

SPEC.NO.	TQ3C-8EAF0-E1DDQ05-00
DATE	July 21, 2006

# S P E C

FOR : \_\_\_\_\_

TYPE : TCG085WV1AB-G00

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KYOCERA CORPORATION  
KAGOSHIMA HAYATO PLANT  
LCD DIVISION

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

Original	Designed by :Engineering Dept.			Confirmed by :QA Dept.	
Issue Date	Prepared	Checked	Approved	Checked	Approved
July 21, 2006	<i>J. Yamaguchi</i>	<i>S. Oshita</i>	<i>M. Fujitani</i>	<i>S. Higashio</i>	<i>T. Minami</i>

## Warning

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

## Caution

1. Kyocera shall have the right, which Customer hereby acknowledges, to immediately scrap or destroy tooling for Kyocera modules for which no Purchase Orders have been received from the Customer in a two-year period.

Revision Record

Date	Designed by: Engineering Dept.			Confirmed by: QA Dept.	
	Prepared	Checked	Approved	Checked	Approved
Rev. No.	Date	Page	Descriptions		

## 1. Application

This data sheet defines the specification for a (800×R.G.B)×480 dot, amorphous silicon TFT transmissive color dot matrix type Liquid Crystal Display with CFL backlight. 「RoHS compliant」

## 2. Construction and Outline

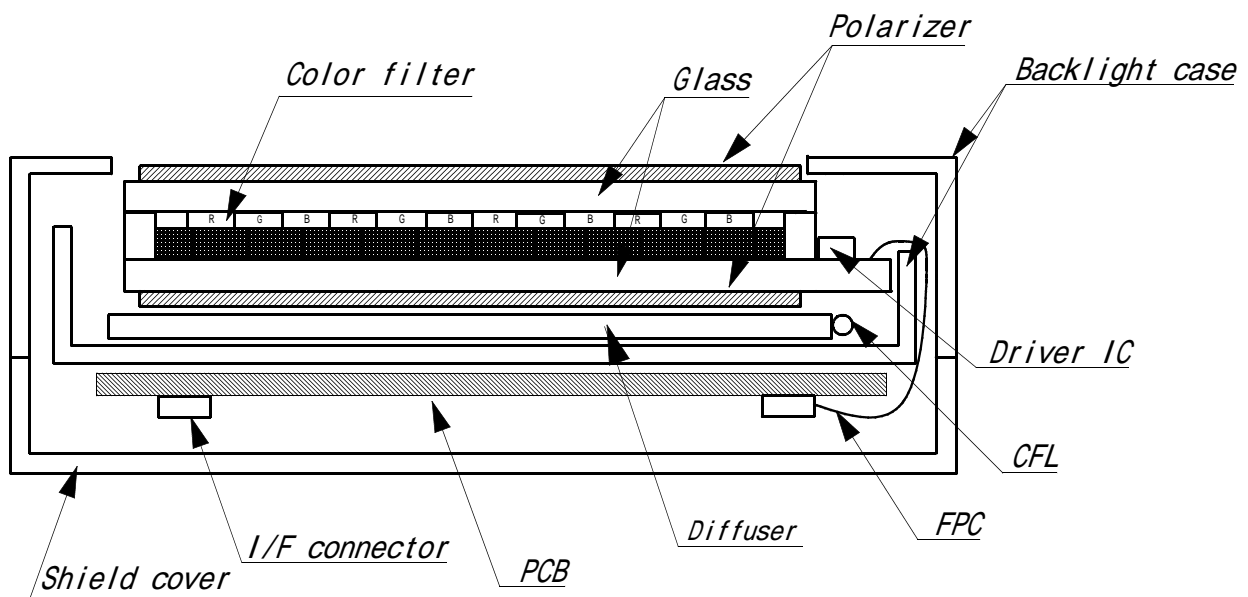
(800×R.G.B)×480 dots, COG type LCD with CFL backlight.

Backlight system : Side edge "L" figured type CFL (1 tube).

Inverter : Option.  
Recommended inverter : TBD

Polarizer : Glare treatment.

Additional circuits : Timing controller, Power supply (3.3V input)



This drawing is showing conception only.

### 3. Mechanical Specifications

ITEM	SPECIFICATION	UNIT
Outline dimensions	(210.7) (W) × (130.8) (H) × (12.2) (D)	mm
Effective viewing area	(186.8) (W) × (112.9) (H)	mm
Dot number	(800 × R.G.B) (W) × 480 (H)	Dots
Dot pitch	(0.077) (W) × (0.231) (H)	mm
Display mode *1	Normally white	-
Mass	(TBD)	g

\*1 Due to the characteristics of the LCD material, the color vary with environmental temperature.

### 4. Absolute Maximum Ratings

#### 4-1. Electrical absolute maximum ratings

ITEM	SYMBOL	Min.	Max.	UNIT
Power input voltage	VDD	(-0.3)	(4.5)	V
Input signal voltage *1	Vin	(-0.3)	(4.5)	V

\*1 Input signals : CLK, R0 ~ R5, G0 ~ G5, B0 ~ B5, Hsync, Vsync, DE

#### 4-2. Environmental absolute maximum ratings

ITEM	SYMBOL	Min.	Max.	UNIT
Operating temperature *1	Top	(-10)	(70)	
Storage temperature *2	Tsto	(-20)	(80)	
Operating humidity *3	Hop	10	*4	%RH
Storage humidity *3	Hsto	10	*4	%RH
Vibration	-	*5	*5	-
Shock	-	*6	*6	-

\*1 Operating temperature means a temperature which operation shall be guaranteed.  
Since display performance is evaluated at 25 , another temperature range should be confirmed.

