, XZ direction: each 2hr Y direction: 4hr	The mechanical and electrical defect shall not be occurred.
9	Shock (Non-operating)	100G, 6ms, Sinusoidal half wave, ±XYZ direction, each 3times	The mechanical and electrical defect shall not be occurred.
10	ESD-1 (Non-operating)	150pF、330Ω、±1kV Position: between power terminal and other terminal, each 3times	The defect shall not be occurred.
11	ESD-2 (Non-operating)	150pF、330Ω、±15kV Position: viewing area center(contact electric discharge), 4 sides of metallic frame(air discharge), each 3times	The defect shall not be occurred.

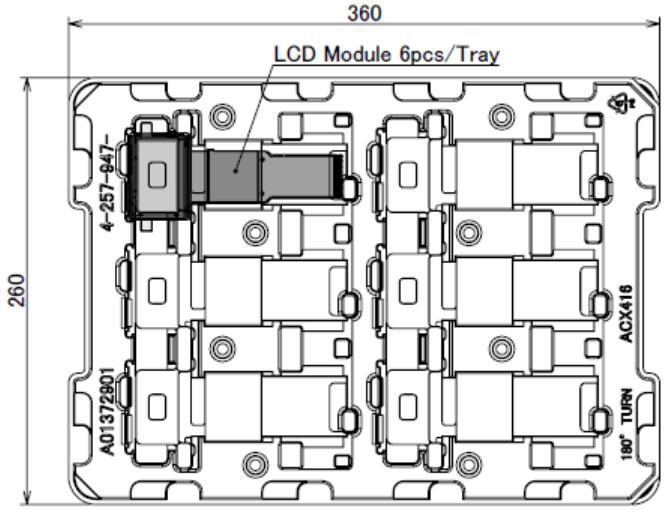
7.2 CRITERIA

After test, the following item shall be checked under normal temperature and normal humidity condition.

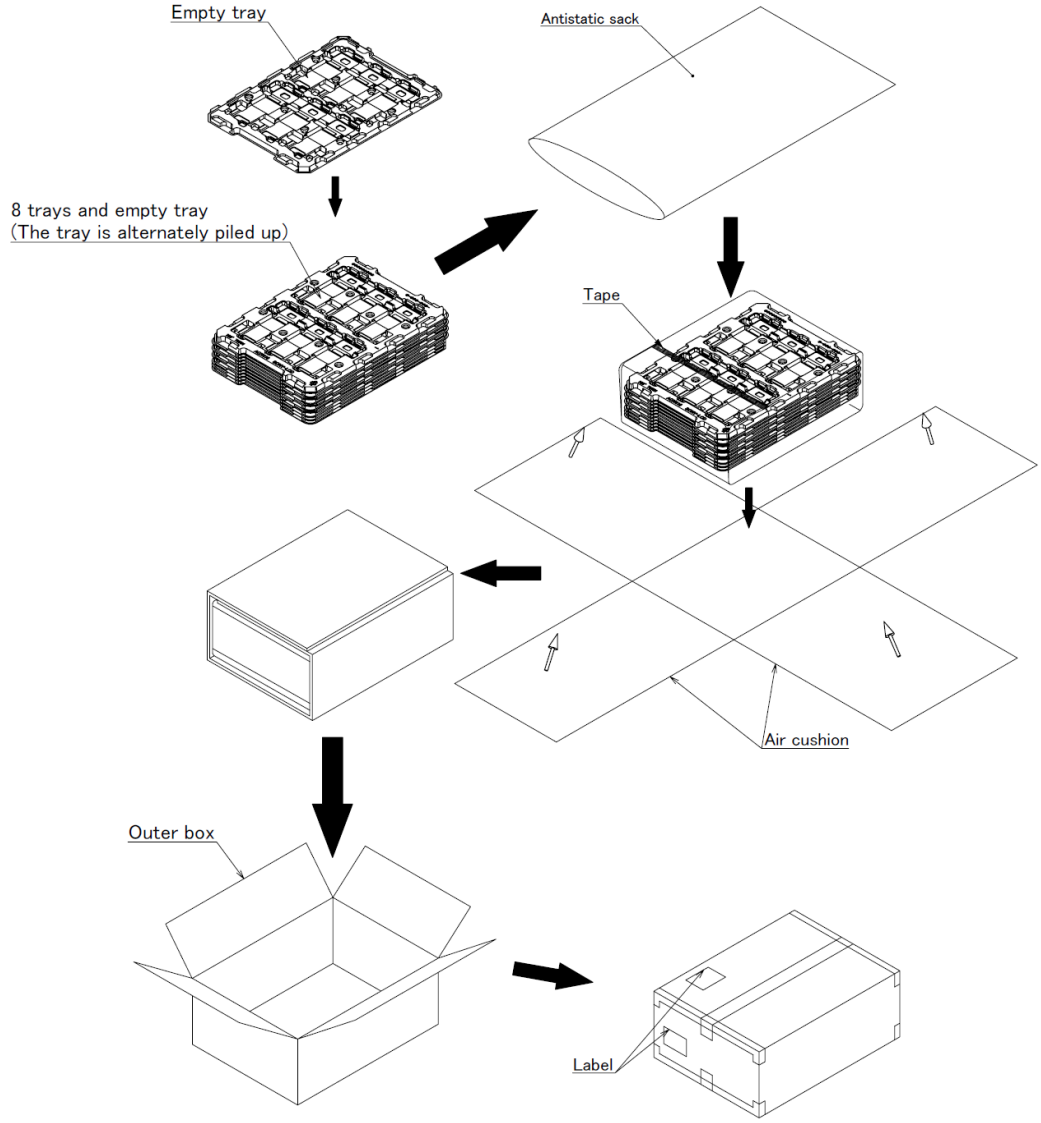
1) The defect and marked degradation of visual quality and appearance shall not be occurred.
2) Contrast ratio after test shall be over 50% of initial contrast ratio.
3) Transmittance after test shall be over 50% of Initial transmittance.
4) The defect of function shall not be occurred.
5) Power supply current after test shall be below 2times initial power supply current.

