To :

Specification of FUJITSU TFT-LCD module

FLC51UXC8V- H

Approval
Date :
By :

This Product is designed, developed and manufactured as contemplated for general use, including without limitation, general office use, personal use, household use, and ordinary industrial use, but is not designed, developed and manufactured as contemplated for use accompanying fatal risks or dangers that, unless extremely high safety is secured, could lead directly to death, personal injury, severe physical damage or other loss (hereinafter "High Safety Required Use"), including without limitation, nuclear reaction control in nuclear facility, aircraft flight control, air traffic control, mass transport control, medical life support system, missile launch control in weapon system. If customer's product possibly falls under the category of High Safety Required Use, please consult with our sales representatives in charge before such use. In addition, Fujitsu shall not be liable against the Customer and/or any third party for any claims or damages arising in connection with the High Safety Required Use of the Product without permission.

Specification No. : Tech Bes LCD-00249

Issue Date : January 7, 2004

Issued by :

K. Tanaka
Director
Design Dep.
Technology Div.

FUJITSU DISPLAY TECHNOLOGIES CORPORATION

REVISION HISTORY

Revision	Date	Prepared	Checked		Approved	Summary
03C	Jan.7.2004	M.Nishido	Y.Furukoshi		K.Tanaka	1st issue

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EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION
DESIG.	20040107	M.Nishido	CHECK	Furukoshi	APPR. K.Tanaka

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1. APPLICATION

This specification is applied to the 20.1-inch UXGA supported TFT-LCD module.

2. PRODUCT NAME AND MODEL NUMBER

2–1 Product Name: LCD Module

2–2 Model Name: FLC51UXC8V- H

3. OVERVIEW

This LCD module has a TFT active matrix type liquid crystal panel 1600x1200 pixels, and diagonal size of 51cm(20.1-inch). This LCD has a LVDS dual interface and can display 16,777,216 colors.

The power supply of this LCD module is +12V DC single.

This module has the characteristics for applying TCO'99.

This module has equivalent to 100% EBU color filter.

4. CONFIGURATION

This LCD module consists of a color TFT-LCD panel that is mounted with TFT driver ICs, a cold-cathode fluorescent tube back-light.
The inverter for the backlight is included.
Figure 4-1 shows a block diagram of this LCD module.

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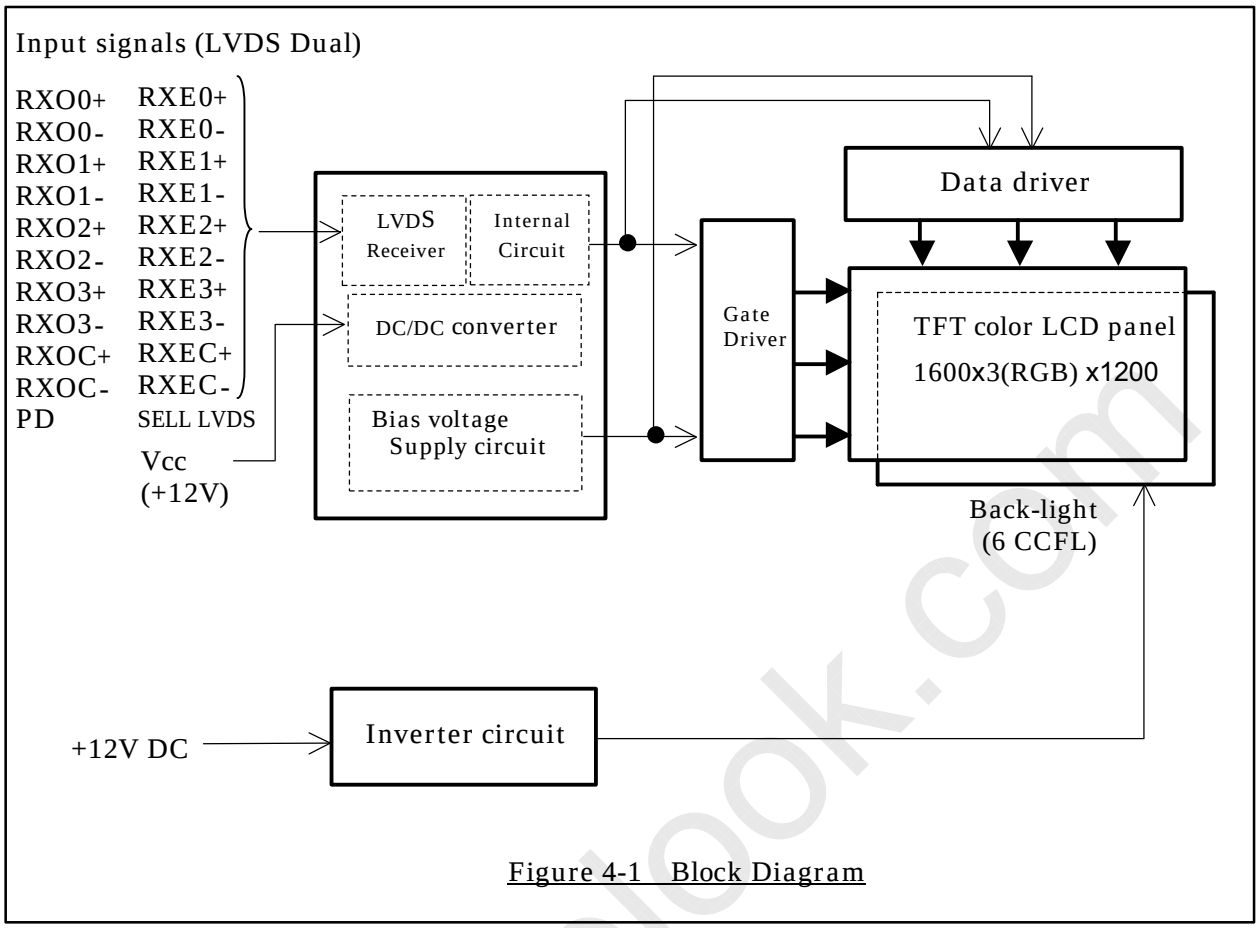

Figure 4-1 Block Diagram

5. MECHANICAL SPECIFICATIONS

Table 5-1 shows the mechanical specifications of this LCD module.

Table 5-1 Mechanical Specifications

Item	Specifications	Unit	Remark
Dimensions	456x356x30.9(TYP.)	mm	Edge type back-light is used. (ϕ 2.6 CCFLx6)
Display Resolution	(1600x3) x1200	—	Include inverter.
Display Dot Area	408.0x306.0	mm	For details on dimensions, See dimensional outline drawing. (At page 34,35,36: Figure 19-1,2,3)
Dot Pitch	(0.085x3)x0.255	mm	
Aspect Ratio	1:1	—	
Weight	3,700 (Typ)	g	Excluding inverter.
FG-SG	Short circuit	—	

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6. ABSOLUTE MAXIMUM RATING

Table 6-1 shows the absolute maximum rating of this LCD module.

Table 6-1 Absolute Maximum Rating

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{CC}	Ta=25ºC	–0.3	—	14.0	V
	V_{INV}	Ta=25ºC	–0.3	—	14.0	V
Input Signal Voltage (LVDS signal, PD, SELL LVDS)	V_{IN}	Ta=25ºC	–0.3	—	3.6	V
Control Voltage	V_{CNT}	Ta=25ºC	–0.3	—	V_{INV}	V
Brightness Control Voltage	V_{VR4}	Ta=25ºC	0	—	4.0	V

7. RECOMMENDED OPERATING CONDITIONS

Table 7-1 shows the recommended operating conditions of this LCD module.