\*2 Temp. = -20 < 48 h , Temp = 80 < 168 h  
Store LCD panel at normal temperature/humidity.  
Keep it free from vibration and shock.  
LCD panel that is kept at low or high temperature for a long time can be defective due to the other conditions, even if the temperature satisfies standard.  
(Please refers to 12. Precautions for use as detail).

\*3 Non-condensation.

\*4 Temp. 40 , 85%RH Max.  
Temp. > 40 , Absolute Humidity shall be less than 85% RH at 40 .

\*5

Frequency	10 ~ 55 Hz	Converted to acceleration value : ( 0.3 ~ 9 m/s <sup>2</sup> )
Vibration width	0.15 mm	
Interval	10-55-10 Hz 1 minute	

2 hours in each direction X/Y/Z (6 hours as total)  
EIAJ ED-2531

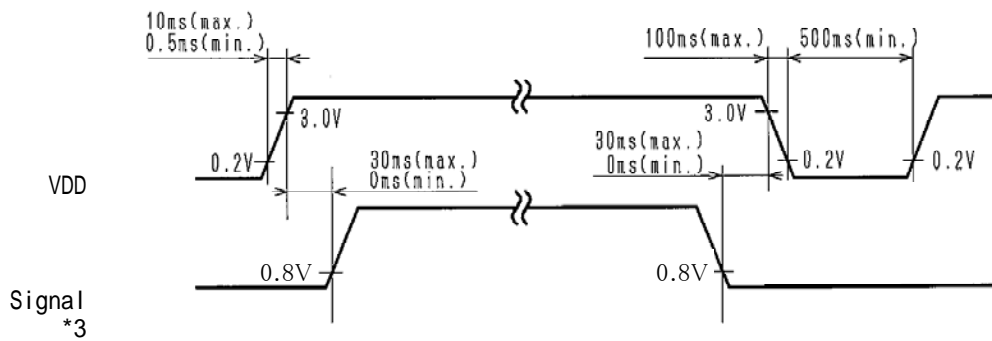
\*6 Acceleration: 490m/s<sup>2</sup>  
Pulse width : 11 ms  
3 times in each direction : ±X/ ±Y/ ±Z.  
EIAJ ED-2531

## 5. Electrical Characteristics

Temp. = -10 ~ 70

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Power input voltage *1	VDD	(3.0)	(3.3)	(3.6)	V
Current consumption *2	IDD	-	TBD	TBD	mA
VDD=3.3V Temp.=25					
Permissive input ripple voltage(VDD=3.3V)	VRP	-	-	TBD	mVp-p
Input signal voltage (Low) *3	VIL	(0)	-	(0.8)	V
Input signal voltage (High) *3	VIH	(2.0)	-	(VDD)	V

### \*1 VDD-turn-on conditions



### \*2 Current consumption Black & White pattern :

VDD = 3.3V  
 123 456 789 . . . . . 239823992400(dot)  
 1  
 2  
 3  
 :  
 :  
 479  
 480  
 ( d o t )

### \*3 Input signals : CLK, R0 ~ R5, G0 ~ G5, B0 ~ B5, Hsync, Vsync, DE

## 6 . Optical Characteristics

Measuring points = 6.0mm, Temp. = 25

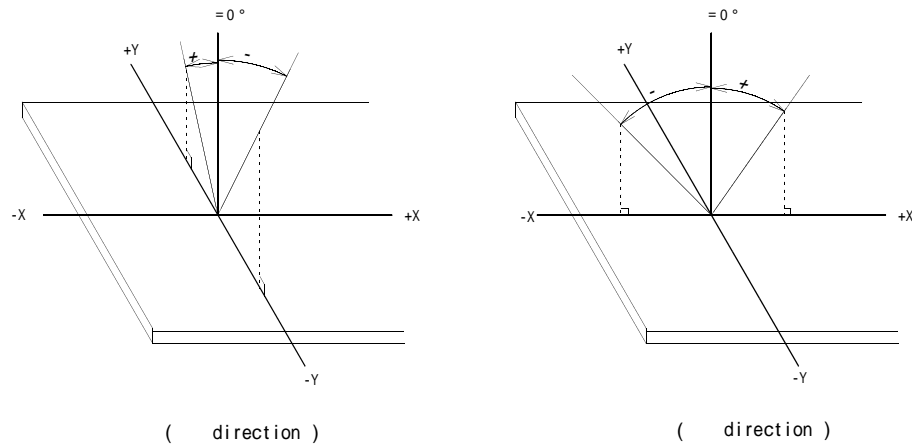
ITEM		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT	
Response time	Rise	r	= =0°	-	(15)	-	ms	
	Down	d	= =0°	-	(35)	-	ms	
Viewing angle range			CR 10	Upper	-	(60)	-	deg.
				Lower	-	(45)	-	
				Left	-	(60)	-	deg.
				Right	-	(60)	-	
Contrast ratio		CR	= =0°	(300)	(500)	-	-	
Luminance(Brightness)		L	IL=(6.0)mArms.	(280)	(400)	-	cd/m <sup>2</sup>	
Luminance uniformity		LU	—	(70)	—	—	%	
Chromaticity coordinates	Red	x	= =0°	TBD	TBD	TBD	-	
		y		TBD	TBD	TBD		
	Green	x	= =0°	TBD	TBD	TBD		
		y		TBD	TBD	TBD		
	Blue	x	= =0°	TBD	TBD	TBD		
		y		TBD	TBD	TBD		
	White	x	= =0°	TBD	TBD	TBD		
		y		TBD	TBD	TBD		