8 PACKING

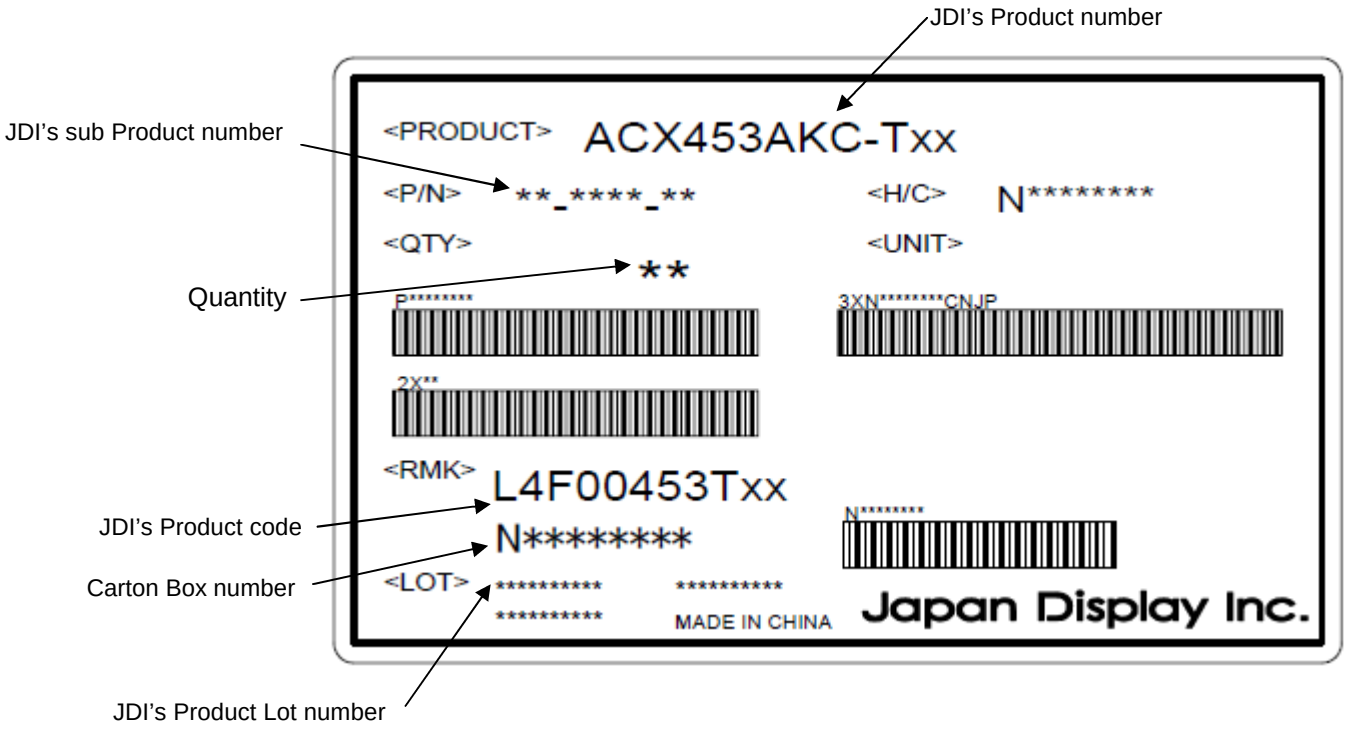
8.1 MASTER CARTON



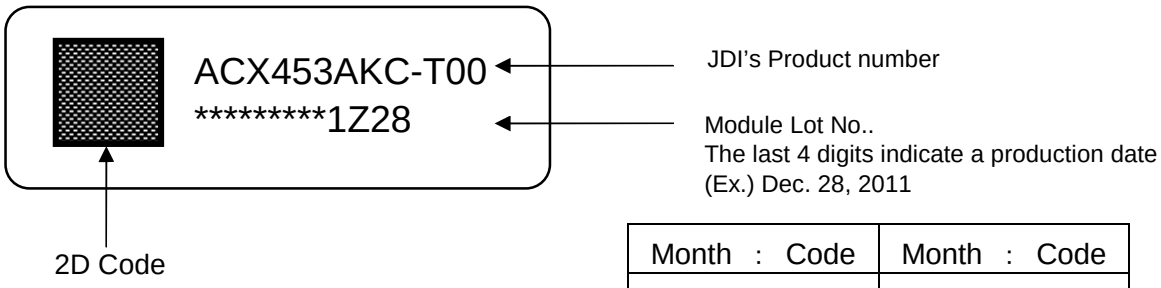
Outer Dimension	L x W x H
	416 x 316 x 148
Quantity	60 pcs max.
Gross Weight	2.5kg



8.1.1 MASTER CARTON LABEL



8.2 LOT LABEL



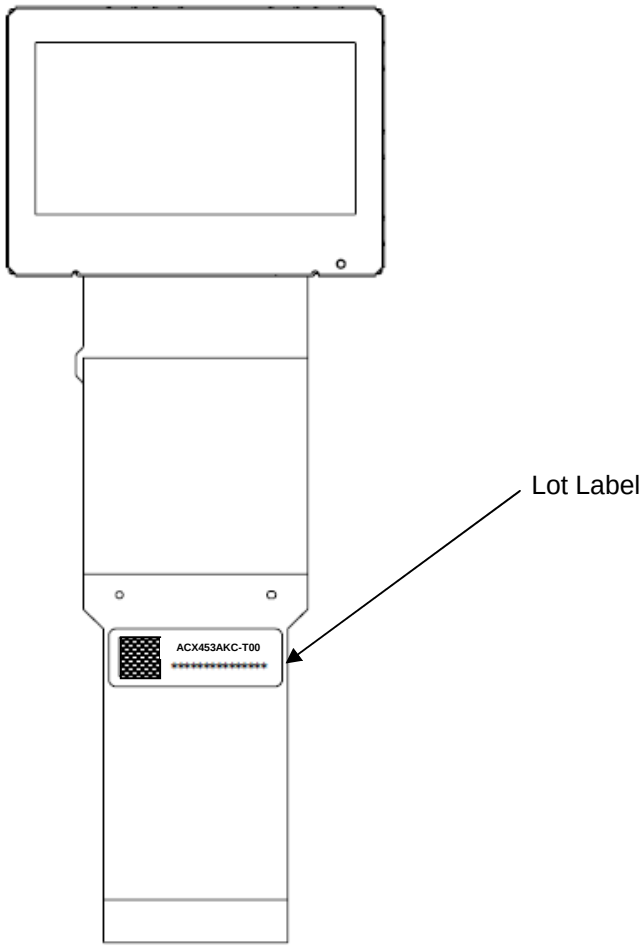
Contents of 2D code

ACX453AKCT00*********1Z28

JDI's Product Number　　Module Lot Number

Month : Code	Month : Code
Jan. : 1	Jul. : 7
Feb. : 2	Aug. : 8
Mar. : 3	Sep. : 9
Apr. : 4	Oct. : X
May. : 5	Nov. : Y
Jun. : 6	Dec. : Z

8.2.1 LABEL POSITION



9 LCD MODULE USAGE AND PRECAUTIONS

9.1 HANDLING

1) Broken glass:
Be careful to broken glass of display face. When display face is damaged, be careful enough not to cut hands by a piece of glass. The surface of a LCD Module is covered by plastic film, and glass is hard to be scattered, but there can be the hurt when touching a broken portion. And because CFL is also made of glass, be careful equally.

2) Broken panel:
Do not touch the liquid which flowed out of a panel. When a panel is damaged and liquid flow, do not breathe in the liquid, drink it or touch it. When liquid stuck to a hand or clothes, wipe it off in soap or alcohol immediately, then wash in water. When liquid touched to eyes, wash eyes with washing water more than 15 minutes, and undergo a medical treatment of a doctor.

3) Preventing of stain and dust:
Handle a LCD module as much as possible in a room with a few dusts. In addition, when in acceptance inspection or installing process, wear a finger case or the soft gloves which do not make a dust to prevent stain of display face of a module.

4) Protection film of display face:
Remove a protection film of display face in the latest possible assembly process to prevent from dust or scratch onto display face. When removing a protection film, remove it gently and slowly at least more than three seconds after pitching pull-tab tape or tab. In case only pull-tab is peeled, lift the edge of film up carefully using an unsharpened nonstick tweezers etc., or remove it gently and slowly after sticking scotch tape to the edge of protection film. If remove it quickly, static electricity occurs, semiconductor and electronic parts inside LCD module may be damaged. When removing a protection film of plastic frame side fast in a vertical direction, there is a possibility that plastic frame is removed.

5) Wiping off of stain on display surface:
When display surface of a LCD module was stained, please wipe it off lightly with clean cotton or soft cloth.

