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To : _____

Specification of FUJITSU TFT-LCD module

FLC43XWC6V-02

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-00087

Issue Date : Nov. 7, 2001

Issued by



T. Naka

Director

LCD Design Dep.

LCD Technology Div.

LCD Group

FUJITSU LIMITED

TABLE OF CONTENTS

1.APPLICATIONS.....	3
2.PRODUCT NAME AND MODEL NUMBER	
2-1.Product Name	3
2-2.Model Name	3
3.OVERVIEW.....	3
4.CONFIGURATION.....	3
5.MECHANICAL SPECIFICATIONS.....	4
6.ABSOLUTE MAXIMUM RATINGS.....	5
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	13
10-3.Input Signal Timing	14
10-4.Correspondence between Data and Display Position	16
10-5.Power Supply Sequence	16
11.BACKLIGHT SPECIFICATIONS	
11-1.Pin Configuration for Backlight	17
11-2.CCFL	17
11-3.Life.....	17
11-4.Lamp Assembly Set (for Replacement)	17
12.APPEARANCE SPECIFICATIONS	
12-1.Zone	18
12-2.Bright Spot.....	18
12-3.Test Condition.....	18
12-4.Standard	18
13.ENVIRONMENTAL SPECIFICATIONS	20
14.INDICATIONS.....	21
15.PACKAGING	
15-1.Packaging Specifications	21
15-2.Packaging Method.....	21
16.WARRANTY.....	26
17.PRECAUTIONS	26
18.PRECAUTIONS FOR USE.....	29
19.MISCELLANEOUS.....	29

DATE	DOCUMENT CONTROL SECTION

						FLC43XWC6V-02			
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	<p>2. PRODUCT NAME AND MODEL NUMBER</p> <p>2-1. <u>Product Name</u> : LCD Module</p> <p>2-2. <u>Model Name</u> : FLC43XWC6V-02</p>																																																														
B	<p>3. OVERVIEW</p> <p>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).</p> <p>This LCD has a digital RGB interface and can display 262,144 colors.</p> <p>Timing control signal is “Data enable signal : ENAB” only. (Data enable mode)</p> <p>Even and odd data are transmitted at the same timing in the interface, so data lines are 36. (R, G, B each 6 bit ×2) The signal level of this interface is +3.3V CMOS level or 5V TTL level.</p> <p>The power supply of this LCD module is +5v DC single.</p>																																																														
C	<p>4. CONFIGURATION</p> <p>This LCD module consists of a LCD panel, LCD driving circuit, control circuit, interface circuit and backlight unit.</p> <p>The LCD panel is active matrix TFT type and Fujitsu’s unique MVA (<u>M</u>ulti-<u>d</u>omain <u>V</u>ertical <u>A</u>lignment) liquid crystal technology is adopted in it. The LCD driving circuit is integrated in IC chips, which are bonded on plastic wiring film (hereinafter TAB driver-IC), and the output terminals of the IC chips are connected to the LCD panel. The control circuit and the interface circuit are mounted on three kinds of printed circuit board (hereinafter PCB) and the input of the TAB driver-ICs are connected to the PCBs.</p> <p>With such circuit construction, the image data received by the interface circuit is forwarded to the control circuit and the control circuit modulates the image data to LCD driving signals. The TAB driver ICs buffer the LCD driving signals and output driving voltages to the LCD panel.</p> <p>These LCD parts such as the LCD panel, the TAB-ICs and the PCBs are assembled together with the backlight module in a plastic case and a metal frame.</p> <p>Fig.4-1 shows a block diagram of this LCD module.</p>																																																														
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A	<div><p>Fig.4-1.Block Diagram</p></div>					A																														
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6. ABSOLUTE MAXIMUM RATINGS									
Table 6-1 shows the absolute maximum rating of this LCD module.									
Table 6-1. Absolute Maximum Ratings									
Item		Symbol	Condition	MIN.	TYP.	MAX.	Unit		
Supply Voltage		V _{CC}	Ta=25°C	-0.3	—	6.0	V		
Input Voltage		V _{IN}	Ta=25°C	-0.3	—	V _{cc} +0.3	V		
7. RECOMMENDED OPERATING CONDITIONS									
Table 7-1 shows the recommended operating conditions of this LCD module.									
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Item			Symbol	MIN.	TYP.	MAX.	Unit		
Supply Voltage (Logic)			V _{CC}	4.75	5.0	5.25	V		
Ripple Voltage		V _{CC}	V _{RP}	—	—	100	mV		
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A	<h2 style="margin: 0;">8. ELECTRICAL SPECIFICATIONS</h2> <p style="margin: 0;">Table 8-1 shows the electrical specifications of this LCD module.</p> <p style="margin: 0;"><u>Table 8-1. Electrical Specifications</u></p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:20%;">Item</th> <th style="width:10%;">Symbol</th> <th style="width:20%;">Condition</th> <th style="width:10%;">MIN.</th> <th style="width:10%;">TYP.</th> <th style="width:10%;">MAX.</th> <th style="width:10%;">Unit</th> <th style="width:10%;">Remark</th> </tr> </thead> <tbody> <tr> <td>Supply Current</td> <td>I_{CC}</td> <td rowspan="5">V_{CC}=+5.0±0.25V V_{SS}=0V DCLK=32.505MHz</td> <td>—</td> <td>380</td> <td>800</td> <td>mA</td> <td>*1</td> </tr> <tr> <td>“H” Level Logic Input Voltage</td> <td>V_{IH}</td> <td>2.3</td> <td>—</td> <td>V_{CC}</td> <td>V</td> <td></td> </tr> <tr> <td>“L” Level Logic Input Voltage</td> <td>V_{IL}</td> <td>V_{SS}</td> <td>—</td> <td>0.9</td> <td>V</td> <td></td> </tr> <tr> <td>Supply Rush Current</td> <td>I_{SCC}</td> <td>—</td> <td>5.5</td> <td>7</td> <td>A</td> <td rowspan="2">*2</td> </tr> <tr> <td>Supply Rush Current Duration (1A excess)</td> <td>T_{SCC}</td> <td>—</td> <td>0.4</td> <td>0.15</td> <td>ms</td> </tr> <tr> <td rowspan="5" style="text-align: center; vertical-align: middle;">B</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">BACK LIGHT</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">CCFL Turn on Voltage</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">V_S</td> <td>f_L=50kHz, Ta=25°C</td> <td>—</td> <td>1230</td> <td>1600</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">V_{rms}</td> <td>*4</td> </tr> <tr> <td>f_L=50kHz, Ta=0°C</td> <td>—</td> <td>—</td> <td>1600</td> <td>*4</td> </tr> <tr> <td rowspan="3" style="text-align: center; vertical-align: middle;">C</td> <td rowspan="3" style="text-align: center; vertical-align: middle;">BACK LIGHT</td> <td>Lighting Voltage</td> <td>V_L</td> <td>f_L=50kHz I_L=10.5mA</td> <td>590</td> <td>630</td> <td>670</td> <td>V_{rms}</td> <td>*4</td> </tr> <tr> <td>Lighting Frequency</td> <td>f_L</td> <td>V_L=580V_{rms}</td> <td>40</td> <td>50</td> <td>60</td> <td>kHz</td> <td></td> </tr> <tr> <td>*3 Tube Current</td> <td>I_L</td> <td>f_L=50kHz V_L=580V_{rms}</td> <td>9.5</td> <td>10.5</td> <td>11.0</td> <td>mA</td> <td>*4</td> </tr> </tbody> </table>							Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark	Supply Current	I _{CC}	V _{CC} =+5.0±0.25V V _{SS} =0V DCLK=32.505MHz	—	380	800	mA	*1	“H” Level Logic Input Voltage	V _{IH}	2.3	—	V _{CC}	V		“L” Level Logic Input Voltage	V _{IL}	V _{SS}	—	0.9	V		Supply Rush Current	I _{SCC}	—	5.5	7	A	*2	Supply Rush Current Duration (1A excess)	T _{SCC}	—	0.4	0.15	ms	B	BACK LIGHT	CCFL Turn on Voltage	V _S	f _L =50kHz, Ta=25°C	—	1230	1600	V _{rms}	*4	f _L =50kHz, Ta=0°C	—	—	1600	*4	C	BACK LIGHT	Lighting Voltage	V _L	f _L =50kHz I _L =10.5mA	590	630	670	V _{rms}	*4	Lighting Frequency	f _L	V _L =580V _{rms}	40	50	60	kHz		*3 Tube Current	I _L	f _L =50kHz V _L =580V _{rms}	9.5	10.5	11.0	mA	*4
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D	<p>(*1) Typical current value is measured when color bar pattern is displayed at V_{CC}=5.0V. Maximum current value is measured when 55/63 and 63/63 gray scale pattern every 2 pixel is displayed at V_{CC}=4.75V. Without rush current.</p> <p>(*2) These items prescribe the rush current for starting internal DC/DC. Charging current to capacitors of V_{CC} is not prescribed.</p> <p>(*3) Backlight specifications are valid when using a suitable inverter such as the “FLCV-15” of Fujitsu Limited.</p> <p>(*4) Tube current (I_L) shows the value of the current that is consumed at one lamp. 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 are bound into 1 line cable, which connected to the backlight connector.</p>																																																																																										
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Note 1) Measurement Circuit