6-1. Contrast ratio is defined as follows:

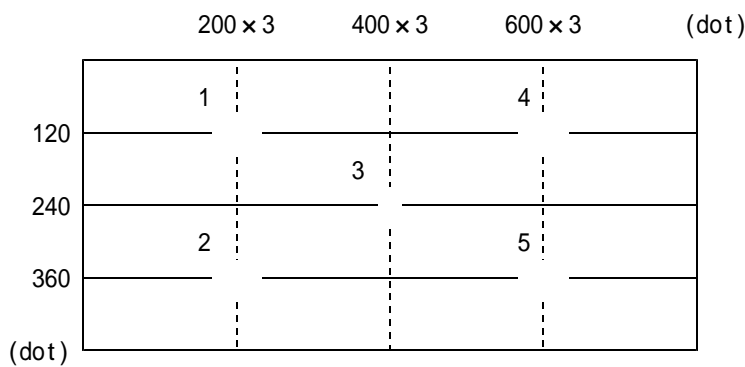
$$CR = \frac{\text{Luminance(Brightness) at all pixels "White"}}{\text{Luminance(Brightness) at all pixels "Black"}}$$



6-2. Definition of viewing angle



6-3. Definition of luminance(brightness) and luminance(brightness) uniformity



1) Rating is defined as the white luminance(brightness) at center of display screen(3).

2) The luminance(brightness) uniformity is calculated by using following formula.

$$\text{Brightness uniformity} = \frac{\text{Minimum luminance(brightness) from 1 to 5}}{\text{Maximum luminance(brightness) from 1 to 5}} \times 100 [\%]$$

3) 30 minutes after CFL is turned on. (Ambient Temp.=25 )

4) The inverter should meet the rating of the CFL;  
-Sine, symmetric waveform without spike in positive and negative.

## 7 . Interface signals

### 7-1. LCD

PIN NO.	SYMBOL	DESCRIPTION	Note
1	VDD	3.3V power supply	
2	VDD	3.3V power supply	
3	VDD	3.3V power supply	
4	VDD	3.3V power supply	
5	NC	No connect	
6	DE	Data Enable (positive)	
7	GND	GND	
8	Vsync	Vertical synchronous signal (negative)	
9	GND	GND	
10	Hsync	Horizontal synchronous signal (negative)	
11	GND	GND	
12	B5	BLUE data signal (MSB)	
13	B4	BLUE data signal	
14	B3	BLUE data signal	
15	GND	GND	
16	B2	BLUE data signal	
17	B1	BLUE data signal	
18	B0	BLUE data signal (LSB)	
19	GND	GND	
20	G5	GREEN data signal (MSB)	
21	G4	GREEN data signal	
22	G3	GREEN data signal	
23	GND	GND	
24	G2	GREEN data signal	
25	G1	GREEN data signal	
26	G0	GREEN data signal (LSB)	
27	GND	GND	
28	R5	RED data signal (MSB)	
29	R4	RED data signal	
30	R3	RED data signal	
31	GND	GND	
32	R2	RED data signal	
33	R1	RED data signal	
34	R0	RED data signal (LSB)	
35	NC	No connect	
36	GND	GND	
37	GND	GND	
38	CLK	Sampling clock	
39	GND	GND	
40	GND	GND	

LCD side connector(CN1) : IMSA-9637S-40C-TB (IRISO)  
 Recommended FFC or FPC : P=0.5mm

### 7-2. CFL

PIN NO.	SYMBOL	DESCRIPTION
1	HOT	Inverter output high voltage side
2	COLD	Inverter output low voltage side

LCD side connector(CN2) : BHR-02(8.0)VS-1N (JST)  
 Recommended matching connector : S02(8.0)B-BHS (JST)  
 S02(8.0)B-BHS(LF)(SN) (JST).....(RoHS)  
 SMO2(8.0)B-BHS-1-TB (JST)  
 SMO2(8.0)B-BHS-1-TB(LF)(SN) (JST).....(RoHS)

\* Please be careful NOT to connect inversely an inverter-output high voltage side to the CFL low voltage side. It may result in damage or electric shock.

## 8 .Timing Characteristics of input signals

### 8-1. Timing characteristics

ITEM		SYMBOL	MIN	TYP	MAX	UNIT
Clock	Frequency	Fck	29.88	33.2	36.52	MHz
	Period	Clk	27.4	30.1	33.5	ns
	High time	Tch	12	-	-	ns
	Low time	Tcl	12	-	-	ns
Data	Set up time	Tds	5	-	-	ns
	Hold time	Tdh	10	-	-	ns
Data Enable	Set up time	Tes	5	-	-	ns
	Hold time	Teh	10	-	-	ns
Horizontal sync. signal	Set up time	Ths	5	-	-	ns
	Hold time	Thh	10	-	-	ns
	Period	Th	944	1,056	1,088	Clk
			-	31.8	-	μs
	Pulse width	Thp	4	128	-	Clk
	Front porch	Thf	-	40	-	Clk
	Back porch	Thb	7	88	-	Clk
Horizontal display period		Thd	800			Clk
Vertical sync. signal	Period	Tv	516	525	534	Th
			14.7	16.6	17.4	ms
	Pulse width	Tvp	1	2	-	Th
	Front porch	Tvf	-	11	-	Th
	Back porch	Tvb	4	32	-	Th
Vertical display period		Tvd	480			Th

\* In case of lower frequency, the deterioration of the display quality, flicker etc., may occur.