6) Water drops on display surface:
Do not leave the water drops on the display surface. When water drops are stuck on the surface, please wipe it off with cotton or soft cloth immediately. Display surface may change color and get a stain of water. In addition, when water drops flow into the LCD module inside, it may cause a trouble or damage.

7) Disassemble or modify of LCD module:
Do not attempt to disassemble, rework or modify the LCD module by any means. There is the possibility of electric shock, destruction of electronic parts, scratch on a display face, or dust passing into a LCD module. And if using disassembled, reworked or modified LCD module, electronic parts might emit smoke or outbreak a fire by dust or malfunction of electronic parts. A product guarantee becomes not available for a LCD module which disassembled, reworked or modified by the user.

8) Countermeasures to static electricity:
C-MOS LSI and an electronic part of the LCD module inside can be destroyed by static electricity. In order not to apply static electricity to a LCD module, spread a conductive mat to a floor and a work desk. In addition, worker should mount a ground band. Make consideration to prevent of static electricity while at work.

9) Power supply when in a handling of LCD module:
Be careful to electric shocks. When handling a LCD module, do it after switching the power supply off by all means. While in operation, there is the possibility of electric shocks by touching on a lamp electrode, a cable, a connector, or an inverter circuit, because the high voltage is applied.

10) Power supply in connecting operation:
Switch off the power supply of the parent application at the time of installing process by all means. When inserting or pulling off a connector of a LCD module with having switched on the parent application, it can be damaged in an electric circuit of a LCD module. When power supply have to be turned on by testing or inspection process, use a driving circuit which satisfies an ON/OFF sequence for power supply and input signals.

11) How to insert a connector:
When inserting a cable in a connector of a LCD module or take it off, make attention so that strong external force is not added to a connector of the LCD module. PWB and inside connection of a COG driver can be damaged by a strong external force. When installing a LCD module to a target, make attention not to put these cables between the case of target and the LCD module. A connector of a parent application and an input connector of LCD module should not be inserted slantways or half-ways. And confirm it by all means. When it is not inserted correctly, a circuit and a part might emit smoke or be damaged by burning by the high voltage of a lamp power supply circuit.

12) Handling of wire cables for backlight and a FPC:
Be careful not to pull or damage the wire cables for backlight lamp. Damage of the wire cables may cause troubles to the LCD module unit and may damage the soldering the root of the lamp and cables. In addition, be careful not to pull or damage a FPC.

9.2 DESIGN

1) Absolute maximum ratings:
Follow the absolute maximum ratings specified in this document by all means. The absolute maximum rating is the rating which LCD module must not be violated. When using a LCD module at the condition beyond those, a burning / destruction of electronic parts or a permanent damage of characteristics may be caused. Therefore, make appropriate design not to violate the absolute maximum ratings with consideration of environmental temperature, deviation of input signals, and electronic parts tolerances.

2) Torsion and bending while in the process of installing:
Make attention that no torsion or bending stress is applied on a LCD module in the installing process to a target frame. Even if the stresses are temporarily, they might be the cause of trouble of a LCD module.

3) Preventing of a mechanical shock:
Be careful not to give a strong mechanical shock such as drops or shocks. There can be a cause of trouble such as a scratch of display face or a malfunction of LCD module.

4) Preventing of a pressure onto display face:
Make attention that no strong external force such as pushing strongly onto display face of a LCD module. Because there can be a scratch on display face or a cause of trouble of a LCD module.

5) Preventing of a scratch on display face:
Make attention not to rub or push a display face of a LCD module by a rigid thing such as tools. In addition, be sure not to put a heavy thing such as a tool on display face and not to pile up LCD modules each other. A polarization plate used for display face is easy to get a scratch or traces and it might be damaged.

6) Torsion, bending:
Installation portions of a LCD module should be designed not to be applied excess torsion or bending.

7) Noise of Power supply:
Because the spike noise existing in a power supply is a cause of malfunction of a driving circuit in a LCD module or an abnormality of display, spike noise must be in a range of VCC ± 100mVP-P (but never violate the absolute maximum rating).

8) Power supply sequence:
The power supply and the input signals of the users' product unit and the inspection circuit, etc., connecting to LCD module, which satisfy the power supply sequence of the recommended operating condition, must be used.

9) Power supply circuit protection device:
Please examine and apply the power supply circuit protection device if necessary when the LCD module breaks down in accordance with the use condition.

10) Recommendation for use of a protection cover and a UV cut filter:
JDI recommends use of a transparent protection cover on a liquid crystal display aperture to prevent scratch and dust of display face and invasion of water, when using under a too cruel condition in such as outdoors. Furthermore, JDI recommends use of a U.V. cut filter (cuts 390nm or less wave length) when it is exposed to direct rays of the sun for a long time. Consider it so that dew condensation does not occur in the cover.

11) Temperature dependence of display:
The response (optical response) of display varies with temperature. The response becomes slow at low temperature. In addition, brightness and chromaticity vary with temperature, too.

12) Starting delay and lifetime under low temperature:
The starting characteristic of a lamp degraded under low temperature (the time before light being stable gets longer from power supply ON). In addition, operate a lamp at room temperature as possible, because the lifetime shortens when operating under low temperature by the characteristics itself.