Table 7-1 Recommended Operating Conditions

Item		Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage (Logic)		V_{CC}	11.5	12.0	12.5	V
Supply Voltage (Inverter)		V_{INV}	10.8	12.0	13.2	V
Ripple Voltage	V_{CC}	V_{RP}	—	—	0.1	V

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8. ELECTRICAL SPECIFICATIONS

Table 8-1 shows the electrical specifications of this LCD module. Figure 8-1 shows the measurement circuit. Figure 8-2(A) shows the equivalent circuit of the logic signal input area. Figure 8-2(B) shows the equivalent circuit of the supply voltage Input area.

Table 8-1 Electrical Specifications

Item		Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark
Differential-input Voltage (High)		V_{IH}	V_{CM}=+1.2V	—	—	100	mV	
Differential-input Voltage (Low)		V_{IL}		–100	—	—	MV	
Supply Current		I_{CC}	V_{CC}=+12.0±0.5V V_{SS}=0V DCLK=81MHz 60Hz	—	600	1200	mA	*1
Supply Rush Current		I_{SCC}		—	—	5.8	A	*2
Supply Rush Current Duration (1A excess)		T_{SCC}		—	—	0.2.	ms	
BACK LIGHT (*3)	Supply Current	I_{INV}	V_{INV}=12.0V V_{VR4}=0V	—	2.6	3.0	A	*3
	Brightness Control Voltage	V_{VR4}		0	—	3.5	V	
	Lighting Frequency	f	V_{INV}=12.0V, V_{VR4}=0V	—	38.1	—	KHz	
	Lighting Fix Voltage	Vcnt		0	—	0.8	V	
	Non-Lighting Fix Voltage	Vcnt		2.1	—	V_{INV}		

(*1) Typical current situation : Color bar pattern. Vcc=12.0V
Maximum current situation: 2pixel checker pattern. Vcc=11.5V
Without rush current.

(*2) These items prescribe the rush current for starting internal DC/DC.
Charging current to capacitors of Vcc is not prescribed.

(*3) External power supply for inverter shall have the current capacity more than 12.6A of the supply current (I_{INV}), otherwise the protective circuit of inverter (fuse) might not work.

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Measurement circuit is based on Figure 8-1.

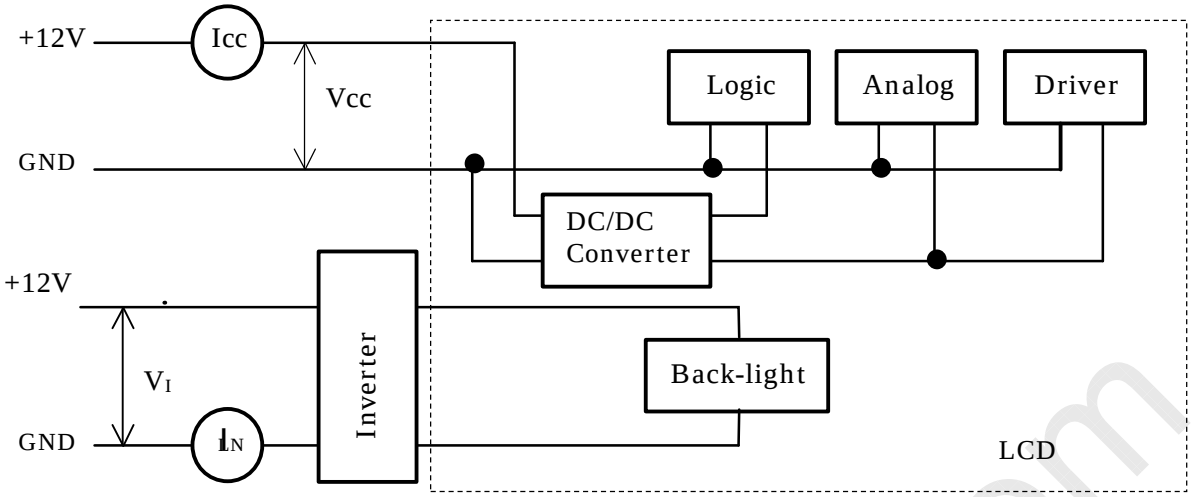
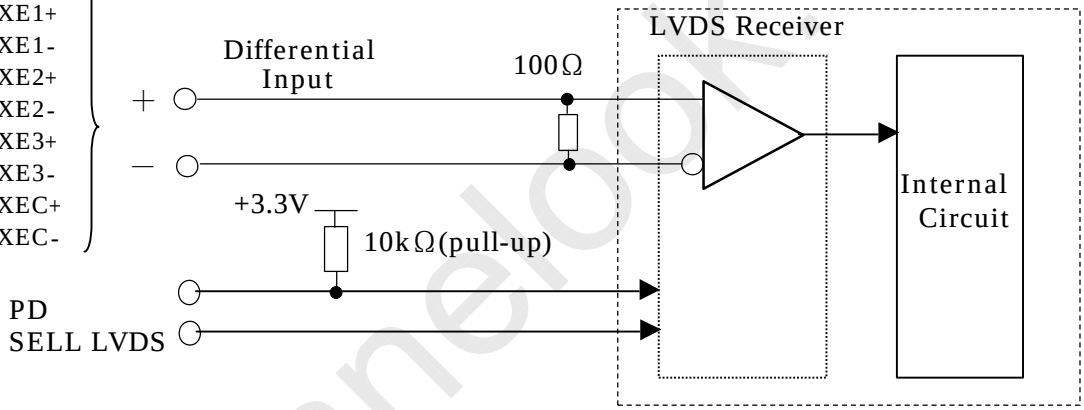


Figure 8-1 Measurement circuit

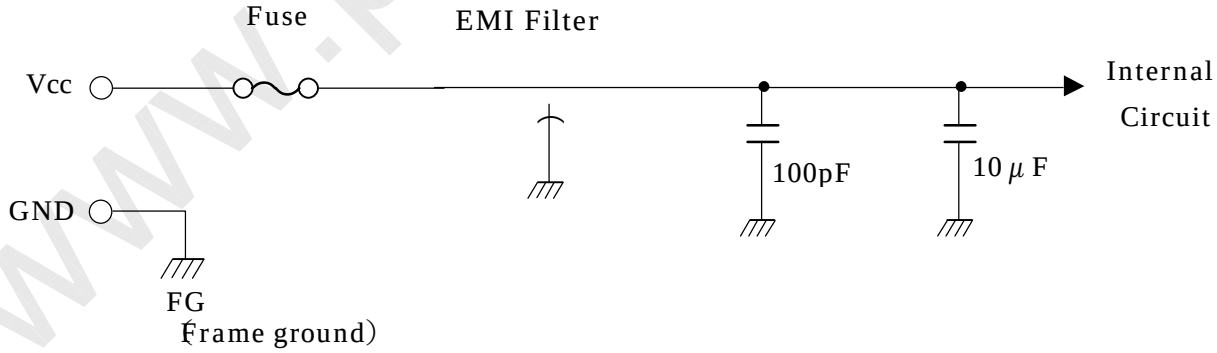
Input signals (LVDS Dual)

RXO0+	RXE0+
RXO0-	RXE0-
RXO1+	RXE1+
RXO1-	RXE1-
RXO2+	RXE2+
RXO2-	RXE2-
RXO3+	RXE3+
RXO3-	RXE3-
RXOC+	RXEC+
RXOC-	RXEC-



LVDS Receiver: DS90CF386 (National Semiconductor) or
THC63LVDF84B (Thine Electronics)

Figure 8-2(A) Equivalent circuit of logic signal Input



Fuse: KAB240240-4A (Matsuo Electric Co.LTD)

EMI Filter: SGM45C1H222 (Sumitomo Metal Electronics Devices Inc)

Figure 8-2(B) Equivalent circuit of power supply

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9. OPTICAL SPECIFICATIONS

Table 9-1 shows the optical specifications of this LCD module.