Based on Fig.8-1.

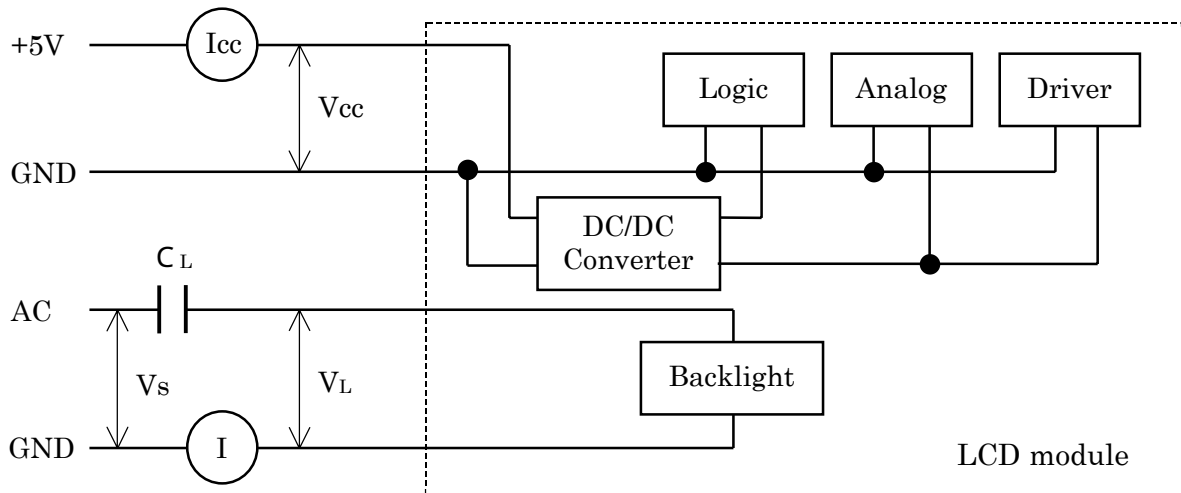


Fig.8-1. Measurement Circuit

Note 2) Equivalent Circuit

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

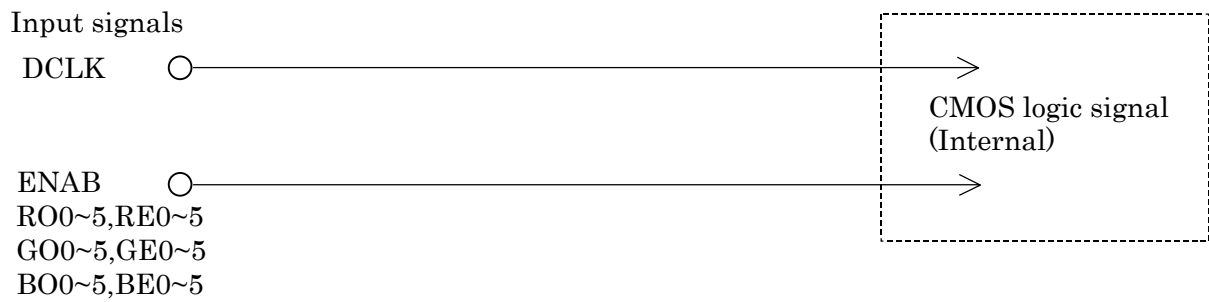
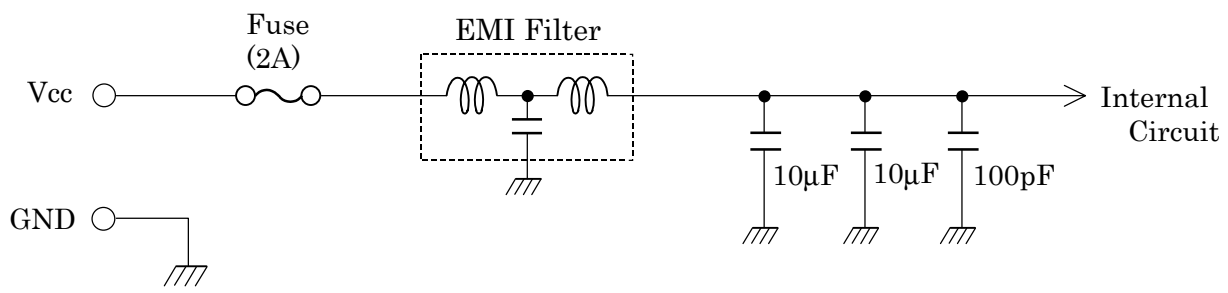


Fig.8-2 (a) Equivalent Circuit of Logic Signal Input



FuseKAB2402202NA (Matsuo Electric CO., LTD.)
EMI FilterSGM20C1E332-2A(Sumitomo Metals)

Fig.8-2 (b) Equivalent Circuit of Power Supply

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Note 4) Definition of Response Time

Based on Fig.9-5.