13) Dew condensation:
In an environment of sudden temperature change, there might be a dew condensation on surface or inside of a LCD module. Because it causes a degradation of display or malfunction, be sure to make consideration for design that dew condensation does not occur.

14) Afterimage:
There is a possibility of an afterimage when a same pattern has been displayed for a long time. But the afterimage is recovered with time elapsed and come back normally.

15) Flickering:
Refrain from the use of the display pattern which has a tendency for flickering to occur in principle.

9.3 STORAGE

1) Storage and transport
Keep a LCD module with a packing form of shipment in a dark room which direct rays of the sun does not irradiate with low temperature, with low humidity, and with no dew condensation. In addition, keep it in an environment with little temperature change because there is the possibility that dew condensation occurs by a sudden temperature change. When dew condensation occurs, it may be a cause of operation abnormality or trouble.

2) Transport:
Because the master carton may be damaged or shape transformed by an excessive load applied, store and transport with piled up in lower than the number which recorded in a master carton label.

3) Handling:
Because a LCD module is a product having precision electronic parts and glass products, it might be damaged by an excessive shock or a dropping. Although a LCD module does protected with master carton, handle it carefully to reduce a shock in transshipping, transporting and loading.

9.4 DISPOSING LCD MODULES

When disposing LCD modules, consult a company specialized in industrial waste treatment which is permitted by the government on the local authority.

9.5 OTHER PRECAUTIONS

1) This product is developed and manufactured for the usage of general electronic equipments (office automation equipments, communication peripherals, electric appliance products, game machines, etc.) and is not suitable for devices that require high reliability and safety (aircraft/ space use equipments, nuclear control apparatus, life maintenance equipments, etc).

2) Use this product correctly according to the operating conditions and precautions that are stated in this specification. Design carefully to prevent accidents, fire hazards, and social damage because of this product.

3) Radiation proof design is not applied to this product.

4) Contents in this specification shall not guarantee any third party's intellectual property right or concession of other rights. Japan Display Inc. will not take responsibility for the industrial property issue arising between the user and a third party.

5) This specification includes copyright-related contents. It is strictly prohibited to make partial/ full reprints or duplicate copies of this specification without the approval of Japan Display Inc..

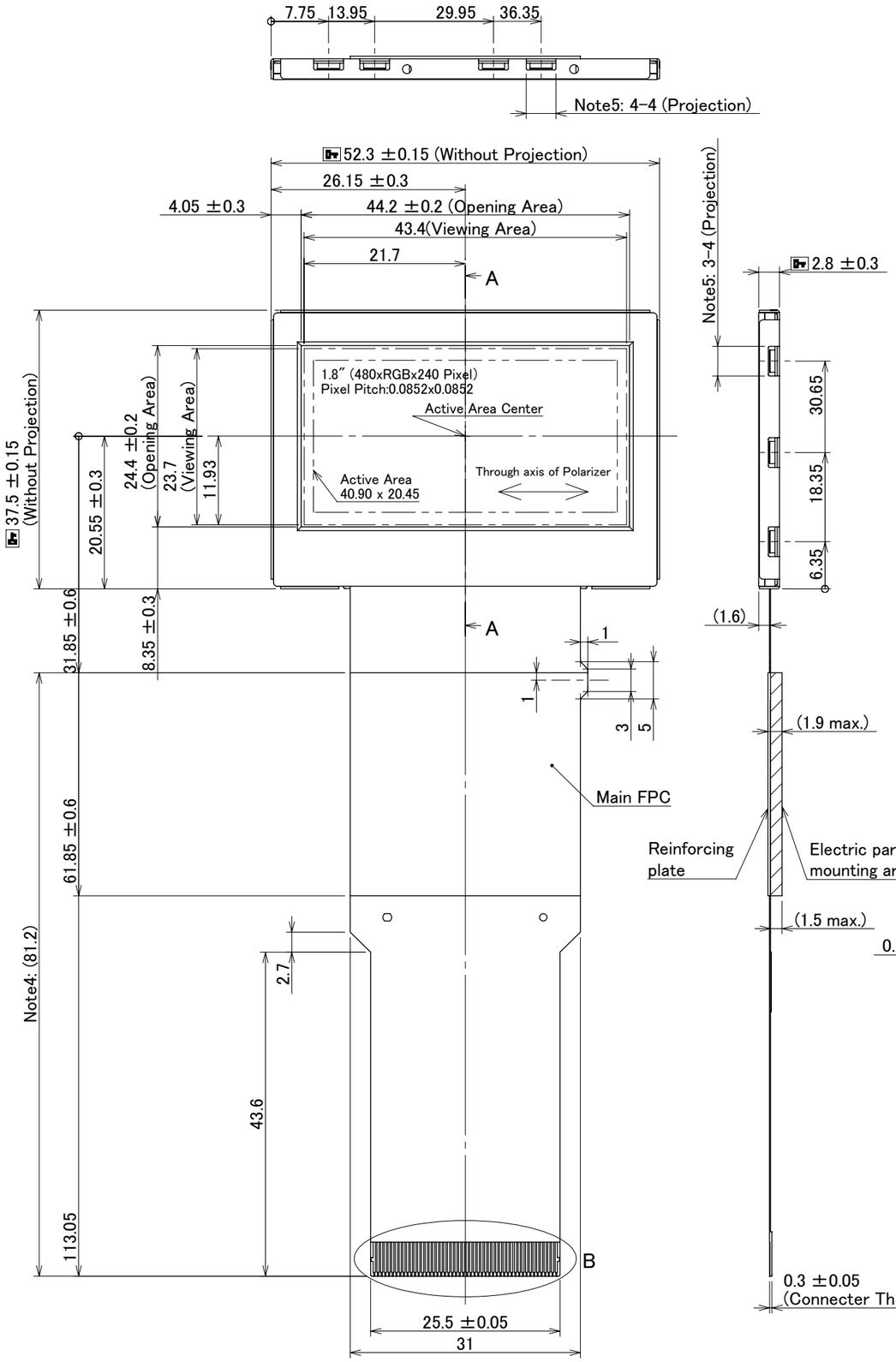
6) Damages caused by the using beyond conditions or notices or precautions as mentions in this specifications, are responsible for the users.

