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Specification of FUJITSU TFT-LCD module

FLC43XWC8V-06

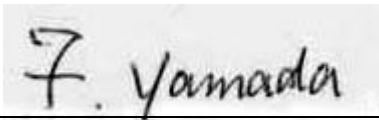
Approval
 Date : By :

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, FDTC 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-00252

Issue Date : Jan. 23, 2004

Issued by :



F. Yamada

Director

Design Dept.

LCD Products Div.

FUJITSU DISPLAY TECHNOLOGIES CORPORATION

		1	2		3	4
【FLC43XWC8V-06】						
A	TABLE OF CONTENTS					
B	1.APPLICATIONS 3					
	2.PRODUCT NAME AND MODEL NAME					
C	2-1.Product Name 3					
	2-2.Model Name 3					
D	3.OVERVIEW 3					
	4.CONFIGURATION..... 3					
E	5.MECHANICAL SPECIFICATIONS 4					
	6.ABSOLUTE MAXIMUM RATINGS 5					
F	7.RECOMMENDED OPERATING CONDITIONS..... 5					
	8.ELECTRICAL SPECIFICATIONS 6					
	9.OPTICAL SPECIFICATIONS..... 8					
	10.INTERFACE SPECIFICATIONS					
	10-1.Signal descriptions 12					
	10-2.Color Data Assignment 15					
	10-3.Input Signal Timing 16					
	10-4.Correspondence between Data and Display Position 18					
	10-5.Power Supply Sequence 18					
	11.BACKLIGHT SPECIFICATIONS					
	11-1.Pin Configuration for Backlight..... 19					
	11-2.CCFL 19					
	11-3.Life..... 19					
	11-4.Lamp Assembly Set (for Replacement) 19					
	12.APPEARANCE SPECIFICATIONS					
	12-1.Zone..... 20					
	12-2.Bright Spot..... 20					
	12-3.Test Condition..... 20					
	12-4.Standard 20					
	13.ENVIRONMENTAL SPECIFICATIONS 23					
	14.INDICATIONS 24					
	15.PACKAGING 25					
	16.WARRANTY 33					
	17.PRECAUTIONS 33					
	18.PRECAUTIONS FOR USE..... 37					
	19.MISCELLANEOUS..... 37					
DOCUMENT CONTROL SECTION						
DATE						
						FLC43XWC8V-06
						Tech Bes LCD-00252
						CUST.
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【FLC43XWC8V-06】										
A	1. APPLICATIONS This specification is applied to the 17.0 in. XGA-WIDE supported TFT-LCD module.									A
	2. PRODUCT NAME AND MODEL NAME 2-1. <u>Product Name</u> : LCD Module 2-2. <u>Model Name</u> : FLC43XWC8V-06									B
B	3. OVERVIEW This LCD module has a TFT active matrix type liquid crystal panel 1280×768 pixels, and diagonal size of 43cm (17.0-inch). This module supports 1280×768 XGA-WIDE mode (Non-interlace). This LCD has a XGA-WIDE-capable 1ch-LVDS interface and can display 16.2 million colors. By timing control signal, images are displayed on the screen at given value under specified timing. Control signals to this LCD module are ENAB (Data enable signal), DCLK signal and RGB data signal. Data signal is transmitted with single port. (8 bit for each R, G, B) Internal control signal of Timing control IC to Data-IC are 1ch-RSDS signal. The power supply of this LCD module is +5V DC. This module has the characteristics that apply to TCO'99 and EBU100%.									C
	4. CONFIGURATION This LCD module consists of a color TFT-LCD panel that mounted with TFT driver ICs, a cold-cathode fluorescent tube back-light, a LVDS interface PCB, a structure and a bezel. And these components are integrated in a LCD module. Cold-cathode fluorescent tube and lamp holder are replaceable. Fig.4-1 shows a block diagram of this LCD module.									D
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D	DATE									
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		Tech Bes LCD-00252								CUST.
		FUJITSU DISPLAY TECHNOLOGIES CORPORATION								3 /
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A

8. ELECTRICAL SPECIFICATIONS

Table 8-1 shows the electrical specifications of this LCD module.

Table 8-1. Electrical Specifications

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark	
Supply Current	I _{CC}	V _{CC} =+5.0±0.25V V _{SS} =0V DCLK=32.498MHz	—	(700)	(1000)	mA	*1	
“H” Level Logic Input Voltage	V _{IH}		0.7 × V _{CC}	—	V _{CC} +0.3	V	*2	
“L” Level Logic Input Voltage	V _{IL}		GND	—	0.3 × V _{CC}	V	*2	
BACK LIGHT	CCFL Turn on Voltage	f _L =50kHz, Ta=25°C	—	1230	1600	V _{rms}		
		f _L =50kHz, Ta=0°C	—	—	1600			
	Lighting Voltage	V _L	f _L =50kHz I _L =10.5mA	590	630	670	V _{rms}	*4
	Lighting Frequency	f _L	V _L =630V _{rms}	40	50	60	kHz	
	*3 Tube Current	I _L	f _L =50kHz V _L =630V _{rms}	9.5	10.5	11.0	mArms	*4

(*)1

Typical current value is measured when gray scale (vertical 256 levels) is displayed at V_{CC}=5.0V.
Maximum current value is measured when V stripes with respect to each RGB dot are displayed at V_{CC}=5.0V.
Without rush current.

(*)2

Timing control circuit input voltage

(*)3

Backlight specifications are valid when using a suitable inverter such as the “FLCV-15” of FDTC.

(*)4

Tube current (I_L) shows the value of the current and voltage that is consumed at one lamp.
(4 tubes/unit)
This LCD module has 4 lamps. Each 2 lamps are placed at upper and lower side of the display.
2 lamps are connected in parallel. Each low voltage terminals (GND side) are bound into 1 line cable.
(See 11-1. Pin configuration for backlight)

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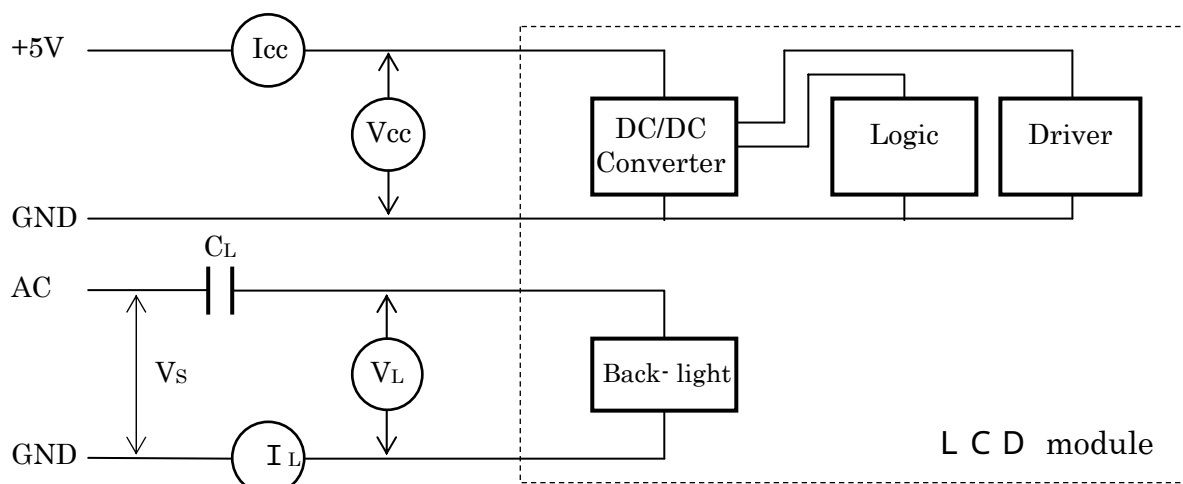
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Note 1) Measurement Circuit

Based on Fig.8-1.

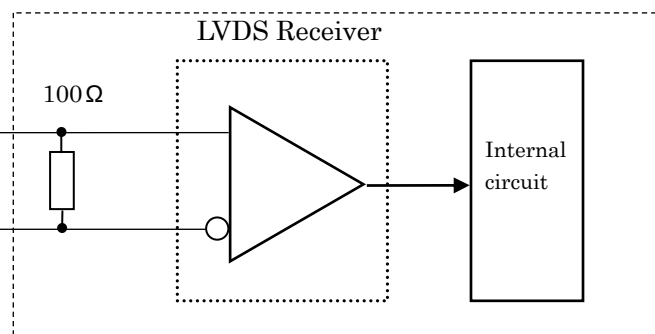
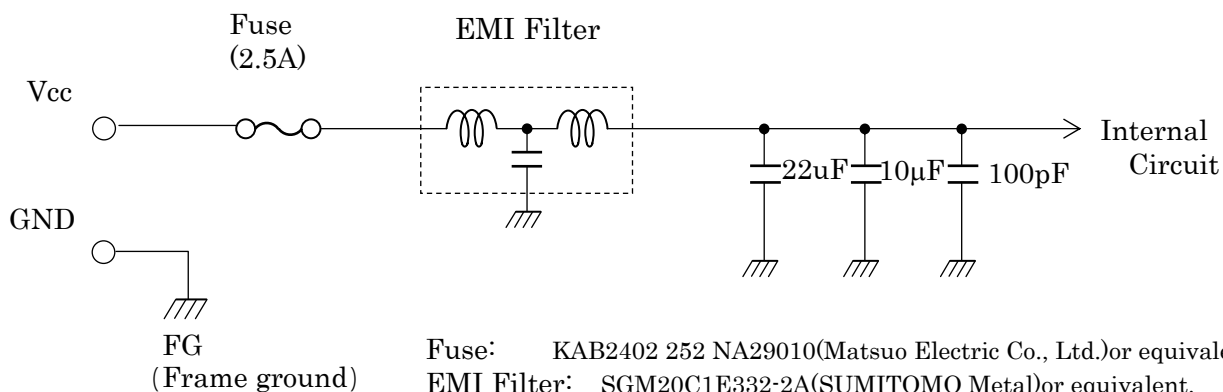
Fig.8-1. Measurement CircuitNote 2) Equivalent Circuit

Based on Fig.8-2 (a), (b).