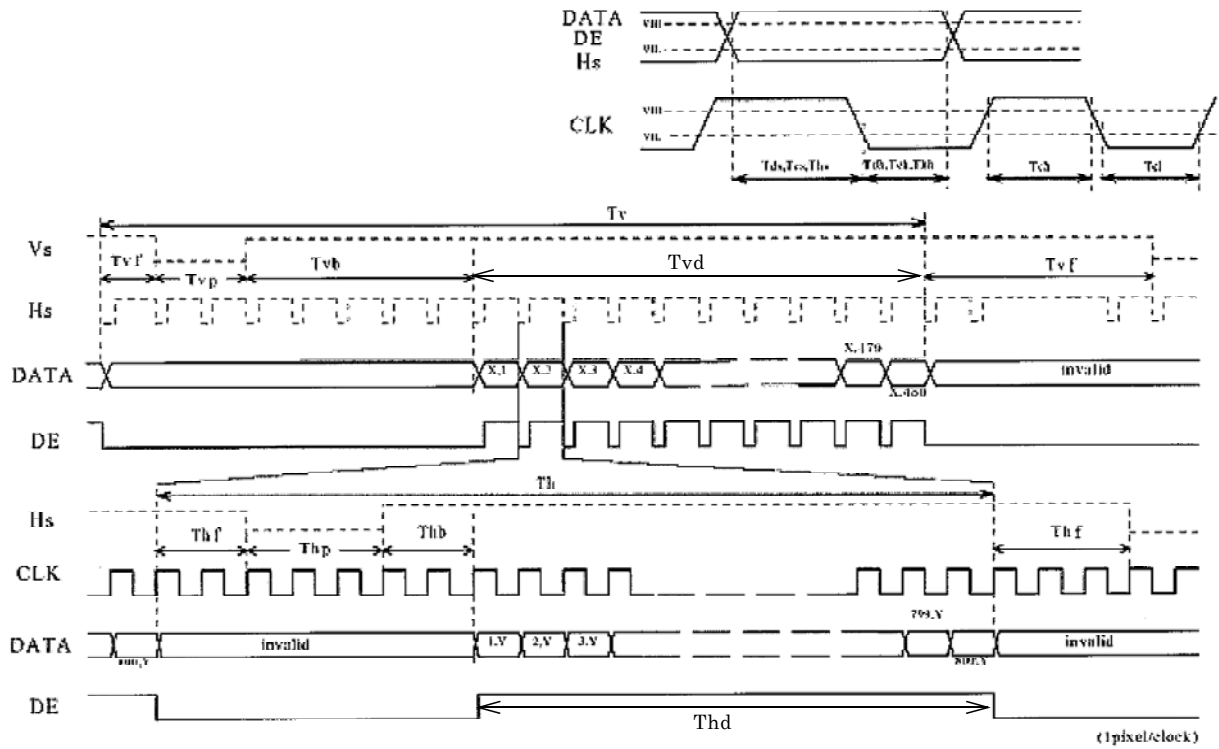
\* If CLK is fixed to "H" or "L" level for certain period while DE is supplied, the panel may be damaged.

\* Please adjust LCD operating signal timing and CFL driving frequency, to optimize the display quality. There is a possibility that flicker is observed by the interference of LCD operating signal timing and CFL driving condition (especially driving frequency), even if the condition satisfies above timing specification.

\* Do not make Tv, Th, and Thp fluctuate .

\* CLK count of each Horizontal Scanning Time should be always the same.  
V-Blanking period should be "n" X "Horizontal Scanning Time" . (n: integer)  
Frame period should be always the same.

### 8-2. Input Timing Characteristics



## 9. Backlight Characteristics

Temp. = 25

ITEM	SYMBOL	MIN.	TYP.	MAX.	NOTE
Starting discharge Voltage *1	VS	-	-	(1,840) Vrms.	-10
		-	-	(1,170) Vrms.	25
Discharging tube current *2	IL	(2.0) mArms.	(5.0) mArms.	(6.0) mArms.	-
Discharging tube voltage	VL	-	(680) Vrms.	-	IL=5mArms
Operating life *3	T	(50,000) h	(75,000) h	-	IL=5mArms
Operating frequency *4	F	(30) kHz	-	(100) kHz	-