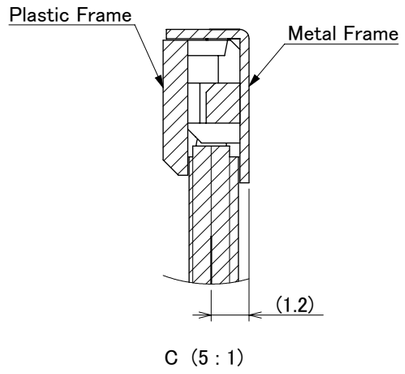
7) If there is unknowns or need more details, please contact sales representative.

8) The contents stated in this document and the product may be subject to change without prior notice. When you kindly study to use this product, please ask our distributor or us for the latest information.

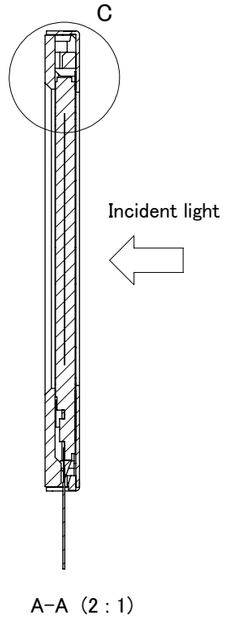
■ Outer Dimensions

CONFIDENTIAL

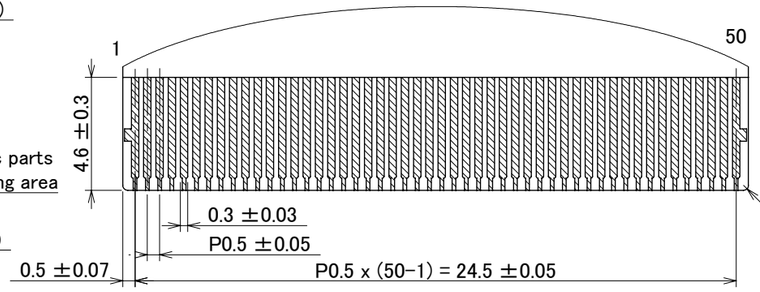




C (5 : 1)



A–A (2 : 1)



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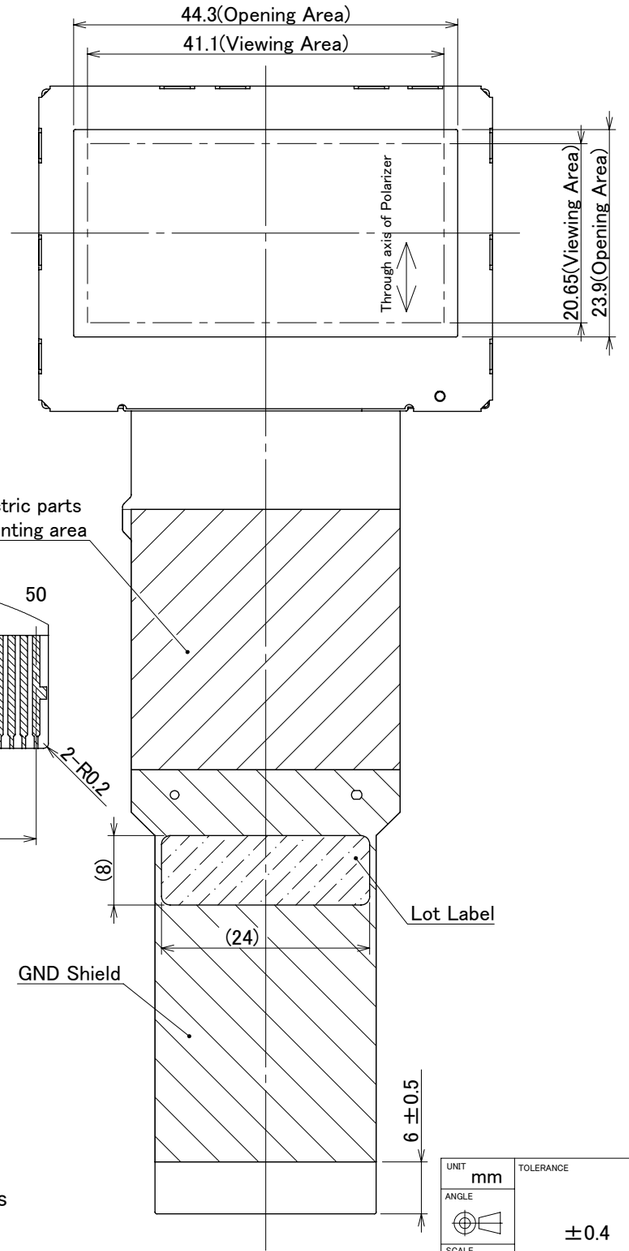