Table 9-1 Optical Specifications

Ta=25˚C

Item		Symbol	Condition		Specifications MIN.	Specifications TYP.	Specifications MAX.	Unit	Remark	Note
Visual Angle	Horizontal	$\theta_{L,R}$	CR≧10	$\theta_{U,D}$=0°	85	—	—	deg		(1)(2)(3)(5)(6)
	Vertical	$\theta_{U,D}$		$\theta_{L,R}$=0°	85	—	—	deg		
	All Direction	θ			—	80	—	deg		
Contrast Ratio		CR	$\theta_{L,R,U,D}$=0°		350	600	—	—	White/ Black	(1)(2)(3)(5)
Response Time (ON) (B→W)		t_{on}	$\theta_{L,R,U,D}$=0°	Ta=25˚C	—	15	30	ms		(1)(4)(5)
				Ta=0˚C	—	50	100	ms		
Response Time (OFF) (W→B)		t_{off}	$\theta_{L,R,U,D}$=0°	Ta=25˚C	—	10	25	ms		
				Ta=0˚C	—	50	100	ms		
Response Time (ON or OFF) (All gray scale)		t_{avg}	$\theta_{L,R,U,D}$=0°	Ta=25˚C 50±3Hz 60±3Hz	—	15	—	ms	Average of Response Time	
Brightness		I	$\theta_{L,R,U,D}$=0° V_{CC}=12.0V V_{INV}=12.0V (At maximum Brightness)		200	250		cd/m²	White *1	(1)(5)
Brightness Uniformity		△I			70	—	—	%		(1)(5)(7)
Chromaticity	W	x			0.283.	0.313	0.343	—		(1)(5)
		y			0.299	0.329	0.359	—		
	R	(x, y)		Red	(0.647,0.346) Typ.					
	G			Green	(0.298,0.591) Typ.					
	B			Blue	(0.142,0.070) Typ.					
LCD Panel Type					TFT Color					
Display Mode					Normally Black					
Wide Viewing Angle Technology					MVA					
Optimum Viewing Angle					— (Symmetry)					(6)
Display Color					16,777,216 (8-bit color)					
Color of non-display area					Black					
Surface Treatment					Anti-glare (Haze value: ≦5%), 2H)					

(*1) Value at 15～20 minutes after lighting on.

(Note) ・

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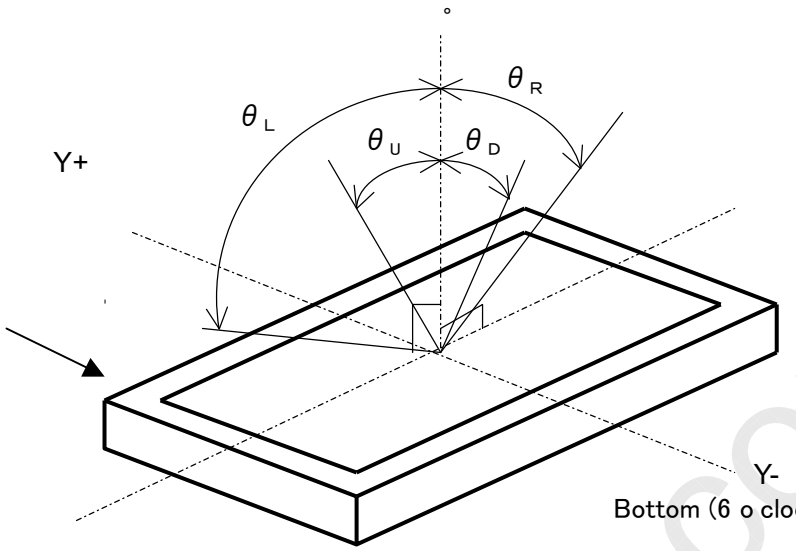

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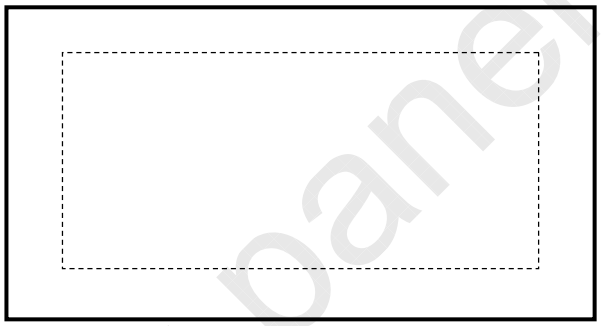

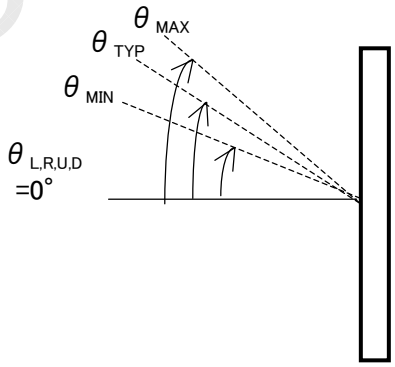

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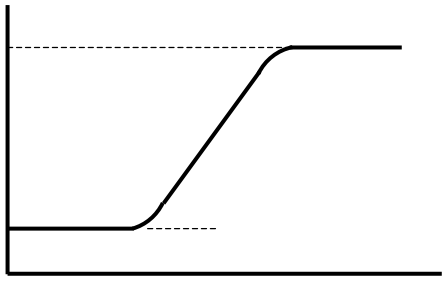

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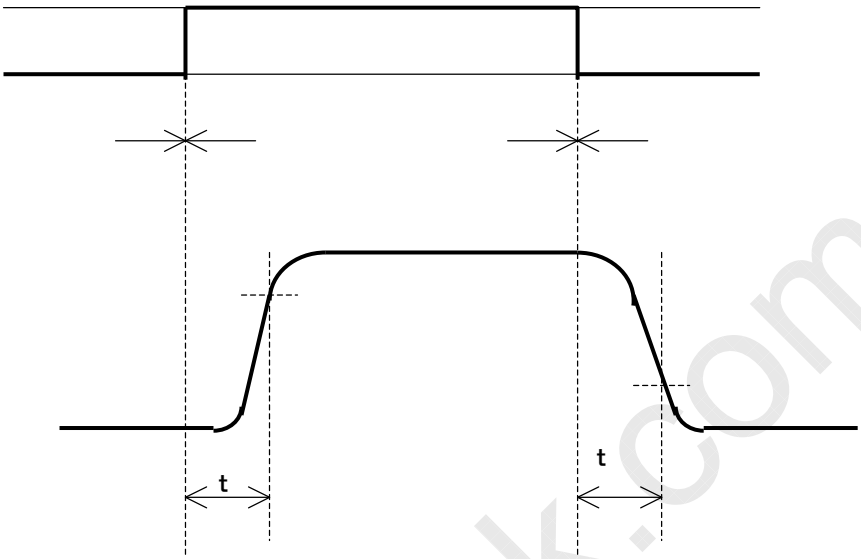