- \*1 The Non-load output voltage (VS) of the inverter should be 1.3 times the maximum VS at the low temperature to provide margin to assure that the CFL will start, because actual VS may increase due to leakage current from the CFL cables. (Reference value : 2,395 Vrms Min.)
- \*2 We recommend that you should set the discharging tube current at lower than typical value so as to prevent the heat accumulation of CFL tube from deteriorating a performance of the LCD.
- \*3 End of life is defined as when the illuminance or quantity of light has decreased to 50% of the initial value. Illuminance of light will drastically decrease when LCD is operated at lower temperature for long hours.
- \*4 The driving frequency of the CFL may interfere with the horizontal synchronous signal ,leaving interference stripes on the display. So please evaluate LCD panels beforehand.  
To avoid interference stripes, we recommend to separate as far as possible the CFL frequency from the horizontal synchronous signal and its high harmonic frequency.
- \* There may be cases where interface noise on LCD PCB, generated by high-voltage products such as inverters, may leave stripes on the display. Please be careful when designing a mold to take into consideration that the inverter shall be located as far as possible from PCB.  
Shield protection may be effective.
- \* Prolonged storage in darkness and/or low temperature may slow the ignition and rise to full brightness of the CFL in an LCD Module. Please use an inverter designed to provide sufficient driving voltage for more than 1 second. Also a decreased Starting Discharge Voltage or shortened ignition time may not turn ON the CFL lamp.

## 1 0 . Lot Number Identification

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

T C G 0 8 5 W V 1 A B - G 0 0 - \_\_\_\_\_ - MADE IN \_\_\_\_\_

YEAR
MONTH
DATE
Version Number
Country of origin (Japan or China)

YEAR	2006	2007	2008	2009	2010	2011
CODE	6	7	8	9	0	1

MONTH	JAN.	FEB.	MAR.	APR.	MAY.	JUN.
CODE	1	2	3	4	5	6

MONTH	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
CODE	7	8	9	X	Y	Z

## 1 1 . Warranty

### 11-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

### 11-2. Production Warranty

Kyocera warrants its LCDs for a period of 12 months after receipt by the purchaser, and within the limits specified. Kyocera shall, by mutual agreement, replace or rework defective LCDs that are shown to be Kyocera's responsibility.

## 1 2 . Precautions for use

### 12-1. Installation of the LCD

1. A transparent protection sheet shall be added to protect the LCD and its polarizers.
2. The LCD shall be installed so that there is no pressure on the LSI chips.
3. The LCD shall be installed flat, without twisting or bending.
4. The display window size should be the same as the effective viewing area.
5. In case you use outside frame of effective viewing area as outward appearance of your product, unevenness of its outward appearance is out of guarantee.
6. A transparent protection sheet is attached to the polarizer. Please remove the protection film slowly before use, paying attention to static electricity.
7. Do not pull the CFL lead wires and do not bend the root of the wires.  
Housing should be designed to protect CFL lead wires from external stress.
8. This Kyocera LCD module has been specifically designed for use in general electronic devices, but not for use in a special environment such as usage in an active gas.  
Hence, when the LCD is supposed to be used in a special environment, evaluate the LCD thoroughly beforehand and do not expose the LCD to chemicals such as an active gas.

### 12-2. Static Electricity

1. Since CMOS ICs are mounted directly onto the LCD glass, protection from static electricity is required. Operator should wear ground straps.

### 12-3. LCD Operation

1. The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.
2. Operation of the LCD at temperature below the limit specified may cause image degradation and/or bubbles.  
It may also change the characteristics of the liquid crystal.  
This phenomenon may not recover. The LCD shall be operated within the temperature limits specified.

### 12-4. Storage

1. The LCD shall be stored within normal temperature and humidity.  
Store in a dark area, and protected the LCD from direct sunlight or fluorescent light.
2. The LCD should be packaged to prevent damage.

### 12-5. Screen Surface

1. DO NOT store in a high humidity environment for extended periods.  
Image degradation, bubbles, and/or peeling off of polarizer may result.
2. The front polarizer is easily scratched or damaged.  
Prevent touching it with any hard material, and from being pushed or rubbed.
3. The LCD screen may be cleaned with a soft cloth or cotton pad.  
Methanol, or Isopropyl Alcohol may be used, but insure that all solvent residue is removed.
4. Water may cause damage or discoloration of the polarizer.  
Clean any condensation or moisture from any source immediately.
5. Always keep the LCD free from condensation during testing.  
Condensation may permanently spot or stain the polarizers.
6. Do not disassemble LCD module because it will result in damage.
7. Please do not use solid-base image pattern for long hours because a temporary afterimage may appear. We recommend to use screen saver etc. in cases where a solid-base image pattern must be used.
8. Liquid crystal may leak when the module is broken. Be careful not to let the fluid go into your eyes and mouth. In the case the fluid touches your body, rinse it off right away with water and soap.

### 1 3 . Reliability Data / Environmental Test

TEST ITEM	TEST CONDITION	TEST TIME	RESULT
High Temp. Atmosphere	TBD	TBD h	Display Quality : TBD Display Function : TBD Current Consumption : TBD
Low Temp. Atmosphere	TBD	TBD h	Low Temp. Bubble : TBD Solid Crystallization of Liquid Crystal : TBD Display Quality : TBD Display Function : TBD Current Consumption : TBD
High Temp. Humidity Atmosphere	TBD TBD %RH	TBD h	Display Quality : TBD Display Function : TBD Peel-off of Organic Sealing : TBD Current Consumption : TBD
Temp. Cycle	TBD TBD h R.T. TBD h TBD TBD h	TBD cycles	Display Quality : TBD Display Function : TBD Peel-off of Organic Sealing : TBD Bubble on Cell : None
High Temp. Operation	TBD	TBD h	Display Quality : No defect Current Consumption : No defect

\* Each test item uses a test LCD only once. The tested LCD is not used in any other tests.