Note 1: Unless otherwise specified,
all dimensional tolerances are ±0.4mm.
Note 2: This drawing is only the preliminary data
and can be changed without prior notice.
Note 3: For the LCD module positioning,
avoid areas near the corners and projections.
Note 4: FPC bending prohibition area is shown.
Note 5: It is possible that the top of plastic frame sticks
out from the face of metal frame in this area.
Maximum size of projection is 0.1mm.
Note 6:Please connect metal frame to the GND electrically.

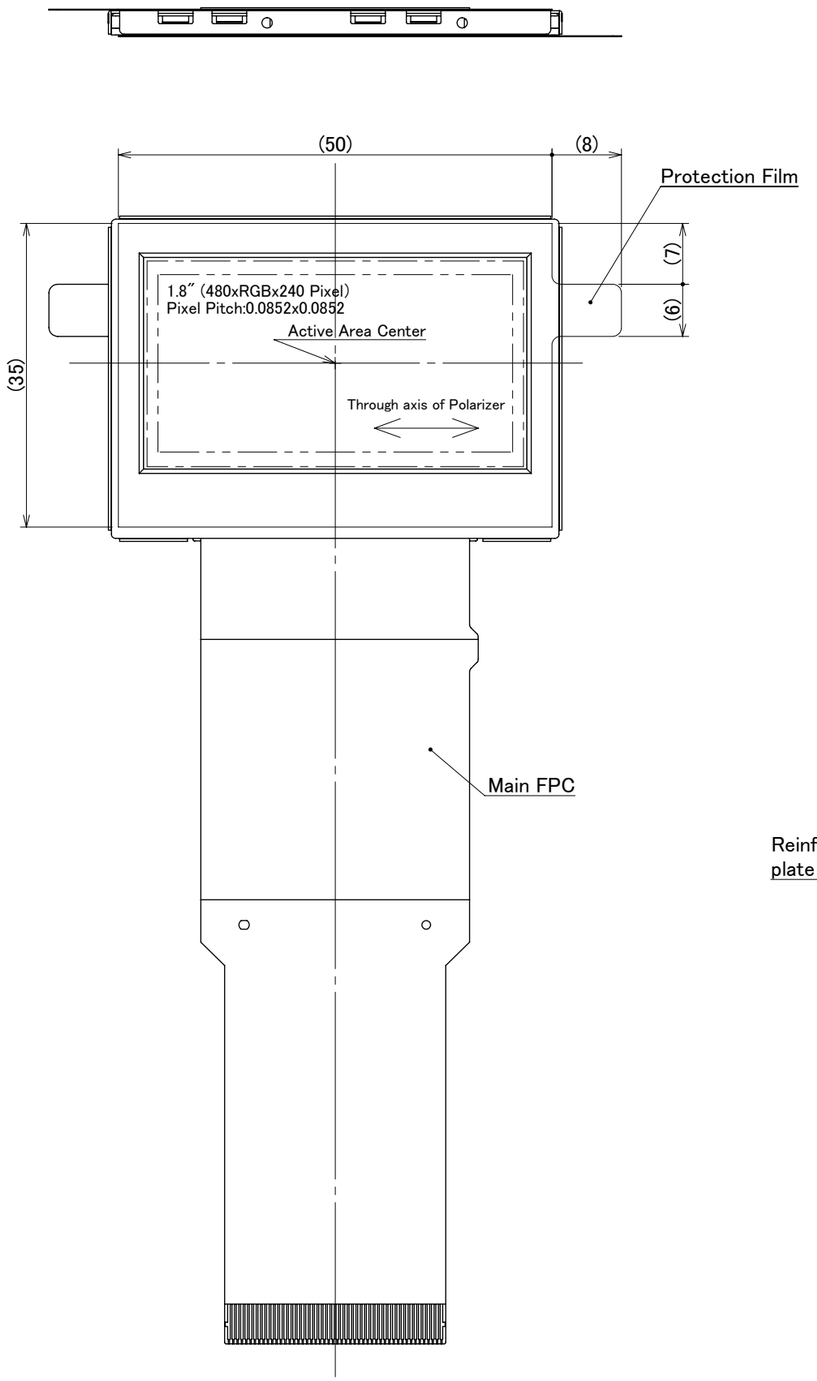
UNIT	TOLERANCE
mm	±0.4
ANGLE	
SCALE √2:1	