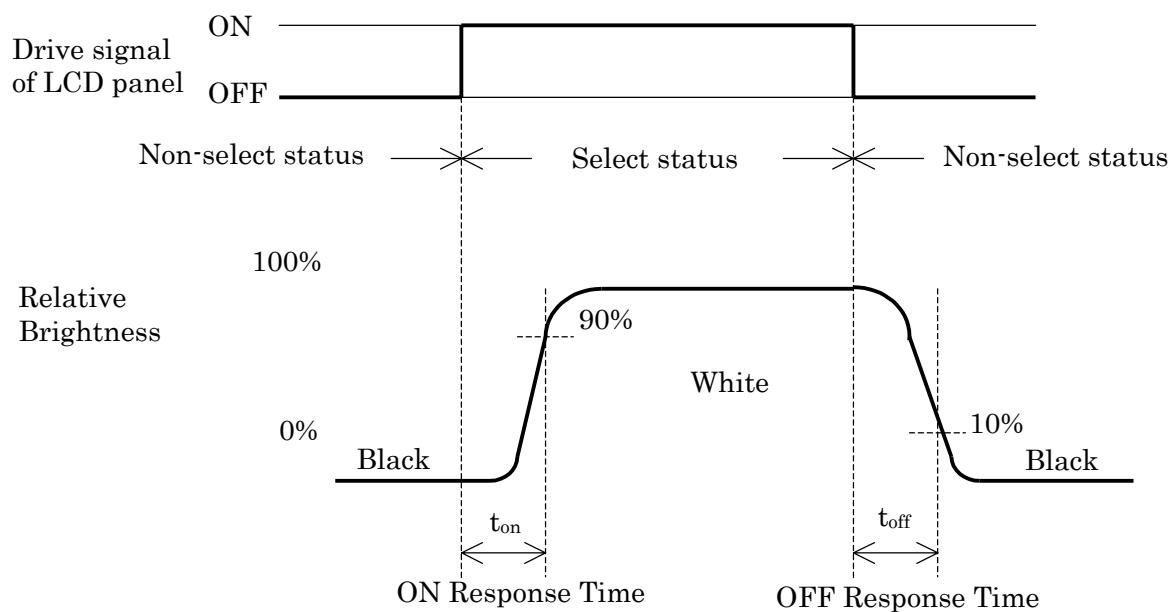


Fig.9-5. Definition of Response Time

Note 5) Contrast Ratio and Response Measurement System

Based on Fig.9-6.

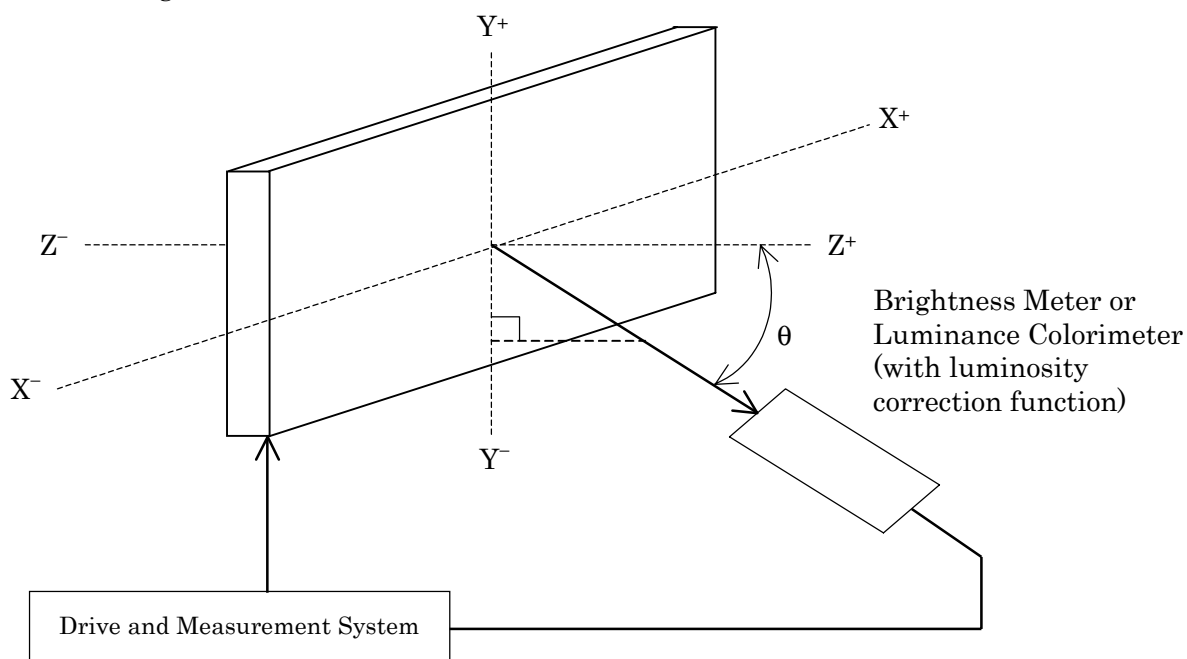


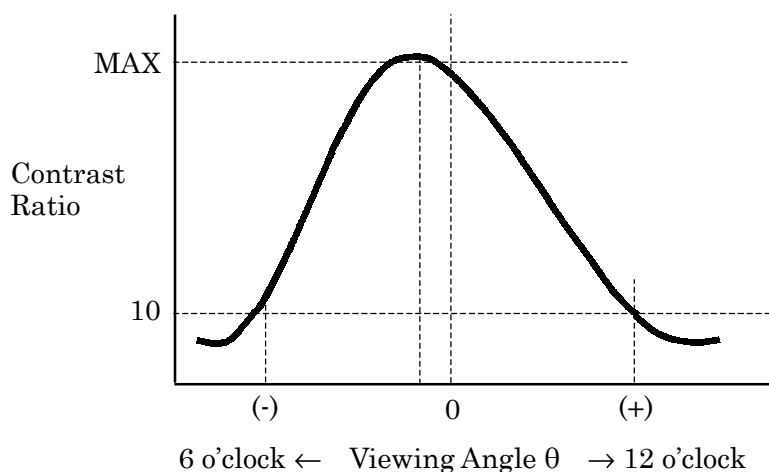
Fig.9-6. Contrast Ratio and Response Time Measurement System

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						Tech Bes LCD-00087			CUST.
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Note 6) Definition of Optimum Viewing Angle

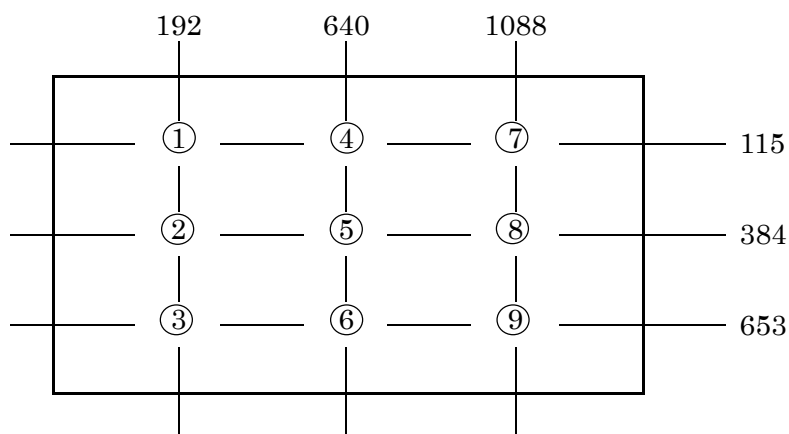
Based on Fig.9-7.