\* The LCD is tested in circumstances in which there is no condensation.

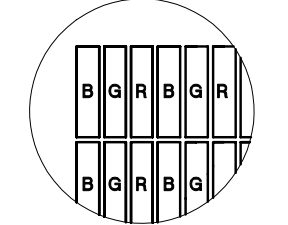
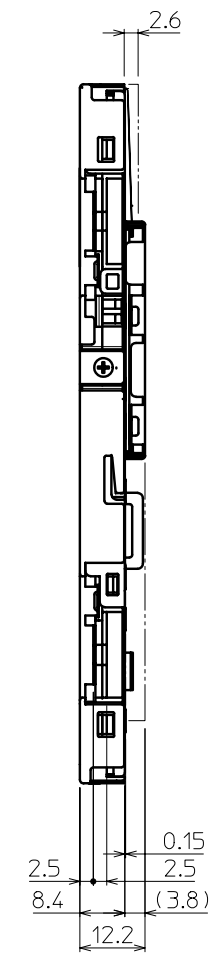
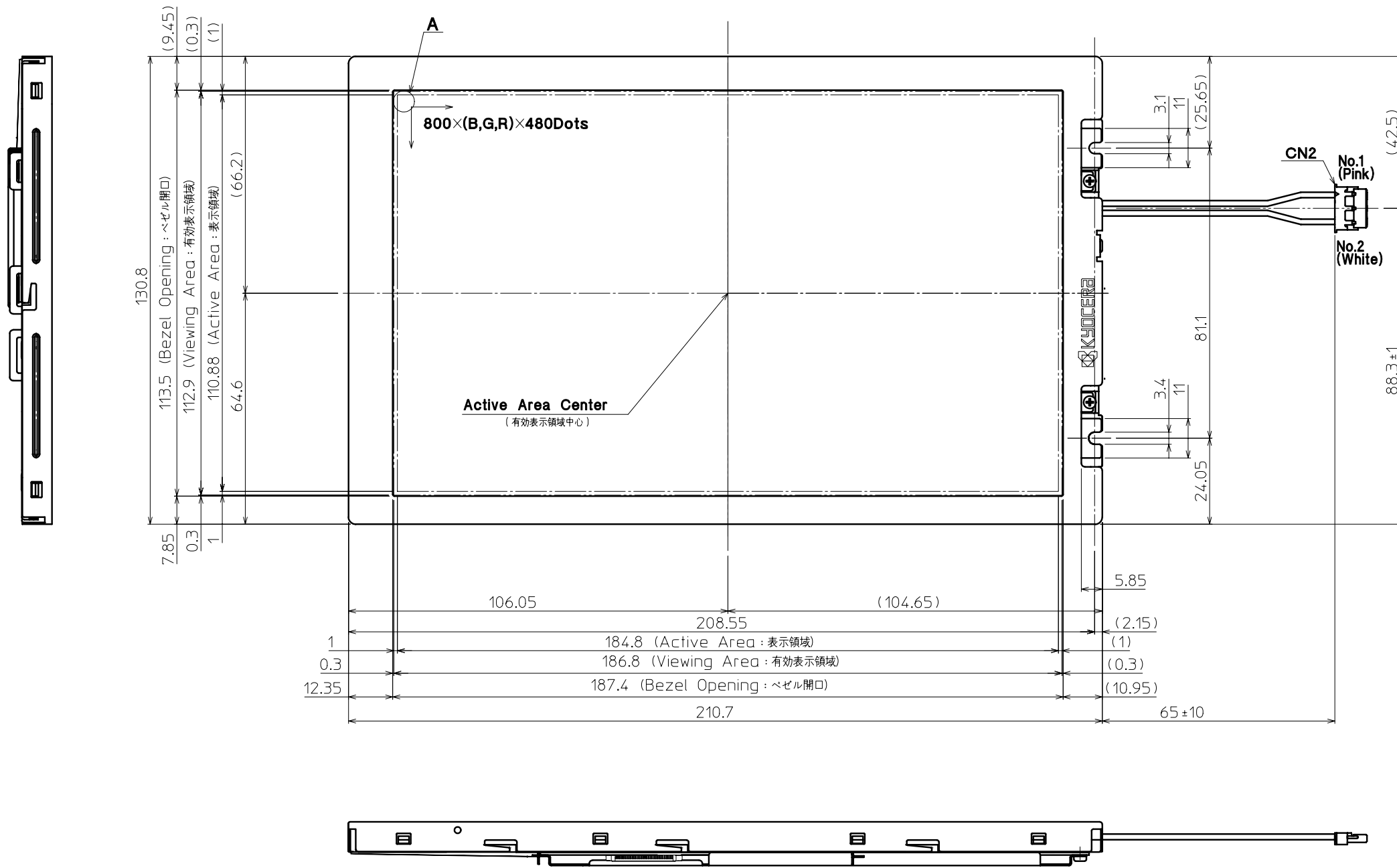
\* The tested LCD is inspected after 24 hours of storage at room temperature and room humidity after each test is finished.

\* The reliability test is not an out-going inspection.

\* The results of the reliability test are for your reference purpose only.  
The reliability test is conducted only to examine the LCD's capability.