Input signals(LVDS-1ch)

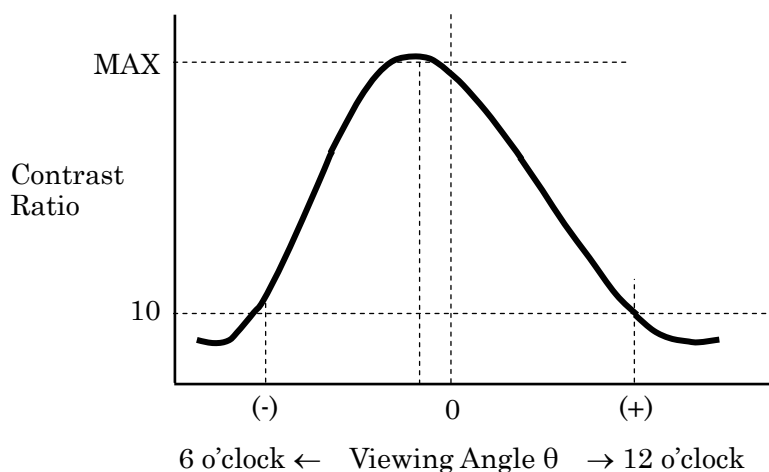
RxCLK+
 RxCLK-
 Rx0+
 Rx0-
 Rx1+
 Rx1-
 Rx2+
 Rx2-
 Rx3+
 Rx3-

Differential Input

Fig.8-2 (a) Equivalent Circuit of Logic Signal InputFig.8-2 (b) Equivalent Circuit of Power Supply

Note 6) Definition of Optimum Viewing Angle

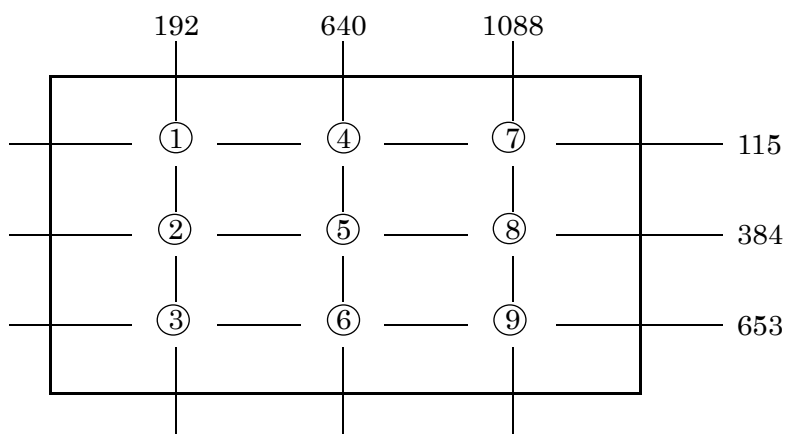
Based on Fig.9-7.

Fig.9-7. Definition of Viewing AngleNote 7) Definition of Brightness Uniformity

Brightness uniformity is defined by the following formula.

Brightness (I1~I9) are measured at the following 9 points (① ~ ⑨) on the display area shown in Fig.9-8.

$$\text{Brightness Uniformity } (\Delta L) = \frac{|\text{Min. In}|}{|\text{Max. In}|} \times 100 (\%), n=1 \text{ to } 9$$



Note) Each measurement point (① ~ ⑨) defines the center spot of Brightness Meter view.
The tolerance of measurement position is $\pm 3\text{mm}$.

Fig.9-8. Measurement Points

1		2		3		4																																																																																					
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10. INTERFACE SPECIFICATIONS																																																																																											
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<table><tr><td>Pin No</td><td>Symbol</td><td>I/O</td><td>Function</td></tr><tr><td>1</td><td>VDD</td><td>-</td><td>+5V Power suply</td></tr><tr><td>2</td><td>VDD</td><td>-</td><td>+5V Power suply</td></tr><tr><td>3</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>4</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>5</td><td>RX0-</td><td>↓</td><td>LVDS Receiver Signal(-)</td></tr><tr><td>6</td><td>RX0+</td><td>↓</td><td>LVDS Receiver Signal(+)</td></tr><tr><td>7</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>8</td><td>RX1-</td><td>↓</td><td>LVDS Receiver Signal(-)</td></tr><tr><td>9</td><td>RX1+</td><td>↓</td><td>LVDS Receiver Signal(+)</td></tr><tr><td>10</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>11</td><td>RX2-</td><td>↓</td><td>LVDS Receiver Signal(-)</td></tr><tr><td>12</td><td>RX2+</td><td>↓</td><td>LVDS Receiver Signal(+)</td></tr><tr><td>13</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>14</td><td>RXCLK-</td><td>↓</td><td>LVDS Receiver Clock Signal(-)</td></tr><tr><td>15</td><td>RXCLK+</td><td>↓</td><td>LVDS Receiver Clock Signal(+)</td></tr><tr><td>16</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>17</td><td>RX3-</td><td>↓</td><td>LVDS Receiver Signal(-)</td></tr><tr><td>18</td><td>RX3+</td><td>↓</td><td>LVDS Receiver Signal(+)</td></tr><tr><td>19</td><td>GND</td><td>-</td><td>Ground</td></tr><tr><td>20</td><td>Data Mapping Select Input</td><td>I</td><td>Low : table 10-1-2 Open or Hi : table 10-1-3</td></tr></table>								Pin No	Symbol	I/O	Function	1	VDD	-	+5V Power suply	2	VDD	-	+5V Power suply	3	GND	-	Ground	4	GND	-	Ground	5	RX0-	↓	LVDS Receiver Signal(-)	6	RX0+	↓	LVDS Receiver Signal(+)	7	GND	-	Ground	8	RX1-	↓	LVDS Receiver Signal(-)	9	RX1+	↓	LVDS Receiver Signal(+)	10	GND	-	Ground	11	RX2-	↓	LVDS Receiver Signal(-)	12	RX2+	↓	LVDS Receiver Signal(+)	13	GND	-	Ground	14	RXCLK-	↓	LVDS Receiver Clock Signal(-)	15	RXCLK+	↓	LVDS Receiver Clock Signal(+)	16	GND	-	Ground	17	RX3-	↓	LVDS Receiver Signal(-)	18	RX3+	↓	LVDS Receiver Signal(+)	19	GND	-	Ground	20	Data Mapping Select Input	I	Low : table 10-1-2 Open or Hi : table 10-1-3
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Upper side Interface connector LCD Module Rear side 20 1 Lower side																																																																																											
Connector : D14H-20P-1.25H(HIROSE) User's connector : DF14-20S-1.25 (HIROSE) Note)When using a interface connector other than the recommended one, a defect in the initial stage or a problem concerning long term reliabiling may occur.																																																																																											
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DOCUMENT CONTROL SECTION

DATE

10-1-2. LVDS Data Mapping 1

Table 10-1-2 shows the LVDS data mapping 1.(DataMappingSelectInput = Low)

Table 10-1-2. LVDS Data Mapping 1

Transmitter (DS90CF385)		Symbol	Interface connector			Receiver (DS90CF386)		LCD Control input
Pin	INPUT		System side	Pin	LCD module	Pin	OUTPUT	
51	TxIN0	R 0	TxOUT0- TxOUT0+	5 6	RX0- RX0+	27	RxOUT0	I R 0
52	TxIN1	R 1				29	RxOUT1	I R 1
54	TxIN2	R 2				30	RxOUT2	I R 2
55	TxIN3	R 3				32	RxOUT3	I R 3
56	TxIN4	R 4				33	RxOUT4	I R 4
2	TxIN5	R 7	TxOUT3- TxOUT3+	17 18	RX3- RX3+	34	RxOUT5	I R 7
3	TxIN6	R 5	TxOUT0- TxOUT0+	5 6	RX0- RX0+	35	RxOUT6	I R 5
4	TxIN7	G 0	TxOUT0+	6	RX0+	37	RxOUT7	I G 0
6	TxIN8	G 1	TxOUT1- TxOUT1+	8 9	RX1- RX1+	38	RxOUT8	I G 1
7	TxIN9	G 2	TxOUT1+	9	RX1+	39	RxOUT9	I G 2
8	TxIN10	G 6	TxOUT3- TxOUT3+	17 18	RX3- RX3+	41	RxOUT10	I G 6
10	TxIN11	G 7	TxOUT3+	18	RX3+	42	RxOUT11	I G 7
11	TxIN12	G 3	TxOUT1- TxOUT1+	8 9	RX1- RX1+	43	RxOUT12	I G 3
12	TxIN13	G 4				45	RxOUT13	I G 4
14	TxIN14	G 5				46	RxOUT14	I G 5
15	TxIN15	B 0	TxOUT3- TxOUT3+	17 18	RX3- RX3+	47	RxOUT15	I B 0
16	TxIN16	B 6				49	RxOUT16	I B 6
18	TxIN17	B 7				50	RxOUT17	I B 7
19	TxIN18	B 1	TxOUT1- TxOUT1+	8 9	RX1- RX1+	51	RxOUT18	I B 1
20	TxIN19	B 2	TxOUT2- TxOUT2+	11 12	RX2- RX2+	53	RxOUT19	I B 2
22	TxIN20	B 3				54	RxOUT20	I B 3
23	TxIN21	B 4				55	RxOUT21	I B 4
24	TxIN22	B 5				1	RxOUT22	I B 5
25	TxIN23	RESERVED	TxOUT3- TxOUT3+	17 18	RX3- RX3+	2	RxOUT23	Not use
27	TxIN24	RESERVED	TxOUT2- TxOUT2+	11 12	RX2- RX2+	3	RxOUT24	Not use
28	TxIN25	RESERVED				5	RxOUT25	Not use
30	TxIN26	ENAB				6	RxOUT26	E N A B
50	TxIN27	R 6	TxOUT3- TxOUT3+	17 18	RX3- RX3+	7	RxOUT27	I R 6
31	TxCLKIN	DCLK	TxCLKOUT- TxCLKOUT+	14 15	RXCLK- RXCLK+	26	RxCLKOUT	D C L K