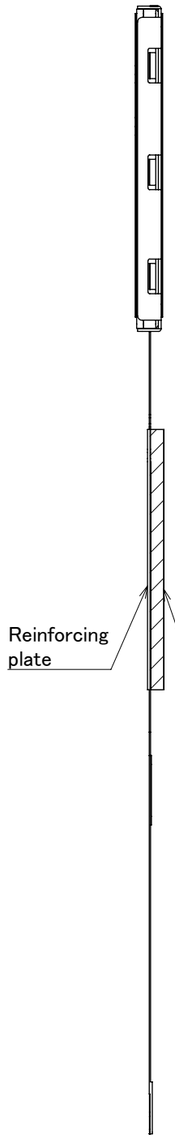
Japan Display Inc.	Product Number	ACX453AKC-E(L4F00453T00)	DWG.REV.No	00

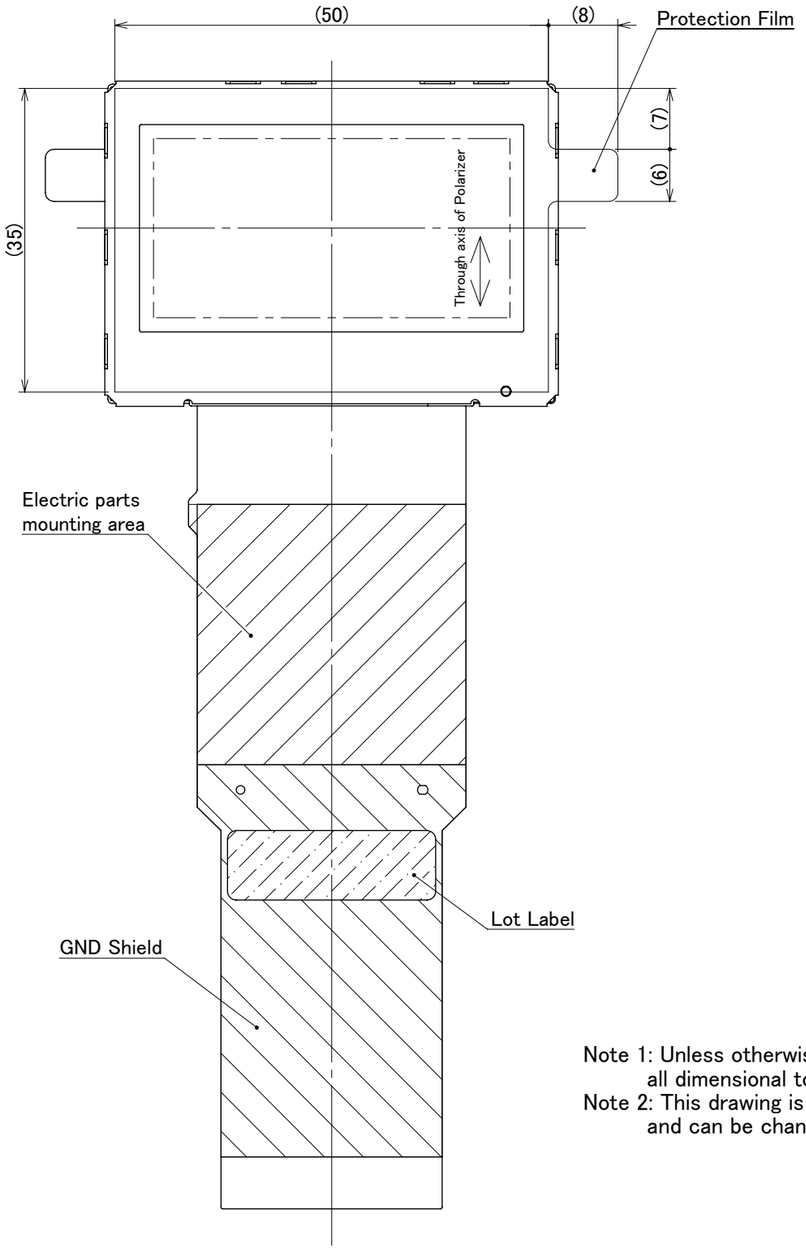
■ Outer Dimensions

Putting position of Protection Film

CONFIDENTIAL







Note 1: Unless otherwise specified,
all dimensional tolerances are ±0.4mm.
Note 2: This drawing is only the preliminary data
and can be changed without prior notice.

UNIT	TOLERANCE
mm	
ANGLE	±0.4
SCALE √2:1	

Japan Display Inc.	Product Number	ACX453AKC-E(L4F00453T00)	DWG.REV.No	00