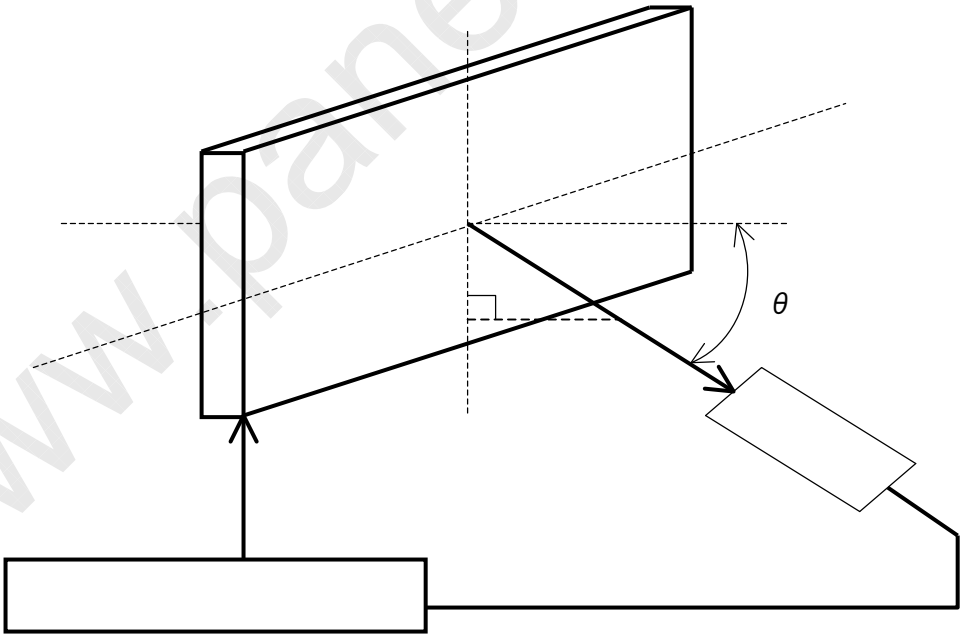

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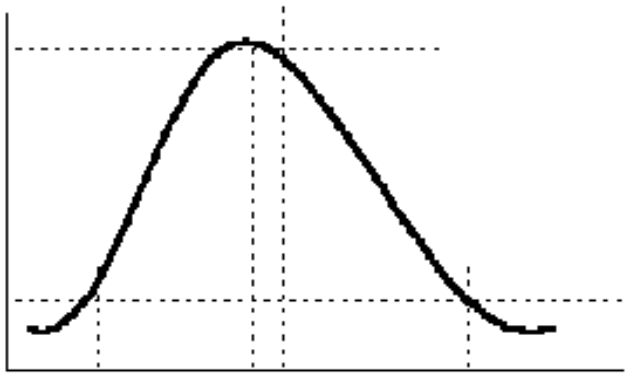

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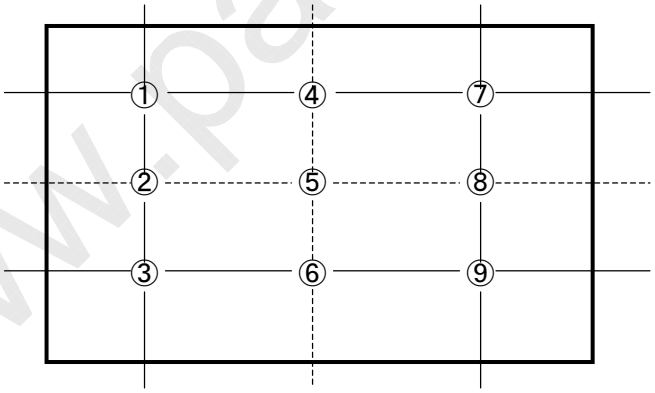

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10. INTERFACE SPECIFICATIONS

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Basic Color			
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Green	⇧ ⇧ ⇩ ⇩		
Blue	⇧ ⇧ ⇩ ⇩		

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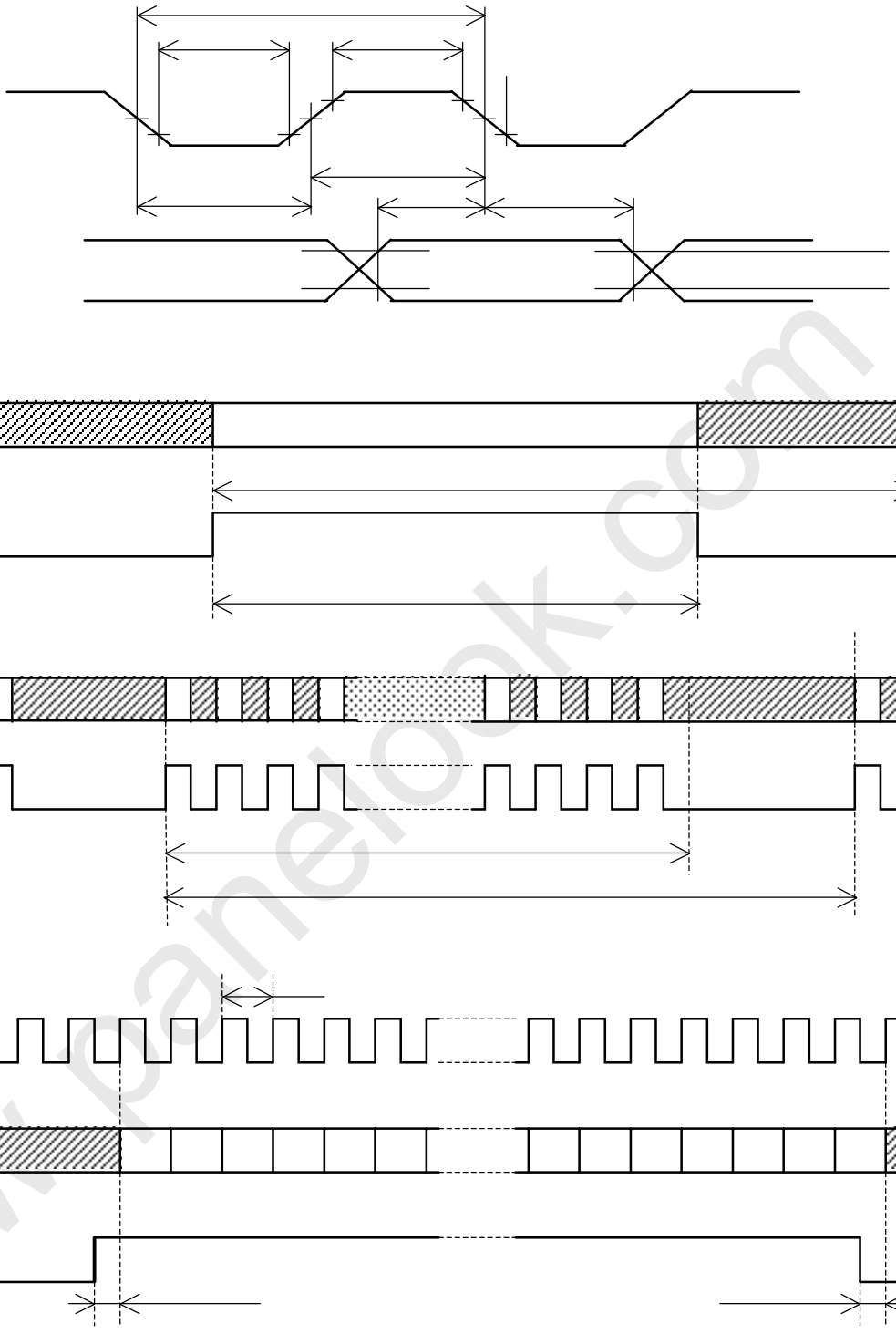