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DATE

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<td>TxIN5</td> <td>R 1</td> <td>TxOUT3- TxOUT3+</td> <td>17 18</td> <td>RX3- RX3+</td> <td>34</td> <td>RxOUT5</td> <td>IR 1</td> </tr> <tr> <td>3</td> <td>TxIN6</td> <td>R 7</td> <td rowspan="2">TxOUT0- TxOUT0+</td> <td rowspan="2">5 6</td> <td rowspan="2">RX0- RX0+</td> <td>35</td> <td>RxOUT6</td> <td>IR 7</td> </tr> <tr> <td>4</td> <td>TxIN7</td> <td>G 2</td> <td>37</td> <td>RxOUT7</td> <td>IG 2</td> </tr> <tr> <td>6</td> <td>TxIN8</td> <td>G 3</td> <td rowspan="2">TxOUT1- TxOUT1+</td> <td rowspan="2">8 9</td> <td rowspan="2">RX1- RX1+</td> <td>38</td> <td>RxOUT8</td> <td>IG 3</td> </tr> <tr> <td>7</td> <td>TxIN9</td> <td>G 4</td> <td>39</td> <td>RxOUT9</td> <td>IG 4</td> </tr> <tr> <td>8</td> <td>TxIN10</td> <td>G 0</td> <td rowspan="2">TxOUT3- TxOUT3+</td> <td rowspan="2">17 18</td> <td rowspan="2">RX3- RX3+</td> <td>41</td> <td>RxOUT10</td> <td>IG 0</td> </tr> <tr> <td>10</td> <td>TxIN11</td> <td>G 1</td> <td>42</td> <td>RxOUT11</td> <td>IG 1</td> </tr> <tr> <td>11</td> <td>TxIN12</td> <td>G 5</td> <td rowspan="4">TxOUT1- TxOUT1+</td> <td rowspan="4">8 9</td> <td rowspan="4">RX1- RX1+</td> <td>43</td> <td>RxOUT12</td> <td>IG 5</td> </tr> <tr> <td>12</td> <td>TxIN13</td> <td>G 6</td> <td>45</td> <td>RxOUT13</td> <td>IG 6</td> </tr> <tr> <td>14</td> <td>TxIN14</td> <td>G 7</td> <td>46</td> <td>RxOUT14</td> <td>IG 7</td> </tr> <tr> <td>15</td> <td>TxIN15</td> <td>B 2</td> <td>47</td> <td>RxOUT15</td> <td>IB 2</td> </tr> <tr> <td>16</td> <td>TxIN16</td> <td>B 0</td> <td rowspan="2">TxOUT3- TxOUT3+</td> <td rowspan="2">17 18</td> <td rowspan="2">RX3- RX3+</td> <td>49</td> <td>RxOUT16</td> <td>IB 0</td> </tr> <tr> <td>18</td> <td>TxIN17</td> <td>B 1</td> <td>50</td> <td>RxOUT17</td> <td>IB 1</td> </tr> <tr> <td>19</td> <td>TxIN18</td> <td>B 3</td> <td>TxOUT1- TxOUT1+</td> <td>8 9</td> <td>RX1- RX1+</td> <td>51</td> <td>RxOUT18</td> <td>IB 3</td> </tr> <tr> <td>20</td> <td>TxIN19</td> <td>B 4</td> <td rowspan="4">TxOUT2- TxOUT2+</td> <td rowspan="4">11 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7	46	RxOUT14	IG 7	15	TxIN15	B 2	47	RxOUT15	IB 2	16	TxIN16	B 0	TxOUT3- TxOUT3+	17 18	RX3- RX3+	49	RxOUT16	IB 0	18	TxIN17	B 1	50	RxOUT17	IB 1	19	TxIN18	B 3	TxOUT1- TxOUT1+	8 9	RX1- RX1+	51	RxOUT18	IB 3	20	TxIN19	B 4	TxOUT2- TxOUT2+	11 12	RX2- RX2+	53	RxOUT19	IB 4	22	TxIN20	B 5	54	RxOUT20	IB 5	23	TxIN21	B 6	55	RxOUT21	IB 6	24	TxIN22	B 7	1	RxOUT22	IB 7	25	TxIN23	RESERVED	TxOUT3- TxOUT3+	17 18	RX3- RX3+	2	RxOUT23	Not use	27	TxIN24	RESERVED	TxOUT2- TxOUT2+	11 12	RX2- RX2+	3	RxOUT24	Not use	28	TxIN25	RESERVED	5	RxOUT25	Not use	30	TxIN26	ENAB	6	RxOUT26	E N A B	50	TxIN27	R 0	TxOUT3- TxOUT3+	17 18	RX3- RX3+	7	RxOUT27	IR 0	31	TxCLKIN	DCLK	TxCLKOUT- TxCLKOUT+	14 15	RXCLK- RXCLK+	26	RxCLKOUT	D C L K
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DATE

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(T=0~50°C, V_{CC}=5±0.25V)

Table 10-5: Timing Characteristics (T_{amb} = 0°C, V_{CC} = 3.3V)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark	
DCLK signal (Clock)	Period	T _c	12.195	15.382	20.000	ns	fc=1/T _c *1	
	Frequency	fc	50.00	65.01	82.00	MHz		
	Duty	T _{ch} /T _c	45	50	55	%		
	High time	T _{cl} kH	5.0	—	—	ns		
	Low time	T _{cl} kL	5.0	—	—	ns		
	Rise time	T _{cl} kr	—	—	5.0	ns		
	Fall time	T _{cl} kf	—	—	5.0	ns		
DCLK-Data Timing	Setup time	T _{set}	4	—	—	ns		
	Hold time	T _{hold}	4	—	—	ns		
Data-ENAB timing	Horizontal	Period	T _h	1310	1344	1688	DCLK	*2,3
		Frequency	f _h	35.0	48.3	75.0	kHz	
		Display period	T _{hd}	1280	1280	1280	DCLK	
	Vertical	Period	T _v	776	806	806	Th	16.67ms
		Frequency	1/T _v	50	60	75	Hz	WXGA mode
		Display period	T _{vd}	768	768	768	Th	*2,3
	Data-ENAB timing		T _{dn}	0	0	0	DCLK	*4

*1) DCLK signal input must be valid while power supply is applied.

*2) Display position is specified by the ENAB signal only.

- Horizontal display position is specified by the rise of ENAB signal. The data which is latched by the falling edge of 1st DCLK right after the rise of ENAB, is displayed on the left edge of the screen.
- Vertical display position is specified by the rise of ENAB after a "Low" level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise of ENAB is displayed at the top line of screen.

*3) If a period of ENAB “High” is less than 1280 DCLK or less than 768 lines, the rest of the screen displays black.

*4) The display position does not fit to the screen if a period of ENAB “High” and the effective data period do not synchronize with each other.

*5) The specifications of all are not provided individually.

It is necessary that all of those specifications are satisfied at the same time.

*6)The display quality is guaranteed by the Typ timing.



	S0001	S0002	S0003	S0004	S0005	S0006	S0007	S0008			S3839	S3840
C001	R 0001	G 0001	B 0001	R 0002	G 0002	B 0002	R 0003	G 0003			G 1280	B 1280
C768												
	R 0001	G 0001	B 0001	R 0002	G 0002	B 0002	R 0003	G 0003			G 1280	B 1280

Fig.10-4. Correspondence Data and Display Position

The sequence of input signals and On/Off of the power supply of this LCD module should be in the specification shown in Fig.10-5 to prevent latch-up of the driver ICs and DC driving of the LCD panel.

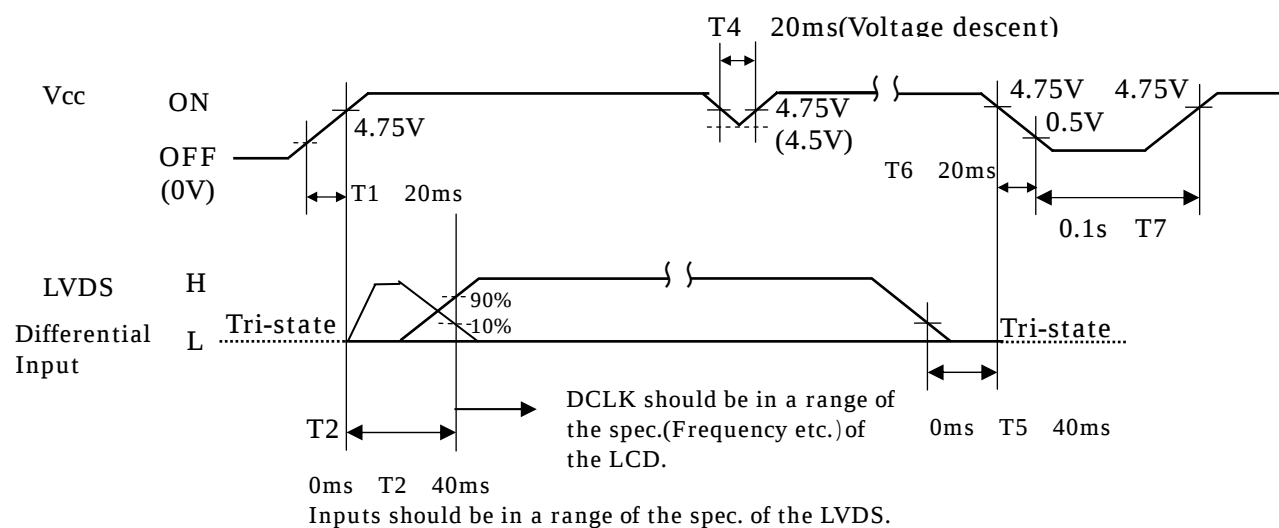


Fig.10-5. Power Supply Sequence

11. BACKLIGHT SPECIFICATIONS

11-1. Pin Configuration for Backlight

Table 11-1(a) and 11-1(b) shows the description and pin assignment of the connectors (CN-A and B) for the Backlight of this LCD module.