10	11	12		
Description	Drawn	Checked	Checked	Approved

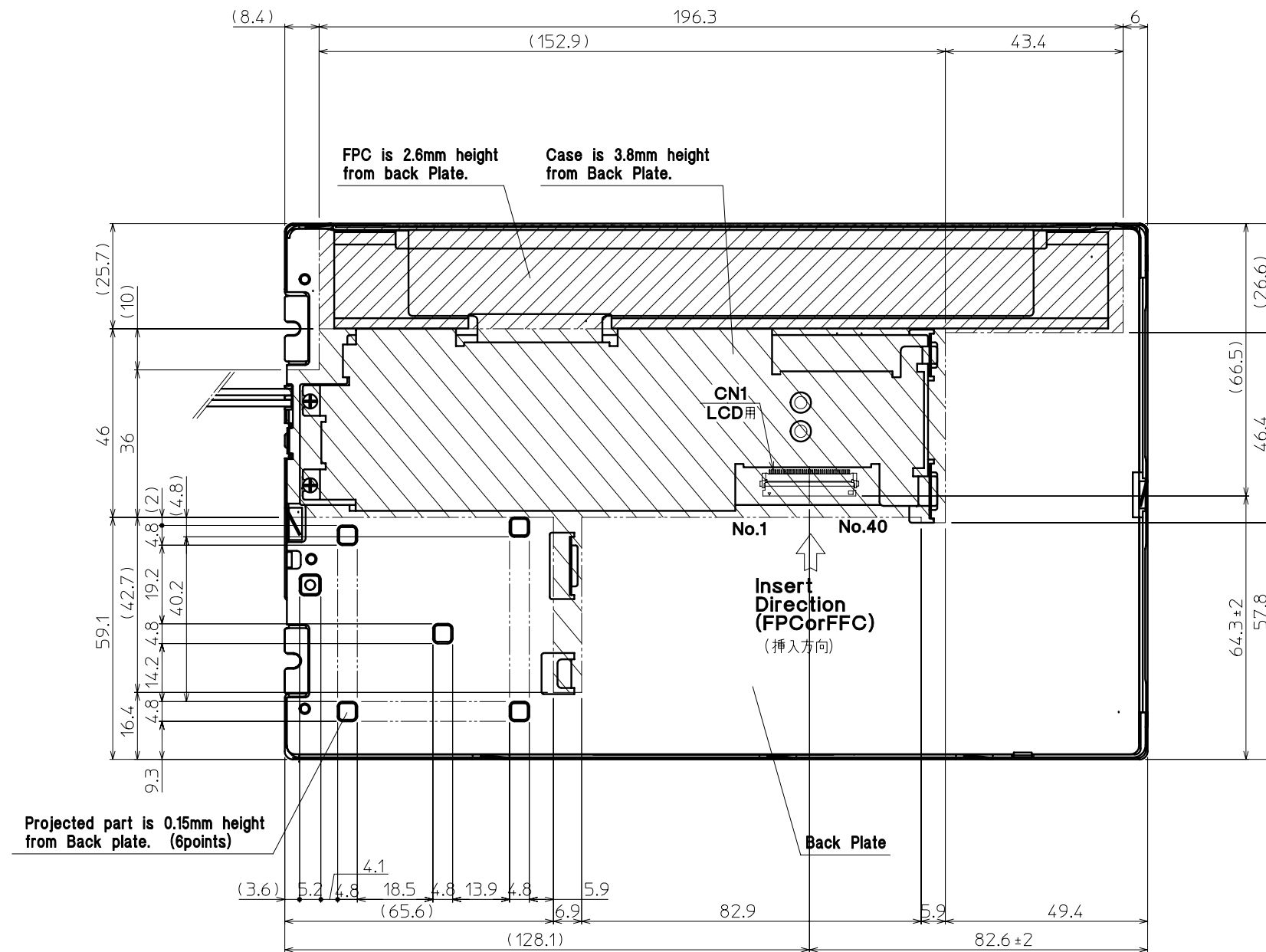


**DETAIL A (Dot Size)**  
(NTS)

Note.  
 1. Connector CN1: IMSA-9637S-40C-TB (IRISO)  
 (コネクタ) CN2: BHR-02(8.0)VS-1N (JST)  
 2. Matching Connector: S02(8.0)B-BHS (JST)  
 (適合コネクタ) S02(8.0)B-BHS(LF)(SN) (JST)  
 SM02(8.0)B-BHS-1-TB (JST)  
 SM02(8.0)B-BHS-1-TB-(LF)(SN) (JST)  
 3. The Information of LCD is displayed starting at the upper left hand corner, moving right then down to the lower right hand corner.  
 (LCDにおいて、画像データの表示は左上コーナーから始まり、右へ進み下へ送られ右下コーナーへ向かう。)  
 4. Tolerance without indication: ±0.5  
 (指示無き公差)

Material Densitron Technologies plc does not warrant the accuracy or completeness of the information contained herein for the supply of product. Densitron is subject to its standard terms and conditions of sale.	Treatment RoHS	Approved 06.07.09 朝倉	Checked 06.07.09 阿部	Checked 倉元	Drawn 倉元	Scale 1:1 (NTS)	Title TCG085WV1AB Outline Dimensions		Year-Month-Day '06.07.07	Size 2
	製作数	備考	朝倉	阿部	倉元	倉元	Drawing No. 121A5051500		1	2