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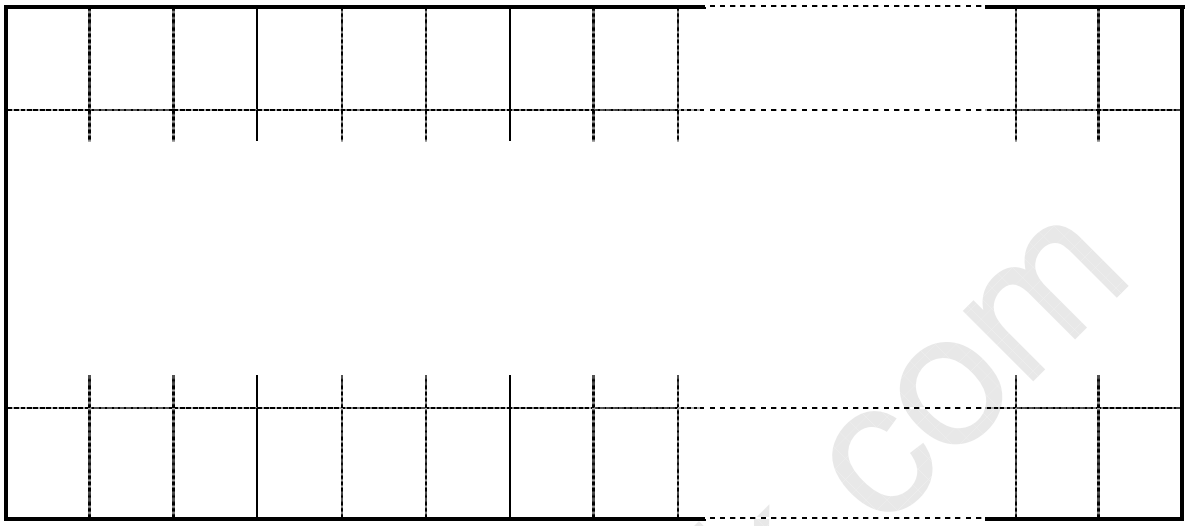

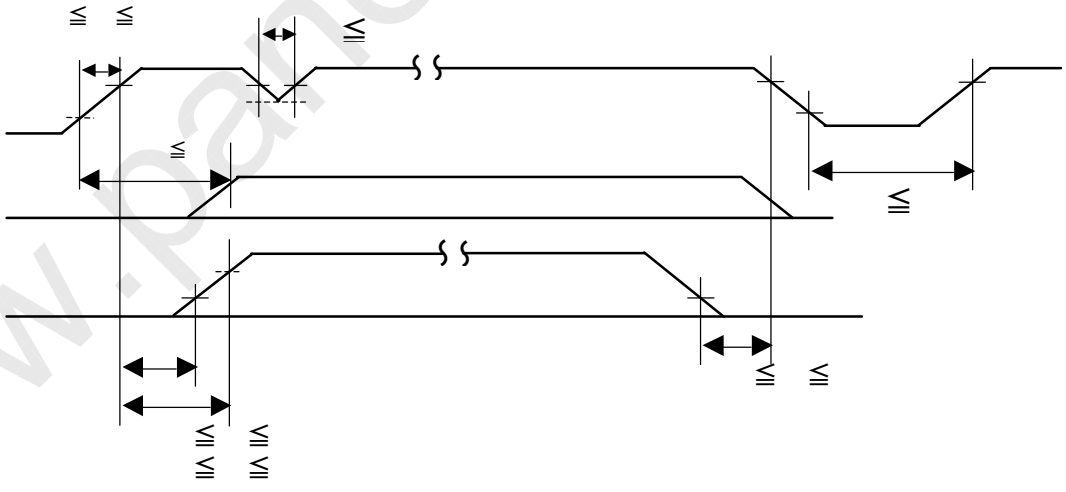

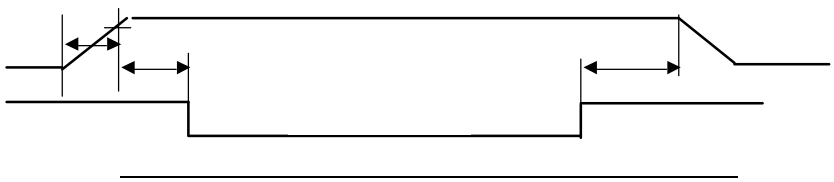

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11. BACK-LIGHT SPECIFICATIONS

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12. APPEARANCE SPECIFICATIONS

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13. ENVIRONMENTAL SPECIFICATIONS

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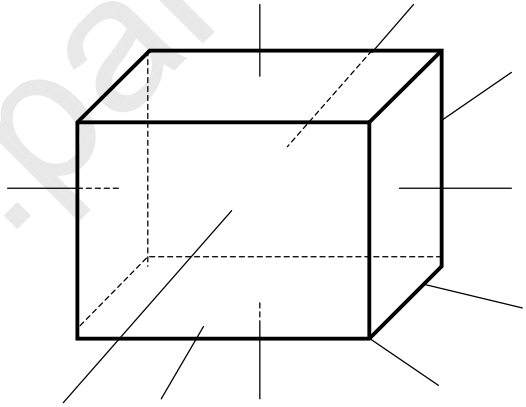

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14. INDICATIONS

LCD unit

FLC51UXC8V- H

NA19025-C154

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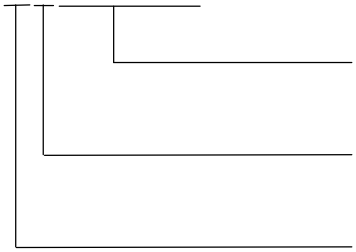

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・THIS TFT COLOR LCD CONTAINS COLD CATHODE FLUORESCENT LAMPS. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR ITS DISPOSAL.
・当該液晶ディスプレイユニットには蛍光管が組み込まれていますので、地方自治体の条例または規則に従って廃棄して下さい。

・WHEN CHANGING COLD CATHODE FLUORESCENT LAMPS, FOLLOW OPERATING SPECIFICATIONS. ESPECIALLY BE CAREFUL BOUT THE LAMPS SIDE-EDGE.
・蛍光管の交換は作業仕様書に従って行って下さい。特に蛍光管ホルダ側面のエッジに気をつけて下さい。