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 $\pm 5\text{mm}$.

Fig.9-8. Measurement Points

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<table><tr><th>Pin No.</th><th>Symbol</th><th>I/O</th><th>Function</th></tr><tr><td>1</td><td>GND</td><td>—</td><td>Ground</td></tr><tr><td>2</td><td>RE0</td><td>I</td><td>Red even data 0</td></tr><tr><td>3</td><td>RE1</td><td>I</td><td>Red even data 1</td></tr><tr><td>4</td><td>RE2</td><td>I</td><td>Red even data 2</td></tr><tr><td>5</td><td>RE3</td><td>I</td><td>Red even data 3</td></tr><tr><td>6</td><td>RE4</td><td>I</td><td>Red even data 4</td></tr><tr><td>7</td><td>RE5</td><td>I</td><td>Red even data 5</td></tr><tr><td>8</td><td>GND</td><td>—</td><td>Ground</td></tr><tr><td>9</td><td>GE0</td><td>I</td><td>Green even data 0</td></tr><tr><td>10</td><td>GE1</td><td>I</td><td>Green even data 1</td></tr><tr><td>11</td><td>GE2</td><td>I</td><td>Green even data 2</td></tr><tr><td>12</td><td>GE3</td><td>I</td><td>Green even data 3</td></tr><tr><td>13</td><td>GE4</td><td>I</td><td>Green even data 4</td></tr><tr><td>14</td><td>GE5</td><td>I</td><td>Green even data 5</td></tr><tr><td>15</td><td>GND</td><td>—</td><td>Ground</td></tr><tr><td>16</td><td>BE0</td><td>I</td><td>Blue even data 0</td></tr><tr><td>17</td><td>BE1</td><td>I</td><td>Blue even data 1</td></tr><tr><td>18</td><td>BE2</td><td>I</td><td>Blue even data 2</td></tr><tr><td>19</td><td>BE3</td><td>I</td><td>Blue even data 3</td></tr><tr><td>20</td><td>BE4</td><td>I</td><td>Blue even data 4</td></tr><tr><td>21</td><td>BE5</td><td>I</td><td>Blue even data 5</td></tr><tr><td>22</td><td>GND</td><td>—</td><td>Ground</td></tr><tr><td>23</td><td>RO0</td><td>I</td><td>Red odd data 0</td></tr><tr><td>24</td><td>RO1</td><td>I</td><td>Red odd data 1</td></tr><tr><td>25</td><td>RO2</td><td>I</td><td>Red odd data 2</td></tr><tr><td>26</td><td>RO3</td><td>I</td><td>Red odd data 3</td></tr><tr><td>27</td><td>RO4</td><td>I</td><td>Red odd data 4</td></tr><tr><td>28</td><td>RO5</td><td>I</td><td>Red odd data 5</td></tr><tr><td>29</td><td>GND</td><td>—</td><td>Ground</td></tr><tr><td>30</td><td>GO0</td><td>I</td><td>Green odd data 0</td></tr></table>				Pin No.	Symbol	I/O	Function	1	GND	—	Ground	2	RE0	I	Red even data 0	3	RE1	I	Red even data 1	4	RE2	I	Red even data 2	5	RE3	I	Red even data 3	6	RE4	I	Red even data 4	7	RE5	I	Red even data 5	8	GND	—	Ground	9	GE0	I	Green even data 0	10	GE1	I	Green even data 1	11	GE2	I	Green even data 2	12	GE3	I	Green even data 3	13	GE4	I	Green even data 4	14	GE5	I	Green even data 5	15	GND	—	Ground	16	BE0	I	Blue even data 0	17	BE1	I	Blue even data 1	18	BE2	I	Blue even data 2	19	BE3	I	Blue even data 3	20	BE4	I	Blue even data 4	21	BE5	I	Blue even data 5	22	GND	—	Ground	23	RO0	I	Red odd data 0	24	RO1	I	Red odd data 1	25	RO2	I	Red odd data 2	26	RO3	I	Red odd data 3	27	RO4	I	Red odd data 4	28	RO5	I	Red odd data 5	29	GND	—	Ground	30	GO0	I	Green odd data 0	<table><tr><th>Pin No.</th><th>Symbol</th><th>I/O</th><th>Function</th></tr><tr><td>31</td><td>GO1</td><td>I</td><td>Green odd data 1</td></tr><tr><td>32</td><td>GO2</td><td>I</td><td>Green odd data 2</td></tr><tr><td>33</td><td>GO3</td><td>I</td><td>Green odd data 3</td></tr><tr><td>34</td><td>GO4</td><td>I</td><td>Green odd data 4</td></tr><tr><td>35</td><td>GO5</td><td>I</td><td>Green odd data 5</td></tr><tr><td>36</td><td>GND</td><td>—</td><td>Ground</td></tr><tr><td>37</td><td>BO0</td><td>I</td><td>Blue odd data 0</td></tr><tr><td>38</td><td>BO1</td><td>I</td><td>Blue odd data 1</td></tr><tr><td>39</td><td>BO2</td><td>I</td><td>Blue odd data 2</td></tr><tr><td>40</td><td>BO3</td><td>I</td><td>Blue odd data 3</td></tr><tr><td>41</td><td>BO4</td><td>I</td><td>Blue odd data 4</td></tr><tr><td>42</td><td>BO5</td><td>I</td><td>Blue odd data 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supply</td></tr><tr><td>59</td><td>VDD</td><td>—</td><td>+5V Power supply</td></tr><tr><td>60</td><td>VDD</td><td>—</td><td>+5V Power supply</td></tr></table>				Pin No.	Symbol	I/O	Function	31	GO1	I	Green odd data 1	32	GO2	I	Green odd data 2	33	GO3	I	Green odd data 3	34	GO4	I	Green odd data 4	35	GO5	I	Green odd data 5	36	GND	—	Ground	37	BO0	I	Blue odd data 0	38	BO1	I	Blue odd data 1	39	BO2	I	Blue odd data 2	40	BO3	I	Blue odd data 3	41	BO4	I	Blue odd data 4	42	BO5	I	Blue odd data 5	43	GND	—	Ground	44	GND	—	Ground	45	GND	—	Ground	46	ENAB	I	Data enable signal	47	GND	—	Ground	48	GND	—	Ground	49	DCLK	I	Dot clock signal	50	GND	—	Ground	51	GND	—	Ground	52	SS	—	SS function ON/OFF (*1)	53	GND	—	Ground	54	GND	—	Ground	55	GND	—	Ground	56	GND	—	Ground	57	VDD	—	+5V Power supply	58	VDD	—	+5V Power supply	59	VDD	—	+5V Power supply	60	VDD	—	+5V Power supply
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46	ENAB	I	Data enable signal																																																																																																																																																																																																																																																												
47	GND	—	Ground																																																																																																																																																																																																																																																												
48	GND	—	Ground																																																																																																																																																																																																																																																												
49	DCLK	I	Dot clock signal																																																																																																																																																																																																																																																												
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51	GND	—	Ground																																																																																																																																																																																																																																																												
52	SS	—	SS function ON/OFF (*1)																																																																																																																																																																																																																																																												
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(*1) SS (Spread Spectrum):SS function is ON when signal level is high or N.C..(generally set up N.C.) SS function is OFF when signal level is low.																																																																																																																																																																																																																																																															
<div>Upper side</div> <div><div>Interface connector</div><div>LCD Module</div><div>Rear side</div><div>3130601</div></div> <div>Lower side</div> <div>Connector : 52760-0600 (Molex)</div> <div>User's connector : 53475-0600 (Molex)</div>																																																																																																																																																																																																																																																															
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Color			R Input data							G Input data							B Input data						
	Odd Even		R05	R04	R03	R02	R01	R00	G05	G04	G03	G02	G01	R00	B05	B04	B03	B02	B01	B00			
			RE5	RE4	RE3	RE2	RE1	RE0	GE5	GE4	GE3	GE2	GE1	GE0	BE5	BE4	BE3	BE2	BE1	BE0			
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Blue		0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1			
	Green		0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0			
	Cyan		0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1			
	Red		1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0			
	Magenta		1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1			
	Yellow		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
	White		1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0			
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	↑	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0			
	↑																						
	↓																						
	Brighter	61	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0			
	↓	62	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
	Red	63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0			
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	↑	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0			
	↑																						
	↓																						
	Brighter	61	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0			
	↓	62	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0			
	Green	63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0			
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
	↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1			
	↑																						
	↓																						
	Brighter	61	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1			
	↓	62	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0			
	Blue	63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1			