Description	11		12	
	Drawn	Checked	Checked	Approved



Material Densitron Technologies plc does not warrant the accuracy or completeness of the information contained herein. The supply of product is subject to its standard terms and conditions of sale.	Treatment RoHS	Approved 06.07.09 朝倉	Checked 06.07.09 阿部	Checked 06.07.09 倉元	Drawn 倉元	Scale 1:1 (NTS)	Title TCG085WV1AB Outline Dimensions	Year-Month-Day '06.07.07 Drawing No. 121A5051500	Size 2 2 2
	Quantity 製作数	備考	朝倉	阿部	倉元	倉元	倉元		

SPEC. NO.	TQ3C-8EAF0-E2DDQ05-00
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KYOCERA INSPECTION STANDARD

TYPE : TCG085WV1AB-G00

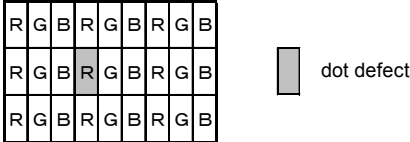
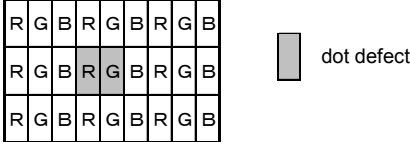
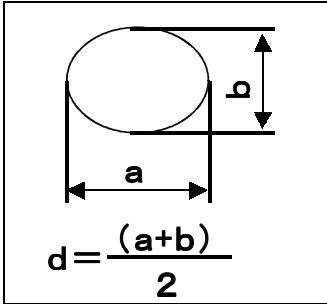
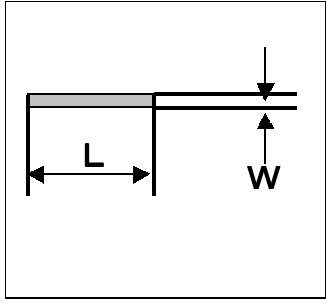
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LCD DIVISION

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1) Note

		Note		
General	<p>1. Customer identified anomalies not defined within this inspection standard shall be reviewed by Kyocera, and an additional standard shall be determined by mutual consent.</p> <p>2. Inspection Conditions            Luminance : 500 Lux minimum            Inspection distance : 300 mm (from the sample)            Temperature : 25 ± 5 °C            Direction : directly above</p>			
Definition of Inspection item	Dot defect	Bright dot defect	<p>The dot is constantly "on" when power applied to the LCD, even when all "Black" data sent to the screen.            Inspection tool: 5% Transparency neutral density filter.            Count dot: If the dot is visible through the filter            Don't count dot: If the dot is not visible through the filter.</p> 	
		Black dot defect	<p>The dot is constantly "off" when power applied to the LCD, even when all "white" data sent to the screen.</p>	
		Adjacent dot	<p>Adjacent dot defect is defined as two or more bright dot defects or black dot defects.</p> 	
	External inspection	Bubble, Scratches, Foreign particle (Polarizer, Cell, Backlight)	Visible operating (all pixels "Black" or "White") and non operating.	
		Appearance inspection	Does not satisfy the value at the spec.	
	Others	CFL wires	Damaged to the CFL wires, connector, pin, functional failure or appearance failure.	
	Definition of size	Definition of circle size		Definition of linear size
				

## 2) Standard

Classification		Inspection item		Judgement standard																
defect (in LCD glass)	Dot defect	Bright dot defect		Acceptable number : 4 bright dots defects Bright dot spacing : 5 mm or more																
		Black dot defect		Acceptable number : 5 black dots defects Black dot spacing : 5 mm or more																
		2 dots join	Bright dot defect	Acceptable number : 2																
			Black dot defect	Acceptable number : 3																
		3 or more dots join		Acceptable number : 0																
	Total dot defects		Acceptable number : 5 Max																	
	Others	White dot, Dark dot (Circle)		<table border="1"> <thead> <tr> <th>Size (mm)</th> <th>Acceptable Number</th> </tr> </thead> <tbody> <tr> <td><math>d &lt; 0.2</math></td> <td>(neglected)</td> </tr> <tr> <td><math>0.2 &lt; d \leq 0.4</math></td> <td>5</td> </tr> <tr> <td><math>0.4 &lt; d \leq 0.5</math></td> <td>3</td> </tr> <tr> <td><math>0.5 &lt; d</math></td> <td>0</td> </tr> </tbody> </table>			Size (mm)	Acceptable Number	$d < 0.2$	(neglected)	$0.2 < d \leq 0.4$	5	$0.4 < d \leq 0.5$	3	$0.5 < d$	0				
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External inspection (Defect on Polarizer or between Polariz- er and LCD glass)	Polarizer (Scratches)			<table border="1"> <thead> <tr> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable Number</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.1</math></td> <td>-</td> <td>(neglected)</td> </tr> <tr> <td rowspan="2"><math>0.1 &lt; W \leq 0.3</math></td> <td><math>L \leq 5.0</math></td> <td>(neglected)</td> </tr> <tr> <td><math>5.0 &lt; L</math></td> <td>0</td> </tr> <tr> <td><math>0.3 &lt; W</math></td> <td>-</td> <td>0</td> </tr> </tbody> </table>			Width (mm)	Length (mm)	Acceptable Number	$W \leq 0.1$	-	(neglected)	$0.1 < W \leq 0.3$	$L \leq 5.0$	(neglected)	$5.0 < L$	0	$0.3 < W$	-	0
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