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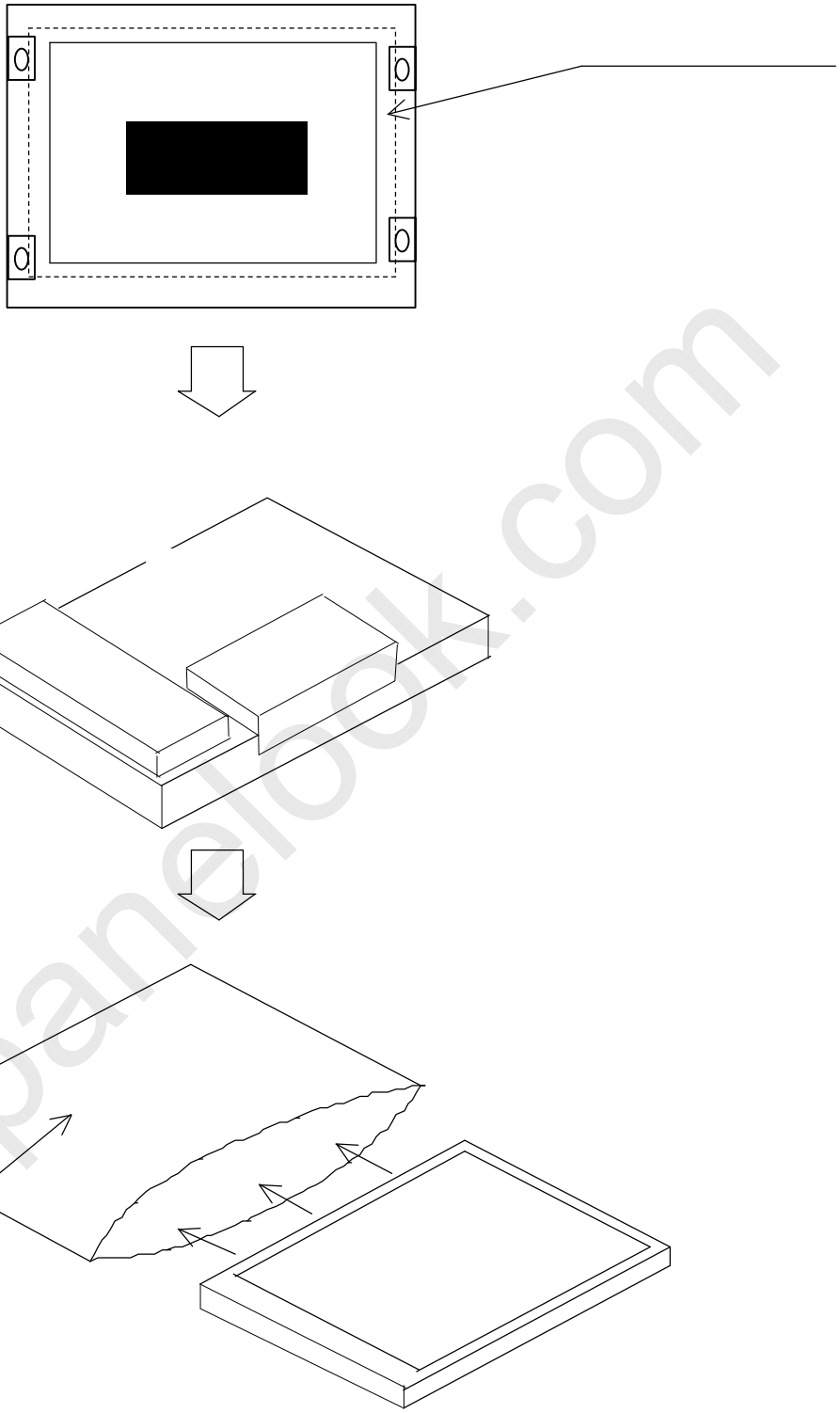

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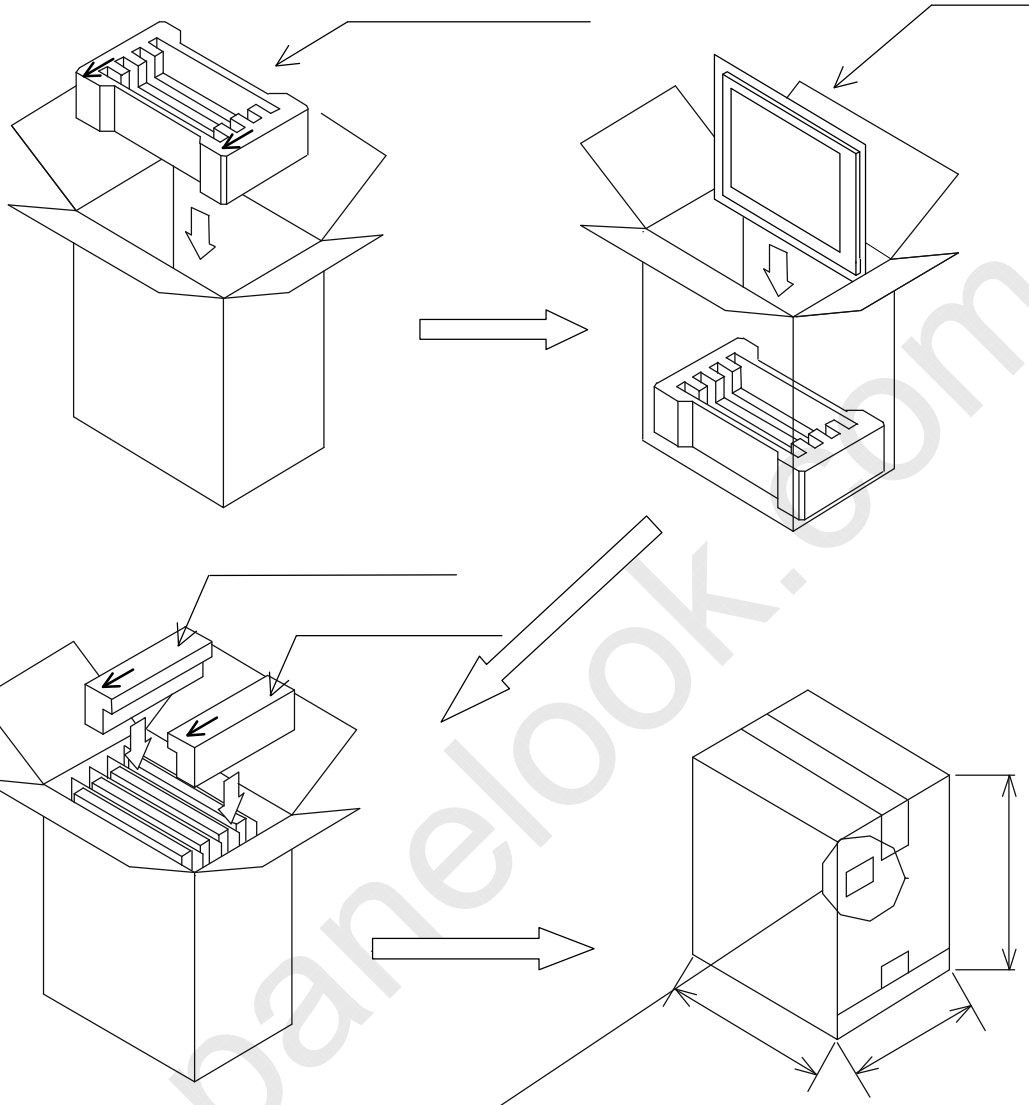