Note.3) Color data consist of 36 bits, namely, 6-bit odd and even data for each red, green and blue. Optional data can be set to red, green and blue independently. Therefore, the module is able to display 262,144 colors.

B

C

Th

C768

D

$$T_v$$

ENAB

74 1050

Tdn=0clk

DOCUMENT CONTROL SECTION

DATE _____

CUST.

FUJITSU LIMITED

ST(E)S

15/

F


		1		2		3		4				
【FLC43XWC6V-02】												
10-4. Correspondence between Data and Display Position												
Fig.10-3 shows the Correspondence between Data and Display Position.												
S0001 S0002 S0003 S0004 S0005 S0006 S0007 S0008 S3071 S3072												
C001		RO 0001	GO 0001	BO 0001	RE 0002	GE 0002	BE 0002	RO 0003	GO 0003	GE 1280	BE 1280
B												
C768		RO 0001	GO 0001	BO 0001	RE 0002	GE 0002	BE 0002	RO 0003	GO 0003	GE 1280	BE 1280
Fig.10-4. Correspondence Data and Display Position												
10-5. Power Supply Sequence												
The sequence of input signals and On/Off of the power supply of this LCD module should be in the specification shown in Fig.10-4 to prevent latch-up of the driver ICs and DC driving of the LCD panel.												
<p>The diagram shows two waveforms: Vcc and Input signal. Vcc transitions from OFF (0V) to ON (4.75V) with a rise time T4 ≤ 20ms, and from ON (4.75V) to OFF (0V) with a fall time T5 ≤ 20ms (Voltage descent). The Input signal transitions from L (Low) to H (High) with a rise time T1 (10% to 90%) and from H to L with a fall time T2 (90% to 10%). Both T1 and T2 are constrained to 10ms ≤ T1 ≤ 40ms and 10ms ≤ T2 ≤ 40ms. A third transition T3 is shown from H to L with a constraint 0ms ≤ T3 ≤ 40ms. A final transition T6 is shown from 4.75V to 0.5V with a constraint 0.1s ≤ T6.</p>												
Fig.10-5. Power Supply Sequence												
DOCUMENT CONTROL SECTION												
DATE		FLC43XWC6V-02										
		Tech Bes LCD-00087										
		CUST.										
EDIT		DATE	DESIG.	CHECK	APPR.	DESCRIPTION						
DESIG.				CHECK		APPR.	FUJITSU LIMITED					
1		16/										

		1		2		3		4		
【FLC43XWC6V-02】										
A	11. BACKLIGHT SPECIFICATIONS									A
	<u>11-1. Pin Configuration for Backlight</u> 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.									
B	<u>Table 11-1(a) Pin Assignment of CN-A</u>					<u>Table11-1(b) Pin Assignment of CN-B</u>				B
	Pin	Signal	Function			Pin	Signal	Function		
	1	VL1	Power supply for CCFL 1			1	VL3	Power supply for CCFL 3		
	2	VL2	Power supply for CCFL 2			2	VL4	Power supply for CCFL 4		
	3	NC				3	NC			
	4	GND	Ground (for VL1, 2)			4	GND	Ground (for VL3, 4)		
C	Cable color (CN-A and B) : White at GND, Pink at VL1,2,3 and 4 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.)									C
	<u>11-2. CCFL</u> Supplier : SANKEN ELECTRIC CO., LTD Part No. SD26E3850E8350B3113000									
	<u>11-3. Life</u> The life of the backlight is a minimum of 25,000 hours at the following conditions.									
	(1) Working conditions Ambient temperature : 25±5°C Tube current(IL) : (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.									
D	<u>11-4. Lamp Assembly set (for replacement)</u> 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									D
E										E
F										F