Table 11-1(a) Pin Assignment of CN-A

Pin No	Signal	Function	Cable color
1	V _{L1}	Power supply for CCFL 1	Red
2	V _{L2}	Power supply for CCFL 2	Red
3	NC	—	-
4	GND	Ground (for V _{L1} , 2)	White

Table11-1(b) Pin Assignment of CN-B

Pin No	Signal	Function	Cable color
1	V _{L3}	Power supply for CCFL 3	Red
2	V _{L4}	Power supply for CCFL 4	Red
3	NC	—	-
4	GND	Ground (for V _{L3} , 4)	White

Connector	: Housing	: BHR-04VS-1
	: Contact	: SBH-001T-P0.5
User's Connector	: Post with base	: SM04(4.0)B-BHS-1-TB
Supplier	: Japan Solderless Terminal Trading Company LTD. (J.S.T.)	

11-2. CCFL

Supplier : SANKEN ELECTRIC CO., LTD Part No. SD26E3850E8350B3113000

11-3. Life

The life of the backlight is a minimum of 25,000 hours at the following conditions.

(1) Working conditions

Ambient temperature : $25 \pm 5^{\circ}\text{C}$
 Tube current(I_L) : (10.5mA or less)

(2) Definition of life

Brightness becomes 50% or below 50% of the minimum brightness value shown in Table 9-1.
The lamp cannot be lit by the breakdown voltage of 1600Vrms.
Lamp is flashing.

11-4. Lamp Assembly set (for replacement)

Lamp Assembly set (with charge) is prepared for maintenance.
This set consists of an upper lamp assembly and a lower lamp assembly.

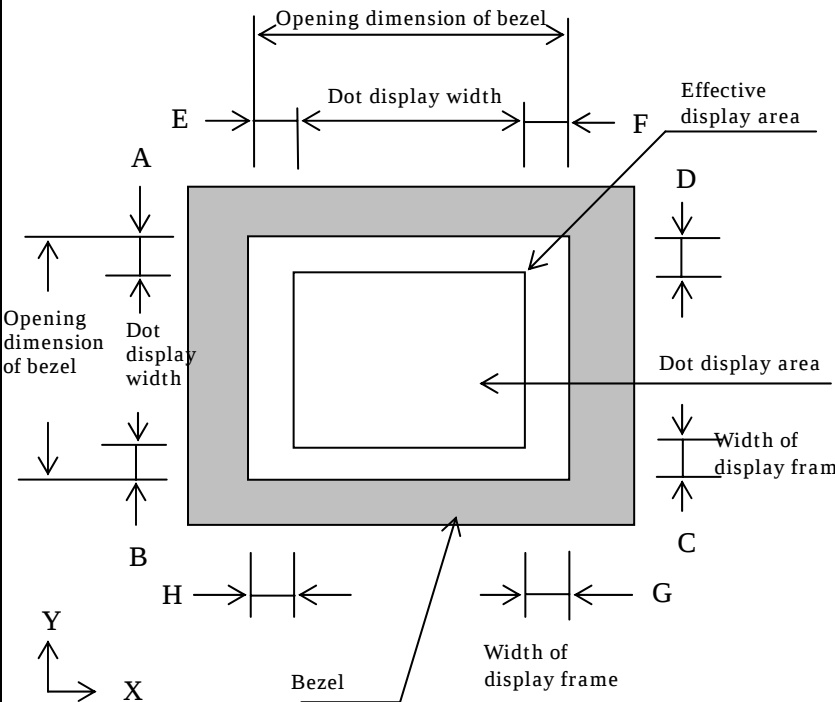
Type number : FLCL-21

		1			2			3			4
【FLC43XWC8V-06】											
12. APPEARANCE SPECIFICATIONS											
A	<u>12-1. Zone</u> · Inside display dot area (369.6× 221.8mm) · Display dot area means active area. · One pixel consists of 3 dots (red, green and blue). · Foreign particle and scratch unharmed to display image, such as the foreign particle under polarizer film but outside of the display area and scratch on metal bezel, backlight module or polarizer film out of the display area, etc., are not counted.										
B	<u>12-2. Bright spots</u> (1) Bright spots by the defect of TFT. · Visible under bias of 2% ND filterHigh bright spot R•G · Visible under 5% but invisible under 2% ND filter.....Low bright spot R•G•B · Invisible under bias of 5% ND filterNot counted (2) Bright spots by the light passing through tears, breaks, etc in color filter. · Exceed size of a half dot.....High bright spot · A half dot or less.....Not counted (3) Bright spots by the light passing through tears, breaks, etc in chromium mask. · Exceed 50μmHigh bright spot · 50μm or lessNot counted										
C	<u>12-3. Test condition</u> · Inspector must observe the LCD screen from the normal direction under the illumination by a single 20W fluorescent lamp. The distance between the LCD screen and the inspector should be a height of 50cm above the worktable. - The vertical illuminance is 300 to 600lux (reference value). · Bright spot should be counted under entire black screen. · Dark spot should be counted under entire white screen. · Frame frequency should be 60Hz.										
D	<u>12-4. Specifications</u> Table 12-4 shows the appearance standard. (Note1) Please do not mistake a single bright spot for a bright spot connection due to Cs(supplemental capacitance) line at the center of each dot. (Note2) If a pixel is dark partially, it connects into the number of dark spots in accordance with following rule. (a) $S < 1/3$: Not count. Only one of 4 dark connection is allowed. (b) $1/3 \leq S < 2/3$: Considered as 0.5 dot. (C) $2/3 \leq S$: Considered as 1 dot. (S=Dark spot size/dot size) (Note3) Min. distance between foreign particles : 100mm										
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F											

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						CUST.					
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		1		2		3		4	
【FLC43XWC8V-06】									
A	No.	Item		Judgment method and standard					
	1	Bright spot (high and Low)		≤3 dots (Note 1)					
	2	Bright spot connection (high and low)		≤1 pair (Note 1) (2 dot connection in horizontal)					
	3	Total of bright spot		≤3 dots					
	4	Dark spot		≤5 dots (Note 2)					
	5	Dark spot connection		≤2 pairs (2 dot connection in horizontal) (Note 2)					
	6	Total of dark spot		≤ 5dots (Note 2)					
B	7	Total of dot defect(bright and dark)		≤ 8 dots					
	8	Distance of bright spot	high-high high	≥15mm					
C			others	≥ 5mm					
	9	Distance of dark spot		≥ 5mm					
	10	Scratch on polarizer	W 0.03	————		Not count			
			0.03 < W 0.05	L 6	Not count				
				6 < L 12	5				
				12 < L	0				
			0.05 < W 0.10	L 0.6	Not count				
				0.6 < L 5	3				
				5 < L, W × L < 0.5	1				
				5 < L, 0.5 W × L	0				
0.10 < W	————		0						
11	Dent on polarizer	D 0.3		Not count					
		0.3 < D 0.4		6					
		0.4 < D		0					
12	Bubble in polarizer	D 0.5		Not count					
		0.5 < D		0					
D	13	Spot (black/white) by foreign particle	D < 0.5		5				
			0.5 D		0				
	14	Bright spot by fiber foreign particle (under the polarizer. i.e. between the polarizer and the glass) (Note 3)	D 0.2		Not count				
			0.2 < D 0.3		2				
			0.3 < D 0.35		1				
			0.35 < D		0				
	15	Line (black /white), scratch by fiber foreign particle	W 0.03	————		Not count			
			0.03 < W 0.05	L 6	Not count				
6 < L 12				5					
12 < L				0					
0.05 < W 0.1			L 0.6	Not count					
			0.6 < L 5	3					
			5 < L	0					
0.1 < W	(W+L)/2 = D		Count as spot (black/white) of No.13						
16	Mura		Invisible under 6%ND filter from center of display. (Display pattern : Black, White, 50%gray)						
D:Average diameter [mm], W:Width [mm], L:Length [mm], S=(bright spot size)/(dot size)									
DOCUMENT CONTROL SECTION							FLC43XWC8V-06		
							Tech Bes LCD-00252		CUST.
DATE	EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION		FUJITSU DISPLAY TECHNOLOGIES CORPORATION	21/
	DESIG.			CHECK			APPR.		
1									

Applied area	Item	Condi tion	Specification										
Display dot area	Display location	Non-lighting	As for the display position in the display dot area, the variation of tolerance between window frame of the upper bezel and dot display area (right, left, up and down) is shown in the following table.  The diagram illustrates the display area with various dimensions and tolerances. It shows a central 'Dot display area' surrounded by a 'Dot display width' and an 'Opening dimension of bezel'. The 'Effective display area' is defined by the 'Opening dimension of bezel' and 'Dot display width'. The 'Width of display frame' is also indicated. A coordinate system with X and Y axes is shown at the bottom left. <table><tr><th>Tolerance (X direction)</th><th>Tolerance (Y direction)</th></tr><tr><td> E-F 1.0mm</td><td> A-B 1.0mm</td></tr><tr><td> E-H 0.7mm</td><td> A-D 0.7mm</td></tr><tr><td> F-G 0.7mm</td><td> B-C 0.7mm</td></tr><tr><td> G-H 1.0mm</td><td> C-D 1.0mm</td></tr></table>	Tolerance (X direction)	Tolerance (Y direction)	E-F 1.0mm	A-B 1.0mm	E-H 0.7mm	A-D 0.7mm	F-G 0.7mm	B-C 0.7mm	G-H 1.0mm	C-D 1.0mm
			Tolerance (X direction)	Tolerance (Y direction)									
E-F 1.0mm	A-B 1.0mm												
E-H 0.7mm	A-D 0.7mm												
F-G 0.7mm	B-C 0.7mm												
G-H 1.0mm	C-D 1.0mm												
*The dimension of effective display area, dot display area and display frame should follow the dimensions described in each specification.													