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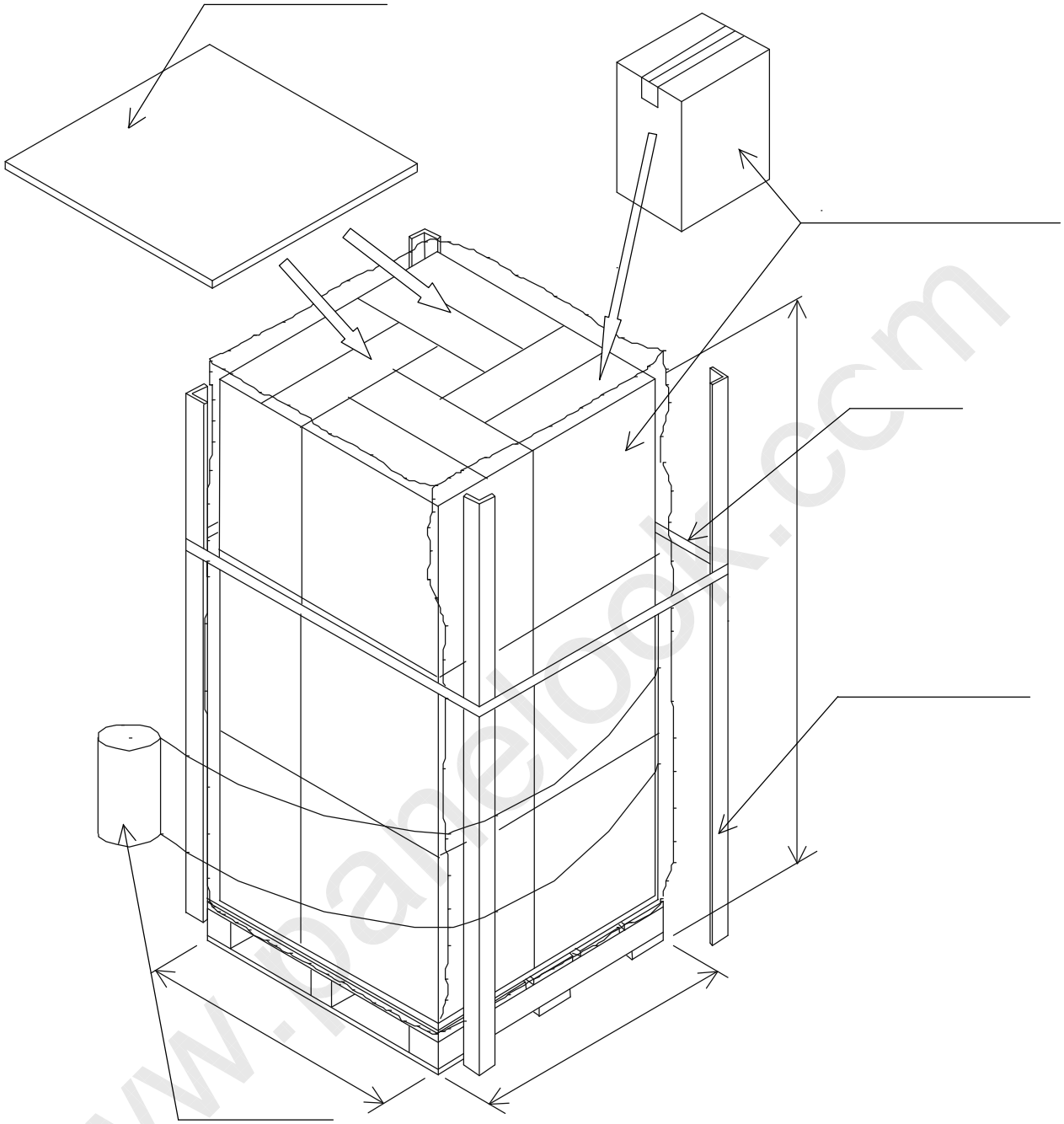

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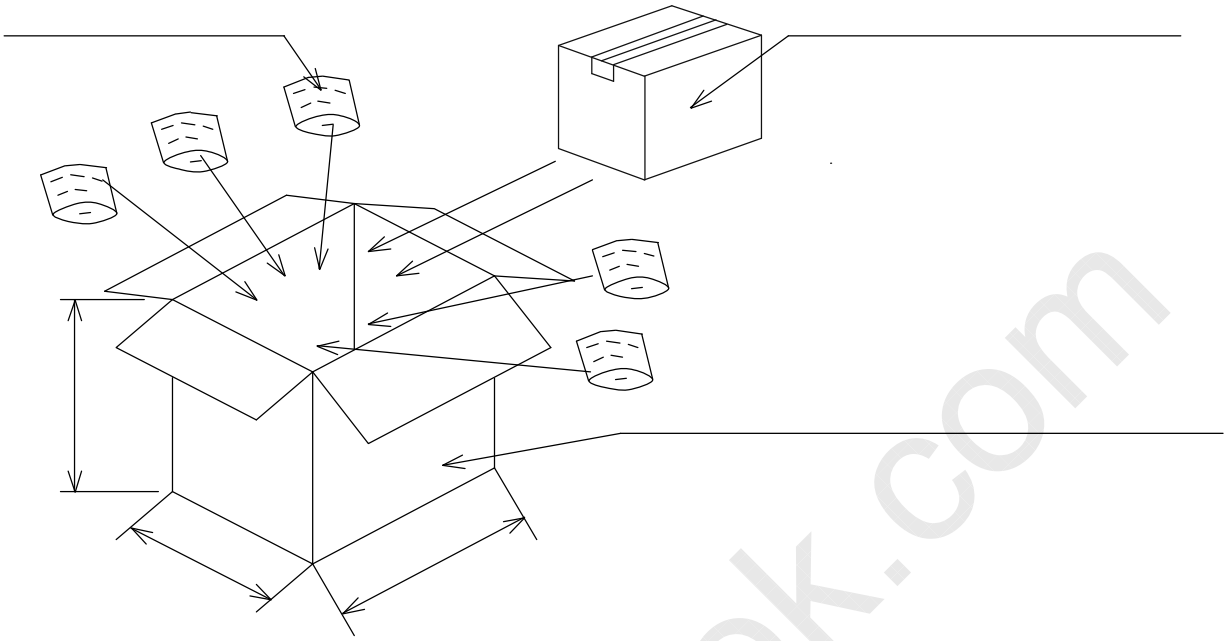

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16.WARRANTY

17.PRECAUTIONS

(1) Handling of LCD panel

① Do not apply any strong mechanical shock to the LCD panel.

② Do not press hard on the LCD panel surface.

①
②
①

②

③ Do not scratch the polarizer film on the LCD panel surface.

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④ Do not place or contact objects on the display surface for a long period of time.

(2) Handling of LCD module

① Do not pull the cold-cathode tube cable strongly.

② Assemble the module into user's system in a dust free environment.

③ Take anti-electrostatic measures for assembling the module.

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④ Do not pull the connecting cable on the rear face of the LCD module strongly.

⑤ Do not disassemble or remodel the LCD module.

(3) Precautions in regards of operating the LCD module

① Adhere to the specified power supply sequence.

② Do not operate the LCD module when condensation occurs.