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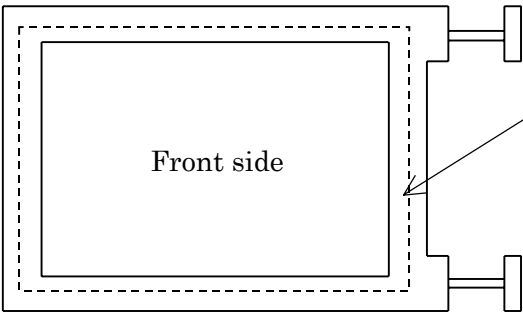
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						Tech Bes LCD-00087	
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【FLC43XWC6V-02】							
13. ENVIRONMENTAL SPECIFICATIONS							
Table 13-1 shows the environmental specifications.							
Table 13-1. Environmental Specifications							
Item		Condition		Remark			
Temperature		Operation	0~60°C (Note1)	Temperature on surface of LCD panel (display area.)			
		Storage	-20~60°C				
Humidity		Operation	20~85%RH	Maximum wet-bulb temperature should not exceed 29°C. 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 60 .							
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							
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【FLC43XWC6V-02】										
14. INDICATIONS										
This module has the following indications.										
A	(1) Product name		: LCD unit							
	(2) Model number		: FLC43XWC6V-02							
	(3) Product drawing number		: NA19020-C553							
	(4) Manufacturing number		: 0 Y 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.			
C	(5) Version number		: 01A (Example)							
			-1st 2 digits “01” means operational version.							
			-3rd alphabet means functional version.							
	(6) Country of origin		: MADE IN JAPAN							
C	(7) Company name		: FUJITSU LIMITED							
	(8) Disposal method of cold-cathode tubes.		(See Fig.14-1)							
	(9) Caution when changing cold-cathode tubes.		(See Fig. 14-2)							
D	• 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 FLUO- RESCENT LAMPS, FOLLOW OPERATING SPECIFICATIONS. ESPECIALLY BE CAREFUL ABOUT 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。		LCD unit  FLC43XWC6V-02 0X50015 NA19020-C553 01A MADE IN JAPAN/FUJITSU LIMITED					
Fig.14-1		Fig.14-2		Fig.14-3 Product label (example)						
15. PACKAGING										
Separately specified in packaging specifications.										
15-1. Packaging specifications										
(1) 5 LCD modules / 1 package.										
(2) Weight: approximately 13kg / 1 package.										
(3) Outline dimensions : 348mm(W) × 328(D) × 490mm(H)										
15-2. Packaging method										
Fig.15-2 (a),(b),(c),(d) show the packing method.										
DOCUMENT CONTROL SECTION								FLC43XWC6V-02		
								Tech Bes LCD-00087		
								CUST.		
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A

A

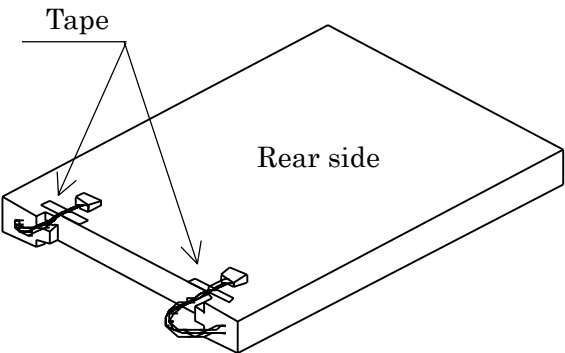


Protective sheet

Front side

B

B



Tape

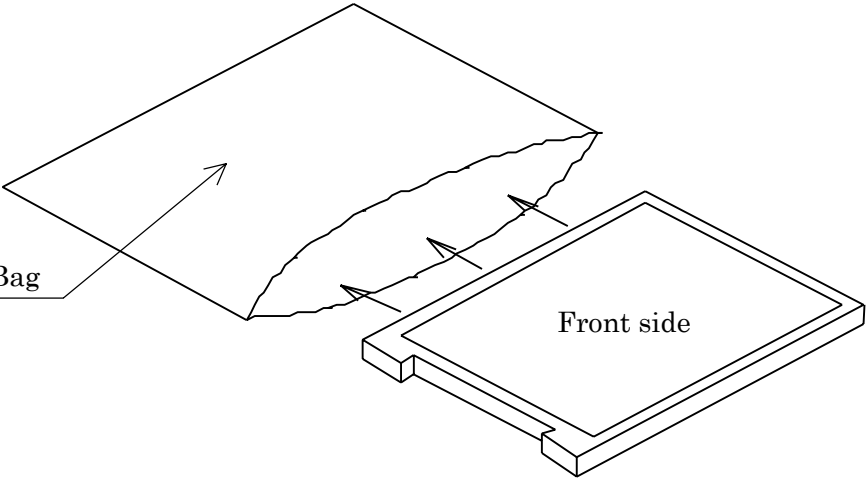
Rear side

C

C



Anti-Electric Bag



Front side

D

D

E

Fig.15-2(a) Packaging Method

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						FLC43XWC6V-02		
						Tech Bes LCD-00087		CUST.
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A

Holder(bottom)

LCD unit

A

B

B

C

Holder(upper)

C

D

D

Label(example)

型 格 (TYPE)	FLC43XWC6V-02	数 量 (QTY.)	5
図 番	NA19020-C553	版 数	01A
(DRWG. NO.)		(REV. NO.)	
	9X00001		
	9X00002		
	9X00003		
	9X00004		
	9X00005		

バーコード

MADE IN JAPAN

- Taping
Upper : H or I method
Bottom : H method
- Upper and bottom holders should be anti-electrostatic type.

(490)

(348)

(328)

Fig.15-2(b) Packaging Method

E

F

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FLC43XWC6V-02

Tech Bes LCD-00087

CUST.

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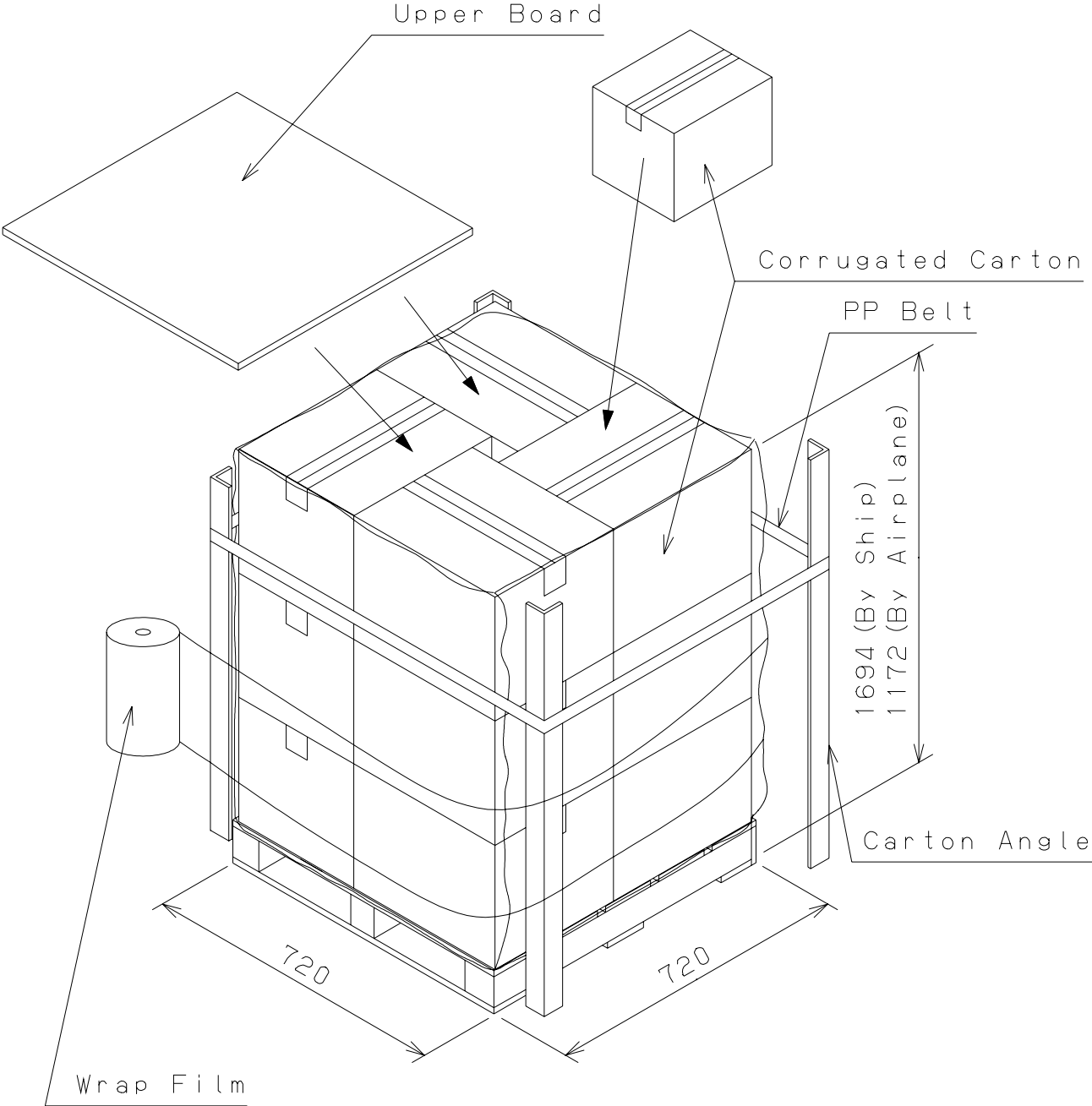
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FUJITSU LIMITED