Tolerance (X direction)		Tolerance (Y direction)	
E-F	1.0mm	A-B	1.0mm
E-H	0.7mm	A-D	0.7mm
F-G	0.7mm	B-C	0.7mm
G-H	1.0mm	C-D	1.0mm

*The dimension of effective display area, dot display area and display frame should follow the dimensions described in each specification.

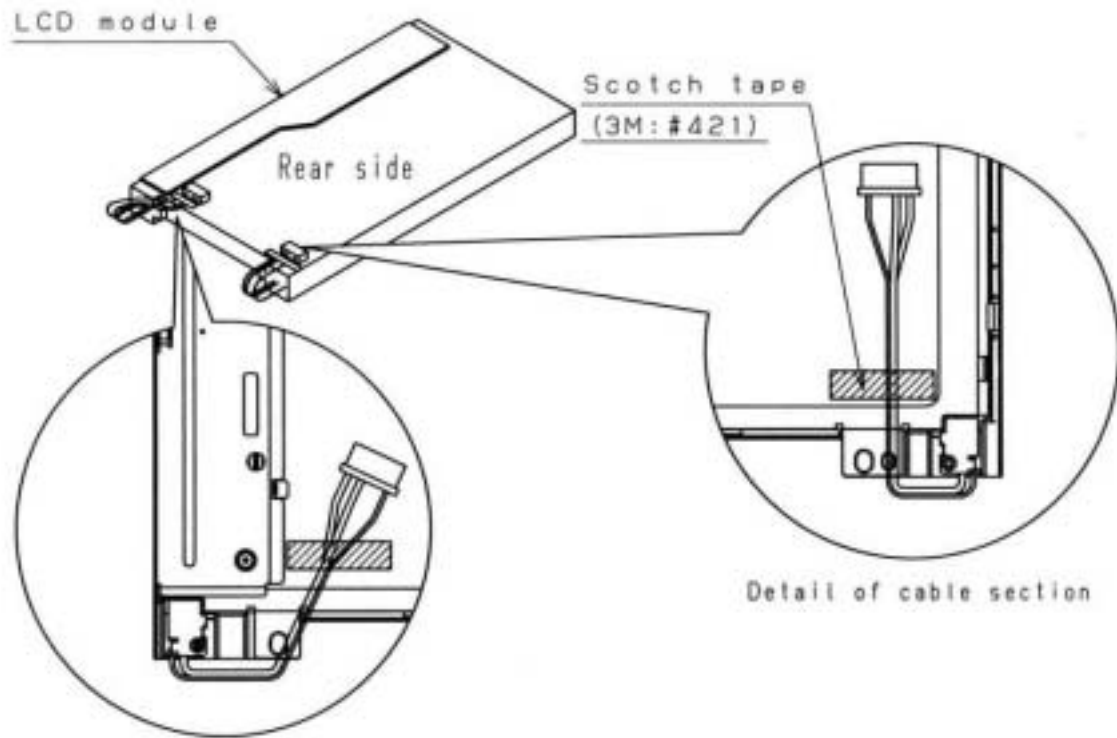
DATE	DOCUMENT CONTROL SECTION

						FLC43XWC8V-06						
						Tech Bes LCD-00252					CUST.	
EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION					FUJITSU DISPLAY TECHNOLOGIES CORPORATION		22 /
DESIG.			CHECK			APPR.						

1	2	3	4				
【FLC43XWC8V-06】							
13. ENVIRONMENTAL SPECIFICATIONS							
Table 13-1 shows the environmental specifications.							
Table 13-1. Environmental Specifications							
Item	Condition		Remark				
Temperature	Operation	0~57℃ (Note1)	Temperature on surface of LCD panel (display area.)				
	Storage	-20~60℃					
Humidity	Operation	20~85%RH	Maximum wet-bulb temperature should not exceed 29℃. No condensation.				
	Storage	5~85%RH					
Vibration	Non-operation	10~500Hz, 1 cycle/20minute, 2G, 1.5mm max, 2hour each X, Y and Z directions	For single module without package.(Note2)				
Shock	Non-operation	30G, 6ms, 1time each ± X, ± Y and ± Z directions.					
Note1: Temperature on surface of LCD panel should be under 57 .							
Note2: Table 13-2 and Fig. 13-1 show the shock resistance standard when module is packaged.							
Table 13-2. Shock Resistance Standard when Module is Packaged							
Dropping location		Dropping height	Count				
A ~ J		60cm	1 time				
Fig.13-1. Direction to apply shock to package							
FLC43XWC8V-06						CUST.	
Tech Bes LCD-00252							
EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION	FUJITSU DISPLAY TECHNOLOGIES CORPORATION	
DESIG.			CHECK		APPR.	23/	
1							

		1	2		3		4			
【FLC43XWC8V-06】										
14. INDICATIONS										
This module has the following indications.										
A	(1) Product name		: LCD unit							
		(2) Model number	: FLC43XWC8V-06							
		(3) Product drawing number	: NA19027-C051							
		(4) Manufacturing number	: 3		X	0	0	0	0	1
B					Serial number (To be reset every month on 1st.)					
				Manufacturing month (Oct. = X, Nov. =Y, Dec. =Z)						
				Last digit of manufacturing year.						
		(5) Version number	: 01A (Example) -1st 2 digits “01” means operational version. -3rd alphabet means functional version.							
		(6) Country of origin	: MADE IN TAIWAN							
C	(7) Company name		: FUJITSU DISPLAY TECHNOLOGIES CORP.							
		(8) Caution when changing cold-cathode tubes and disposal method of them. (See Fig. 14-1)								
		· WHEN CHANGING COLD CATHODE FLUORESCENT LAMPS, FOLLOW OPERATING SPECIFICATIONS. ESPECIALLY BE CAREFUL ABOUT THE LAMP'S 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。 · 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。								
D			Fig.14-1 LCD unitMADE IN TAIWAN FLC43XWC8V-062101234 NA19027-C05101A FUJITSU DISPLAY TECHNOLOGIES CORP							
		Fig.14-2 Product label (example)								
DOCUMENT CONTROL SECTION										
DATE										
		FLC43XWC8V-06								
		Tech Bes LCD-00252								
		CUST.								
		F								
EDIT		DATE	DESIG.	CHECK	APPR.	DESCRIPTION			FUJITSU DISPLAY TECHNOLOGIES CORPORATION	24/
DESIG.				CHECK			APPR.			
1										

Fix backlight cable to the rear side of module by scotch tape



Put LCD module into an anti-static bag.

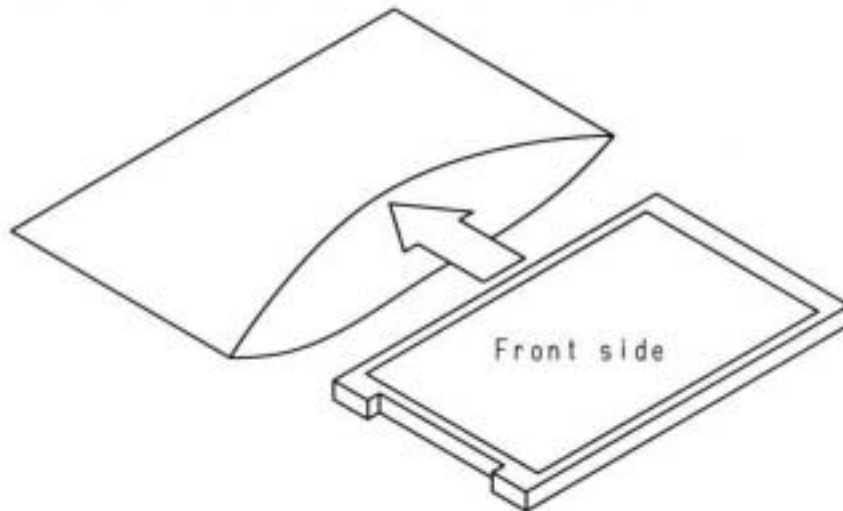


Fig.15-2(a) Packaging Method

DOCUMENT CONTROL SECTION

DATE

EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION
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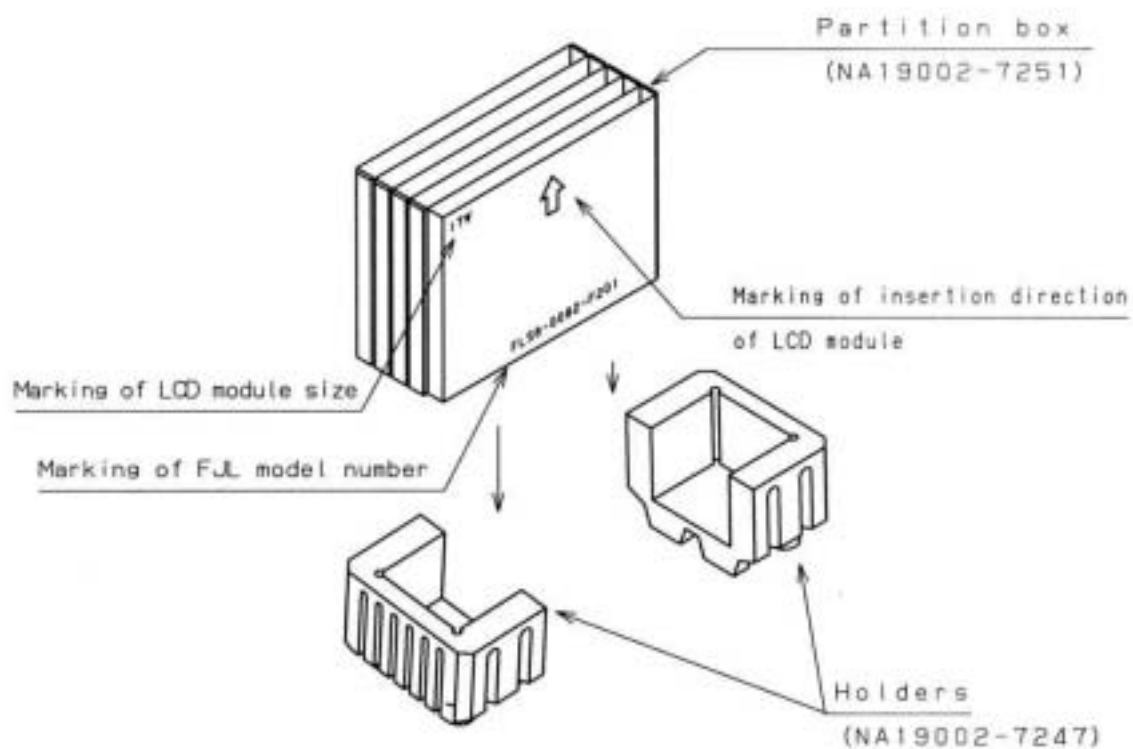
FLC43XWC8V-06

Tech Bes LCD-00252

CUST.