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③ The following troubles occur when the LCD module is not used under recommended temperature.

- ℃
- ℃
- ℃
- ℃

④ Be sure to input the control signals at the correct timing.

(4) Precautions in regards of designing module mounting

① Excessive force should not be applied to the screen or the rear side of the LCD module.

② Avoid twisting and bending the LCD module.

③ Avoid extending the power cable between the LCD module and inverter.

④ Keep the backlight cable apart from the metal enclosure of the LCD module.

⑤ When Mounting LCD module with M4 screws (x4), tighten the screws with torque below 5kgf.

(5) Storage method

① Do not store the LCD module in an atmosphere of organic solvent or corrosive gas.

② Store the LCD module in a Fujitsu package.

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③ The LCD module is recommended to be stored in humidity controlled, cool and dark locations.

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(6) Disposal Method

① LCD module

② Package

(7) Others

① If the LCD panel is damaged, do not inhale and do not swallow the liquid crystal.

② Flux residue on the printed circuit board is harmless to the quality and reliability of LCD module.

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(8) Return method of the LCD unit requested for repair or analysis of the problem

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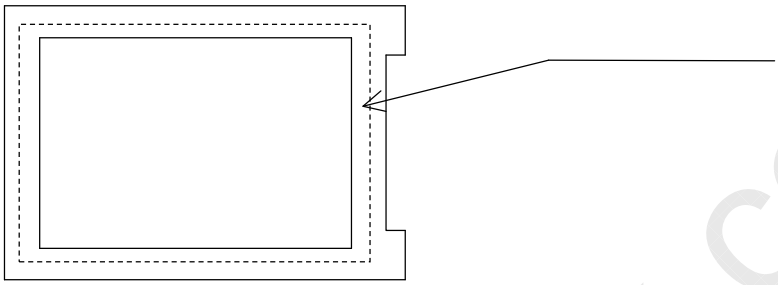
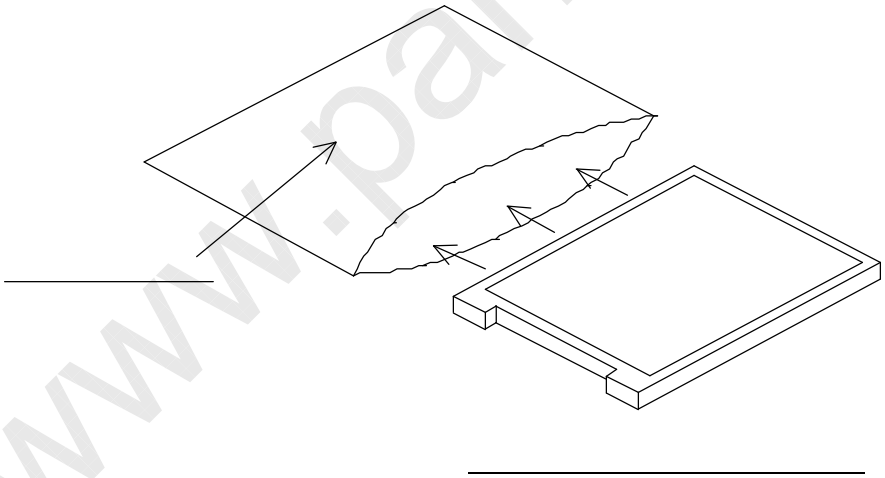
①Attach protective sheet.



②Put the LCD unit into the anti-electric bag



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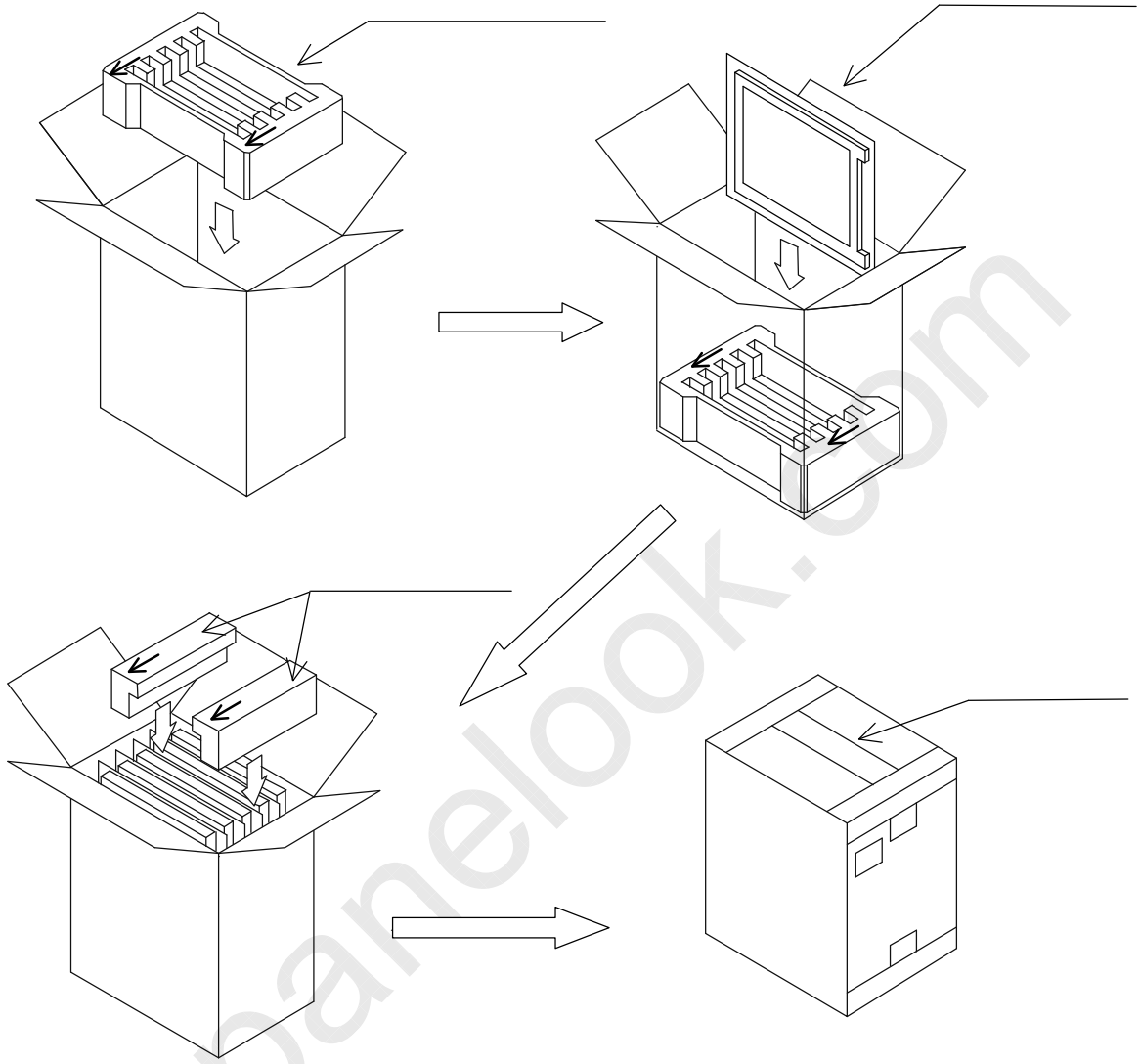
③ Storage into the container box



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18.OTHERS

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