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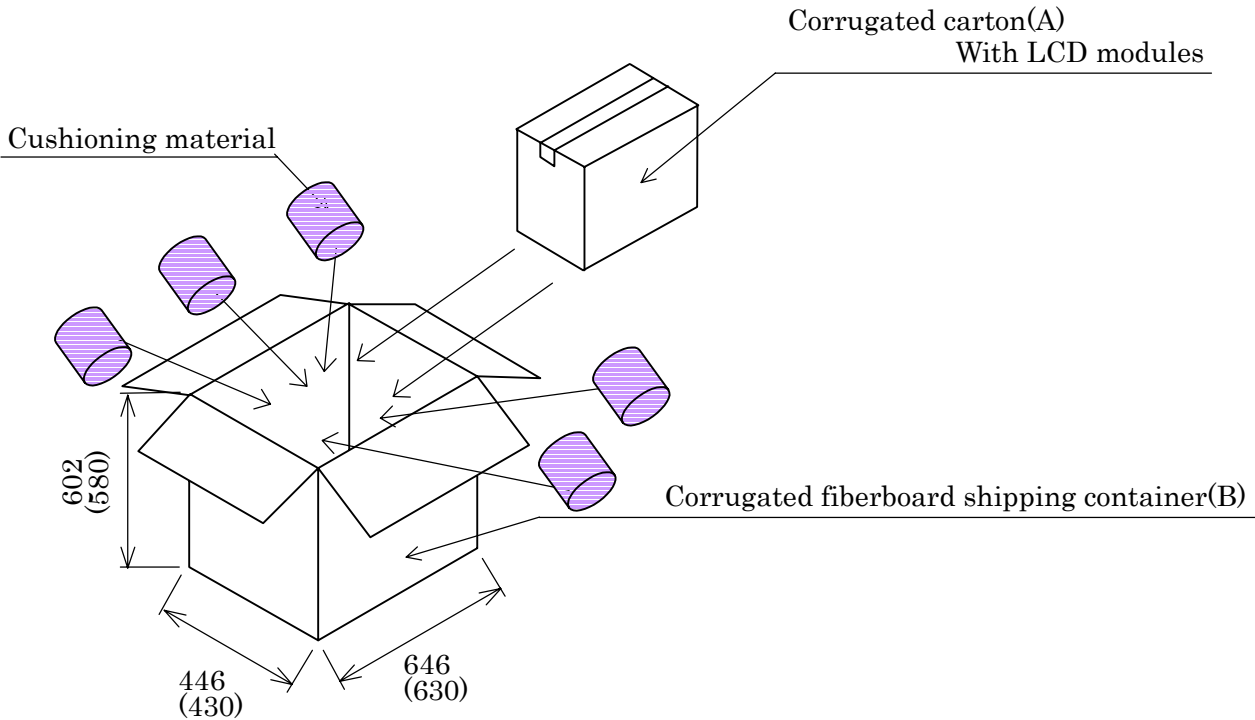


Up and Down : 3 times wrap
Middle : 2 times wrap

Note:1) 4 boxes X 3 layers (maximum 12 boxes) : by ship
4 boxes X 2 layers (maximum 8 boxes) : by airplane
Note:2) This drawing shows marine transportation specification.

Fig.15-2 (C) Packaging Method

					TITLE FLC43XWC6V-02		
					DRAW, NO. Tech Bes LCD-00087		CUST.
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Note 1) The carton (A) should be placed in the middle of the container(B) with enough cushioning materials.

Figure.15-2(d) Packaging Method

DATE	DOCUMENT CONTROL SECTION										
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						Tech Bes LCD-00087				CUST.	
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【FLC43XWC6V-02】												
A	16.WARRANTY The warranty period is one year after manufacturing. Products which fail during this period are repaired or replaced without charge, unless the failure is caused by user.											
	B	17.PRECAUTIONS Adhere to the following precautions to properly use this LCD module.										
		(1) Fail safe design LCD module has an inherent chance of failure. Customers must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions.										
		(2) Handling of LCD panel Do not apply any strong mechanical shock to the LCD panel. Since the LCD panel is made of glass, excessive shock may damage the panel or cause a malfunction.										
		Do not press hard on the LCD panel surface. In the LCD panel, the gap between two glass plates is kept precisely and uniformly to maintain display's characteristics and reliability. If this panel is pressed hard, the following troubles occurs. (a) Ununiformity of color (b) Orientation of liquid crystal becomes disordered Problem (a) returns to normal after a while. Problem (b) returns to normal if power is shut off once then turned on again. However these operations should be avoided to insure reliability.										
C	Do not scratch the polarizer film on the LCD panel surface.											
	<ul style="list-style-type: none"> • Do not press or rub the display surface with a hard tool, pincet, etc. • For handling, use cotton or conductive gloves so that the display surface is not stained. • For If the display surface is stained by dust or dirt, clean it as follows with a soft cloth (deer skin, etc.) 											
	[Dust] Wipe off with a soft cloth. (do not rub.) [Dirt] Wipe off lightly with a soft cloth after soaking in the clear water and squeezing hard out of water drops. Only if the dirt is hardly wiped off, use isopropyl alcohol or ethanol.											
	Be careful not to splash the water or the solvent and water penetrated between the polarizer and the LCD panel. Do not use solvents such as ketone (acetone, etc.) and aromatics (xylene, toluene, etc.)											
	<ul style="list-style-type: none"> • If saliva or water drops are left for long time, it may deform partial deformation or discolored. Wipe off immediately in the same way as for dirt. • Do not allow oil to adhere to the module, since the cleaning of oil is difficult. 											
D	Do not place or contact objects on the display surface for a long period of time. That's because this may make some parts of the LCD module distorted and the display quality may decline.											
DOCUMENT CONTROL SECTION												
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								Tech Bes LCD-00087				CUST.
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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.