FUJITSU DISPLAY TECHNOLOGIES
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26/

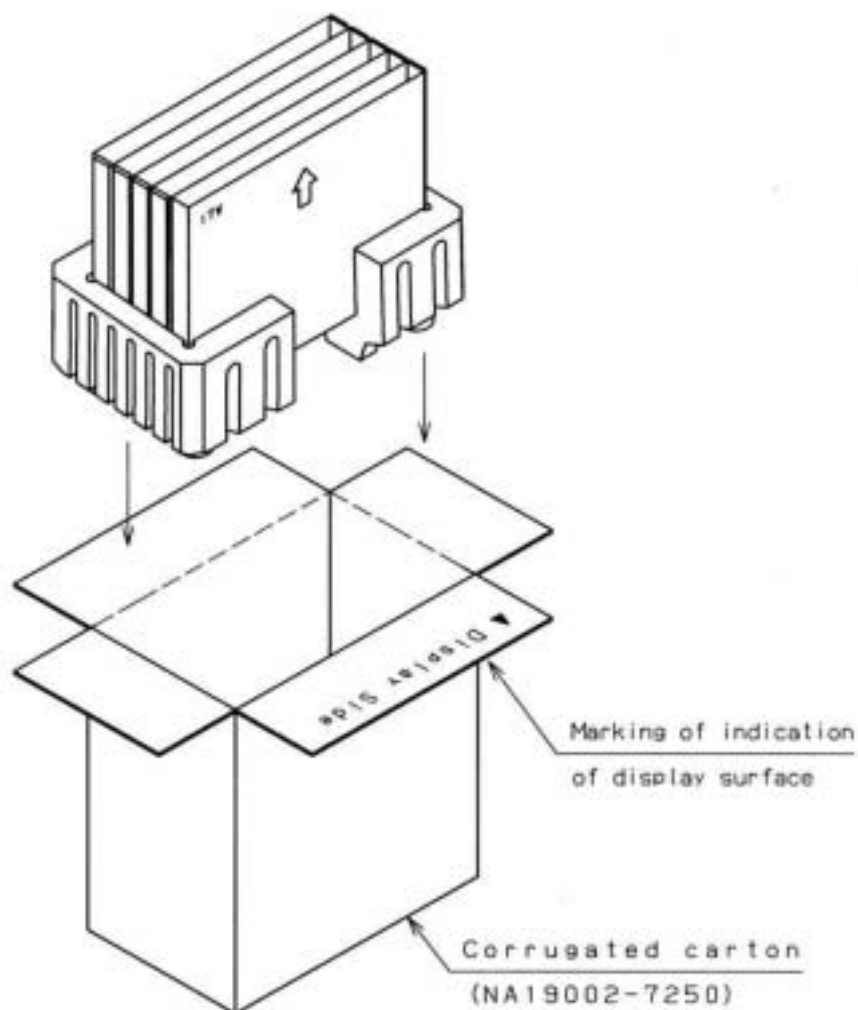


Set the holders so that the insertion side of partition box faces up.

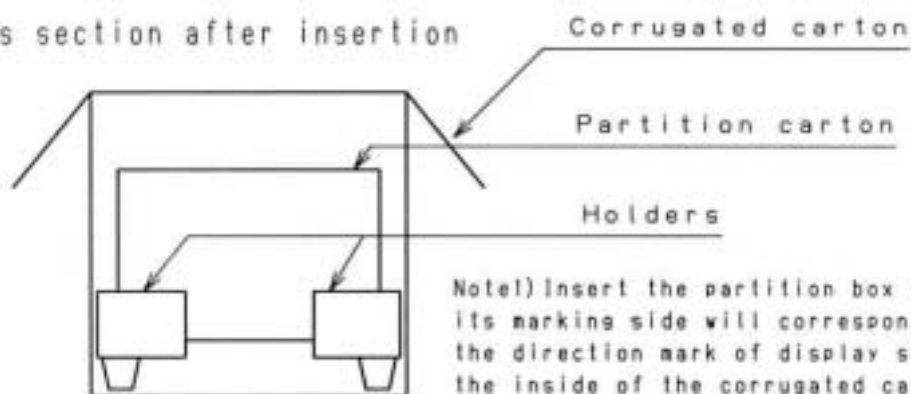
Fig.15-2(b) Packaging Method

[illegible]

Place the partition box with holders into the corrugated carton.



Cross section after insertion



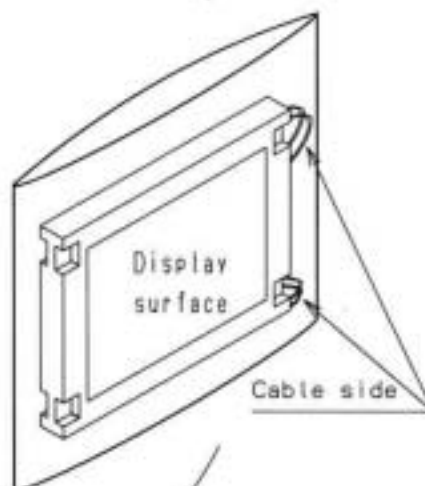
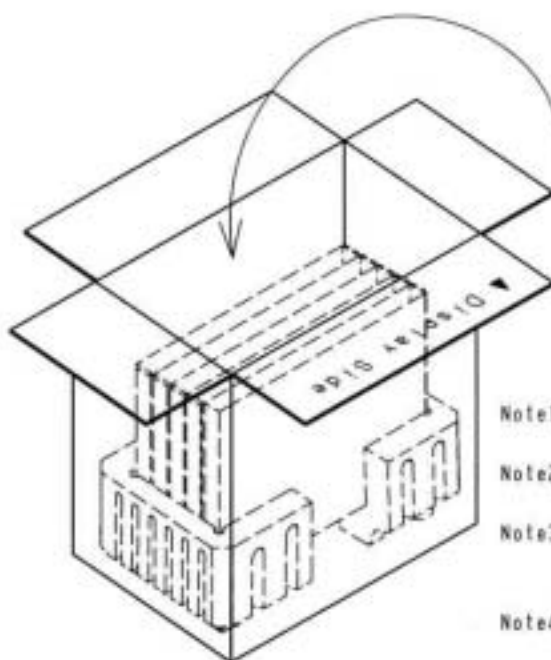
Note!) Insert the partition box so that its marking side will corresponds with the direction mark of display side on the inside of the corrugated carton.

Fig.15-2(c) Packaging Method

DATE	DOCUMENT CONTROL SECTION

						FLC43XWC8V-06							
						Tech Bes LCD-00252							
						CUST.							
EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION						FUJITSU DISPLAY TECHNOLOGIES CORPORATION	Still	28 /
	DESIG.			CHECK			APPR.						

Place the unit-packed product in the corrugated carton one by one.



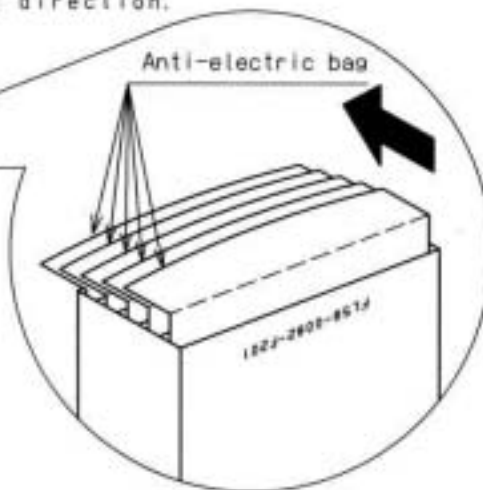
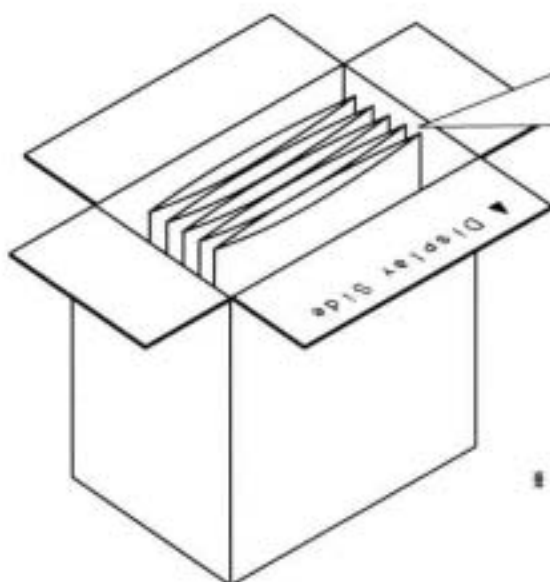
Note1) When modules are shown from the display side, the cable is located on the right.

Note2) Insert them with care so that the cable will not be stuck in the partition box.

Note3) The display side of LCD module and the side of the partition box where the model number is marked should face the same direction.

Note4) Please confirm that the display side of LCD module and the indication of the display side on the corrugated carton face the same direction.

Fold the anti-electric bag in the same direction.



※ Fold each anti-electric bag together to a certain direction as the arrow.

Fig.15-2(d) Packaging Method

DOCUMENT CONTROL SECTION

DATE

FLC43XWC8V-06

Tech Bes LCD-00252

CUST.

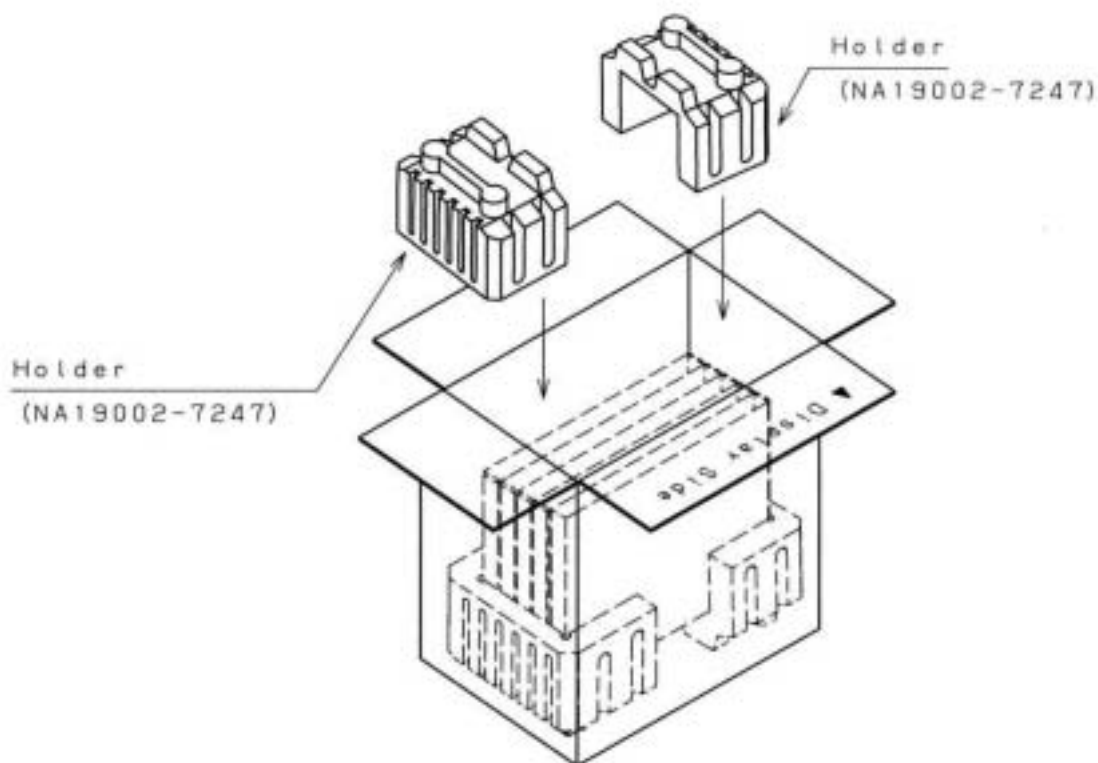
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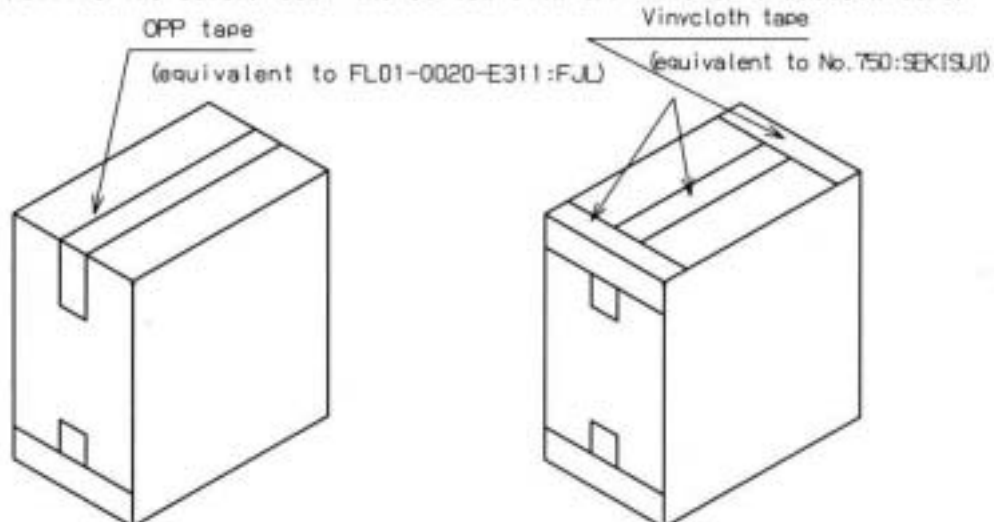
29/

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Place two upper holders on the partition box and close the inner lid.



After putting the cover, seal the carton with OPP tape or vinylcloth tape.



•When using OPP tape
Bottom: H method
Top: I method

•When using vinylcloth tape
Top, Bottom: H method

Note) Make sure to stick the side edge with the tape of 10cm or more.

Fig.15-2(e) Packaging Method

Shipping Label

State the following items on shipping label.
Stick the label according to the locating mark on
a side face of corrugated carton.

(1) Item to state

- Model No. section : indicate the product model number
- Drawing No. section : indicate the product drawing number
- Quantity section : indicate the quantity of packing
- Revision No. section : indicate the product revision number
- Serial No. of the same packing unit

(2) Position of sticking shipping label

Standard of sticking label

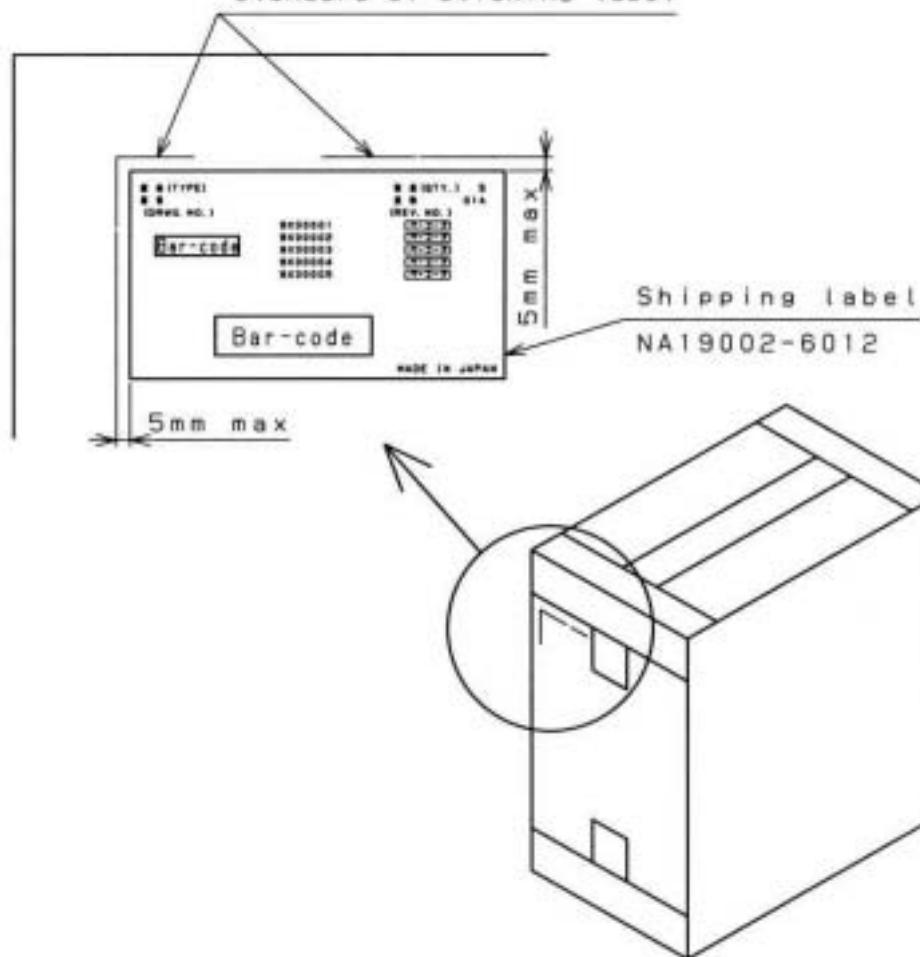


Fig.15-2(i) Packaging Method

DOCUMENT CONTROL SECTION

DATE

FLC43XWC8V-06

Tech Bes LCD-00252

CUST.

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FUJITSU DISPLAY TECHNOLOGIES CORPORATION

STATUS

31/

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Standard of LCD collected oversea packing