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.

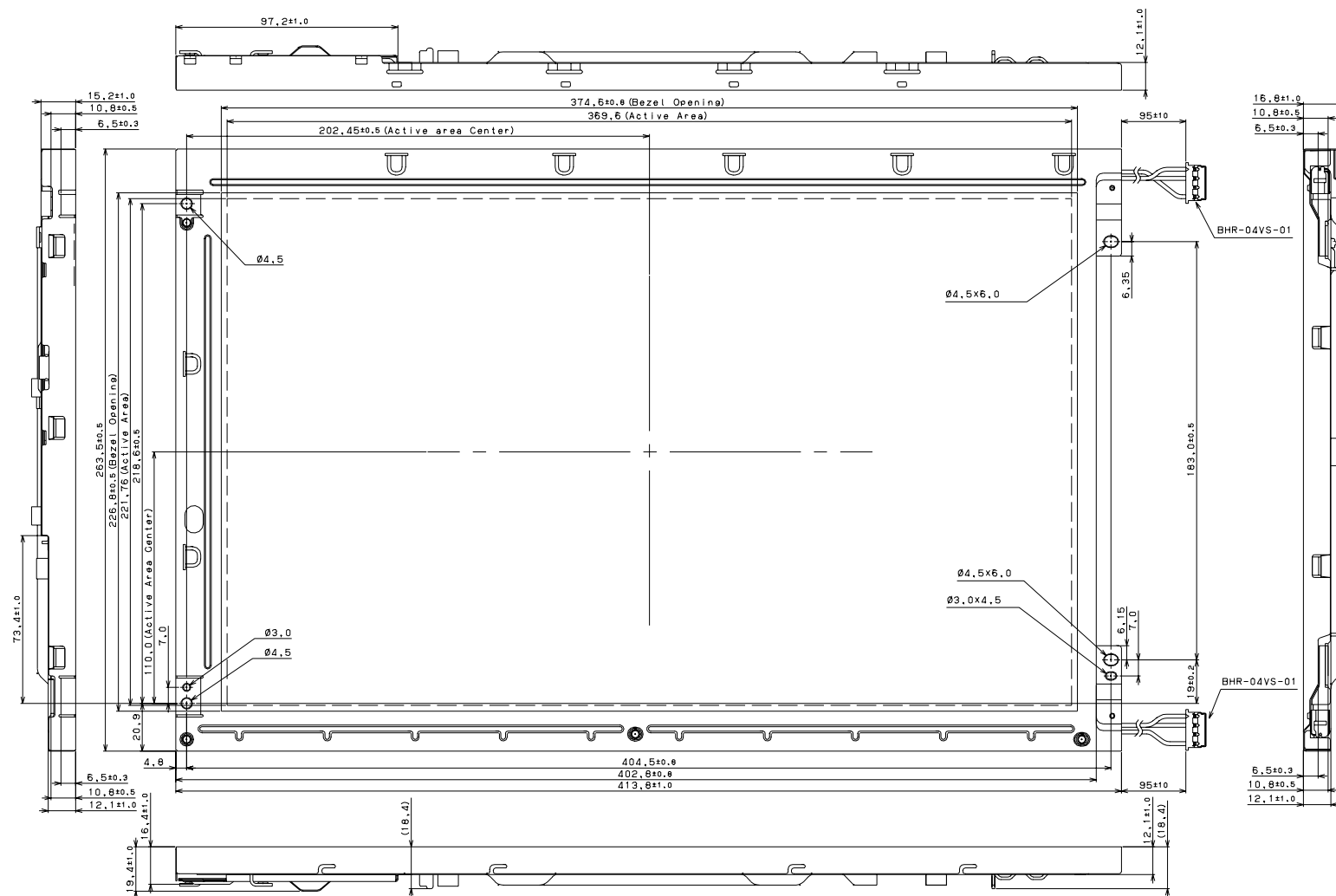
Trouble that occurs when the LCD module is used at not recommended temperature.

- Operation at high temperature($>50^{\circ}\text{C}$) :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.

		1	2		3		4		
【FLC43XWC6V-02】									
A	<p>(5) Precautions on designing module mounting</p> <p>Do not press the display surface and bottom face of the LCD module. Display quality or reliability may be deteriorated if the installation of the LCD module is inappropriate and, as a result, excessive pressure is applied to the surface of LCD screen. Brightness uniformity or the reliability of CCFL may decrease if the pressure is applied to the backlight module.</p> <p>Consider the module mounting design, so that twisting and bending do not occur to the LCD module. Excessive twisting and bending may damage display quality and reliability.</p> <p>The power cable length between the LCD module and inverter should not be extended. Otherwise the backlight may not light or flickering may occur.</p> <p>Do not make the power cable of the backlight clung to a metal plate, etc. Backlight frequency current for backlight driving may leak to the metal and desired brightness may not be assured.</p> <p>When Mounting LCD module with M4 screw(x4) should be screw up under 5.75kgf·cm torque</p>								
	B								
C	<p>(6) Storage method</p> <p>Do not store the LCD module in an atmosphere of organic solvent or corrosive gas. In an organic solvent atmosphere, the polarizer film discolors and display quality deteriorates. In a corrosive gas environment, various problems may occur.</p> <p>Store the LCD module in a Fujitsu package. At storing, Fujitsu packages can be stacked up to 4 boxes. The LCD module is in an anti-static bag. Keep the module in that status.</p> <p>It is recommended that the storage environment should be humidity controlled, cool and dark.</p> <p>Recommended storage environment</p> <ul style="list-style-type: none"> •Place :Dark (avoid direct sunlight) •Temperature : 10~35°C •Humidity : 50~60%RH <p>Note) If the module is left in an environment of 60 or more for a long period of time, optical characteristics may deteriorate.</p>								
	D								
E	<p>(7) Storage method</p> <p>! If the LCD panel is damaged, do not inhale or allow the liquid crystal to enter the mouth If the liquid crystal contacts the body or cloths, wash it off with soap immediately. Follow precautions for regular electronic components.</p> <p>Solder flux on the printed circuit board is harmless to the quality and reliability of LCD module. Fujitsu is practicing non-wash technology on module assembly process.</p>								
	F								
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Front View

[illegible]