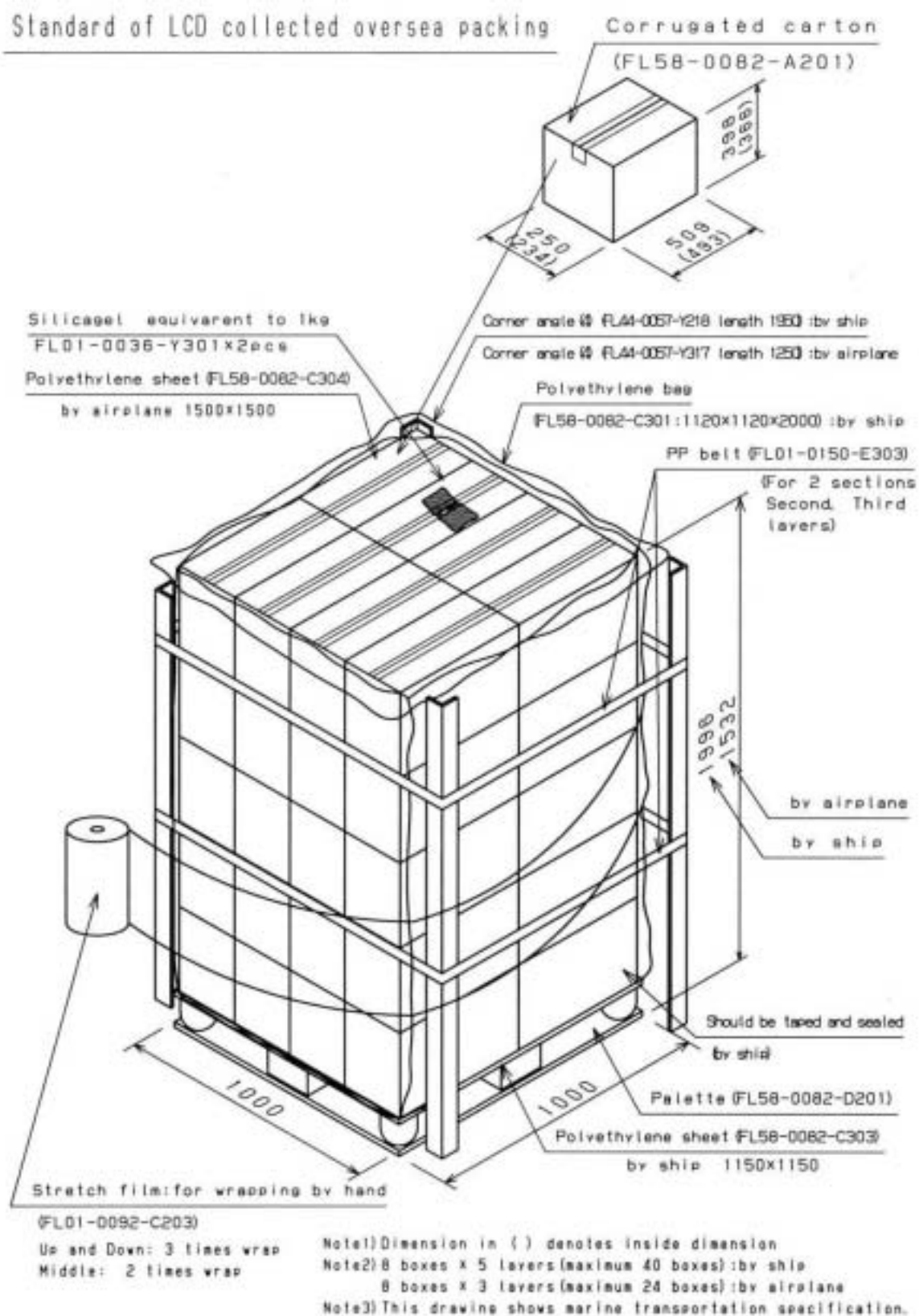


Figure.15-2(g) Packaging Method

DOCUMENT CONTROL SECTION

DATE

FLC43XWC8V-06

Tech Bes LCD-00252

CUST.

EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION
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FUJITSU DISPLAY TECHNOLOGIES CORPORATION

32 /

If the cable is pulled with the load of 2kg or more, the cable may be damaged or reliability may decrease.

If conductive foreign matter adheres to the module, failures may occur.

Since the LCD module contains CMOS-ICs, the following considerations are necessary.

- For assembling the module, operator should be grounded and wear cotton or conductive gloves.
- Floor of work area and work table to assemble the LCD module should be covered with electrostatic shielding in order to discharge static electricity via an earth wire.
- If necessary, ground operation tools (soldering iron, radio pliers, pincet, etc.).
- Do not take the module out of the conductive bag until the time when the module is assembled.
- Assemble the module under low humidity (50%RH or less).

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

Do not disassemble or remodel the LCD module.

If this LCD module is disassembled or remodeled, it may have some trouble, or the display quality and reliability may not be assured.

(4) Precautions for operating the LCD module

Adhere to the specified power supply sequence.

If not followed, the CMOS-IC may cause a latch-up, or the DC voltage may be applied the liquid crystal, and a failure or serious deterioration in display quality may occur.

Do not operate the LCD module when condensation is present.

If the LCD module is operated when condensation is on the terminals of the LCD panel, the terminals cause electrochemical reaction, and may reach disconnection. Condensation easily occurs especially when the module is moved from a cold environment to a warm environment.

Trouble that occurs when the LCD module is used at not recommended temperature.

- Operation at high temperature($>60^{\circ}\text{C}$) :Display colors shift to blue.
- Storage at high temperature($>60^{\circ}\text{C}$) :The polarizer film deteriorates and contrast decreases.
- Operation at low temperature($<0^{\circ}\text{C}$) :The response speed decreases considerably.
- Storage at low temperature ($<-20^{\circ}\text{C}$) :The liquid crystal may solidify and become damaged.

Always input the control signals at the correct timing.

If control signals (DCLK, or ENAB) are not input, or if the timing is out of the specified timing, DC voltage may be applied to the liquid crystal and, as a result, cause image sticking or deterioration of contrast.

(8) CAUTION IN DESIGNING INVERTER

Fluorescent lamps driven by high voltage are included in this LCD module. Please stand to the instructions below when designing inverter that lights the fluorescent lamps. Otherwise it may lead to FATAL FAILURE, such as SMOKING or FIRING.

APPLY PROTECTIVE CIRCUIT in preparation for lamp breaking, wire breaking and short circuit. The protective circuit should also detect half open circuit and wire breaking in narrow gap etc.. Otherwise it may lead to fatal failure.

KEEP ENOUGH CURRENT CAPACITY of inverter output for leakage current, which leaks from lamps and wire to surrounding metal material. Usually output current of about 1.5 times as same as the lamp current is necessary. But it sometimes varies due to characteristics of the inverter itself. So before determining design, please check characteristics of the inverter by connecting it to the LCD module.

KEEP ENOUGH TEMPERATURE MARGIN for each parts mounted on inverter. Temperature of the parts becomes higher when they are mounted in the final products due to heating inside. The temperature of each parts MUST NOT increase over the guaranteed temperature.

DOCUMENT CONTROL SECTION

DATE

						FLC43XWC8V-06		
						Tech Bes LCD-00252		CUST.
						FUJITSU DISPLAY TECHNOLOGIES CORPORATION		36 /
EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION			
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A

B

C

D

A

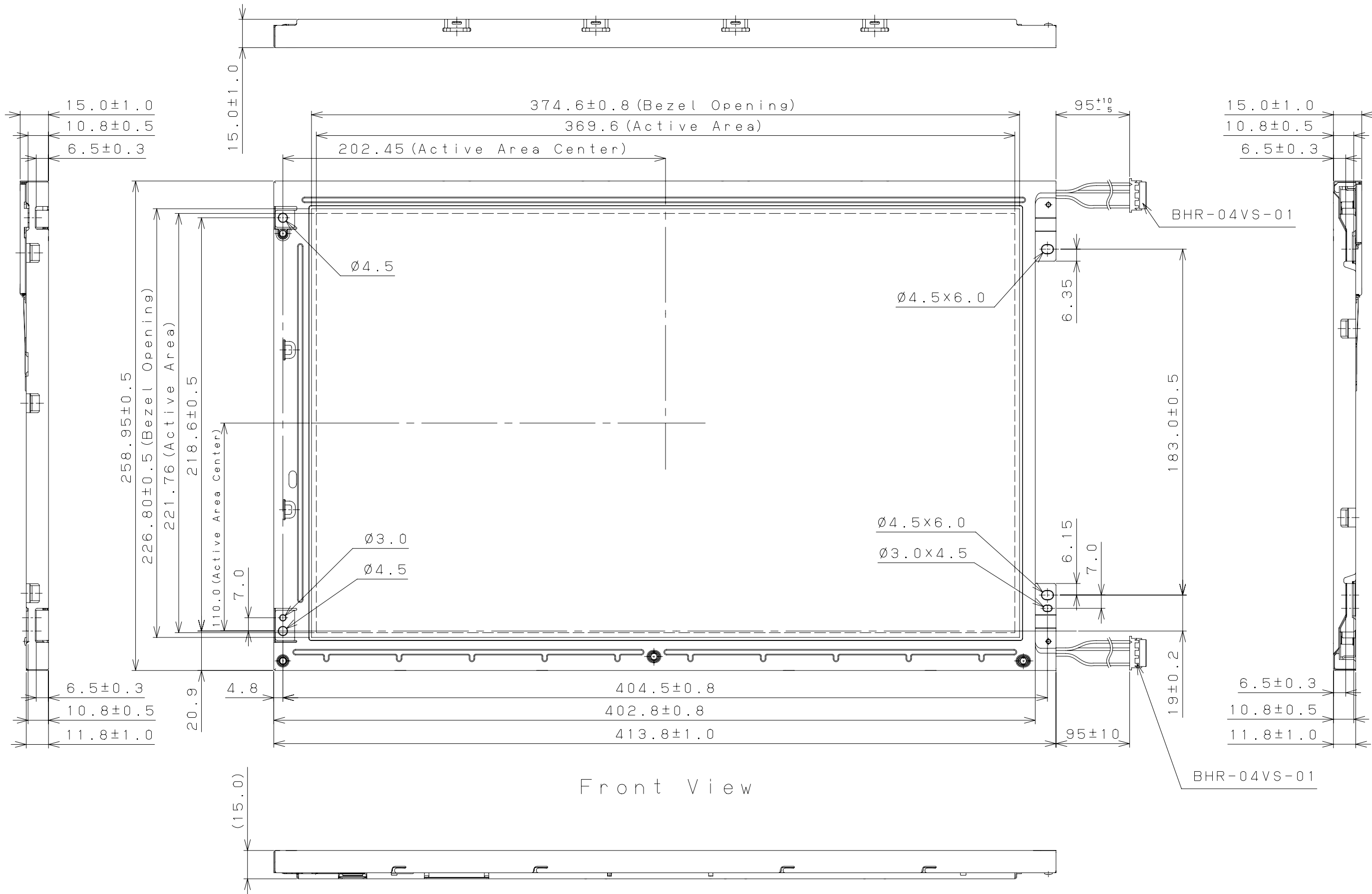
B

C

D

E

F



Front View

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				Fujitsu Display Technologies Corporation		SHEET	
				Fujitsu Display Technologies Corporation		/	

