SHARP

Mobile Liquid Crystal Display

Group

SHARP CORPORATION

SPECIFICATION

DEVICE SPECIFICATION FOR

TFT−LCD Module

MODEL No.

LQ170K1LW01
(FLC43XWC8V−06A)

英文仕様書確認印

モバイル液晶事業本部　第1設計センター　第4開発部

副所長	副参事	係　長	主　事	主　事	担　当
〔印〕	〔印〕	〔印〕		〔印〕	〔印〕

モバイル液晶事業本部　第3製品品質センター

部　長	副参事	係　長	係　長	主　事	担　当
〔印〕	〔印〕			〔印〕	

ユーザー名：

備考：17.0型WXGAカラーモジュール

☐ CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

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TFT-LCD Module

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BY

PRESENTED
BY *T. Yatsui* —   BY *T. Naka*

T. Yatsui   T. Naka

Department general manager   Division deputy general manager of

Product Quality Control DEPT. III   Mobile LCD Design Center I

Mobile Liquid Crystal Display Group Engineering Department IV

SHARP Corporation   Mobile LCD Design Center I

                                    Mobile Liquid Crystal Display Group

                                    SHARP Corporation

REVISION HISTORY

Revision	Date	Prepared	Checked		Approved	Summary
01A	Jun.23,2004	S.Sekido	H.Takahashi	T. Ito	F.Yamada	1st issue Change manufacture to SHARP
02A	~~Mar.09,2005~~ Nov. 12, 2005	S. Fukutoku	T. Ito		T. Naka	~~Change manufacture to SHARP~~ RoHS compliance confirmed product.

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EDIT	DATE	DESIG.	CHECK	APPR.	DESCRIPTION
05	20041130	Sekido	Takahashi	T.Ito	Revised P3,8
04	20040908	Sekido	Takahashi	T.Ito	Revised P6,12
07	20051105	S.Fukutoku		T.Ito	Revised P1, P32
06	20050509	Sekido		T.Ito	Add 02A, Revised P1,3,19,24,31,39

| DESIG. | 20040623 | Sekido | CHECK | Takahashi | APPR. | Ito |

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1. APPLICATIONS

This specification is applied to the 17.0 in. XGA-WIDE supported TFT-LCD module.

2. PRODUCT NAME AND MODEL NAME

2-1. Product Name ： LCD Module

2-2. Model Number： LQ170K1LW01
(FLC43XWC8V-06A)

~~2-3. Drawing Number ： NA19027-C052~~

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'03 and EBU100%.

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.

Input signal

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

Power supply

LVDS → Interface circuit

DC/DC converter

Bias power supply circuit

RSDS

Data Driver

Gate Driver

panel
1280× 3(RGB)× 768

DC → Inverter　(Separate)

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	413.8×259.0×15.0(TYP.)	mm	Edge type backlight is used. (φ2.6 CCFL×4)
Display Resolution	(1280×3) ×768	—	Outward Appearance is shown at last page.
Display Dot Area	369.6×221.76	mm	
Dot Pitch	(0.09625×3) ×0.28875	mm	
Aspect Ratio	1 : 1	—	
Weight	2,000 max	g	
FG-SG	Separate	—	

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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	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{CC}	0.3	—	6.0	V
Input Voltage	V_{IN}	0.3	—	Vcc+0.3	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	V_{CC}	4.75	5.0	5.25	V
Ripple Voltage (Vcc)	V_{RP}	—	—	100	mVp-p

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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}		—	700	1000	mA	*1
Differential Input Voltage (High)		V_{IH}	V_{CM}=+1.2V	—	—	100	mV	
Differential Input Voltage (Low)		V_{IL}		-100	—	—	mV	
"H" Level Data Mapping Select Input Voltage		V_{SH}	V_{CC}=+5.0±0.25V V_{SS}=0V DCLK=32.498MHz	3.0	3.3	3.6	V	*2
"L" Level Data Mapping Select Input Voltage		V_{SL}		GND	—	0.9	V	*2
BACK LIGHT *3	CCFL Turn on Voltage	V_S	=50kHz, Ta=25ºC	—	1230	1600	Vrms	
			=50kHz, Ta=0ºC	—	—	1600		
	Lighting Voltage	V_L	=50kHz =10.5mA	590	630	670	Vrms	*4
	Lighting Frequency	L	=630Vrms	40	50	60	kHz	
	Tube Current	L	=50kHz V =630Vrms	9.5	10.5	11.0	Arms	*4

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

(*2) ~~Timing control circuit input voltage~~ No.20 Pin of I/F connector.

(*3) 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)

Note 1) Measurement Circuit

Based on Fig.8-1.

+5V ── Icc ──

Vcc

GND ──────

AC ── C_L ──

V_S

V_L

GND ── L ──

DC/DC Converter

Logic

Driver

Back-light

module
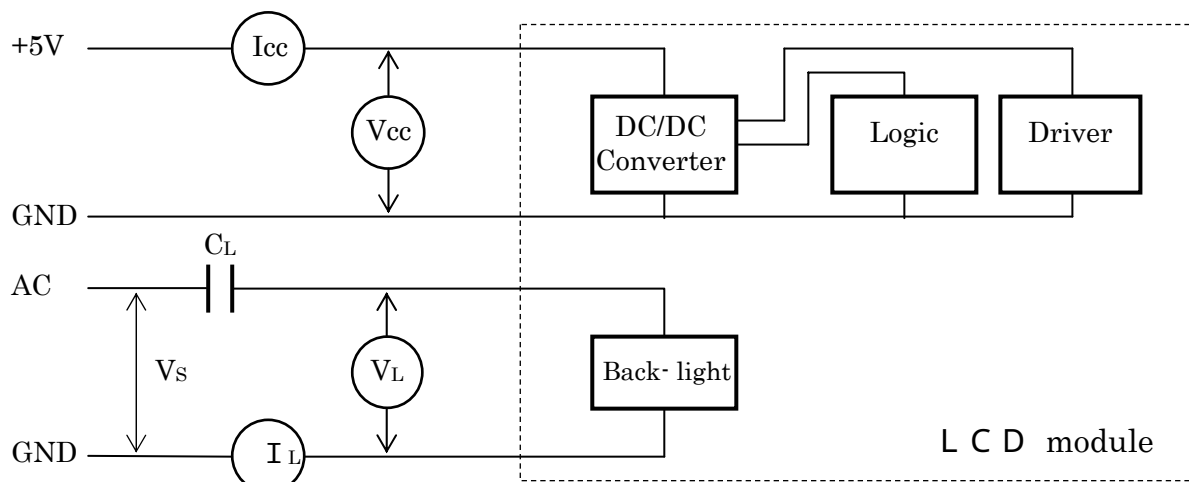
Fig.8-1. Measurement Circuit

Note 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

LVDS Receiver

100

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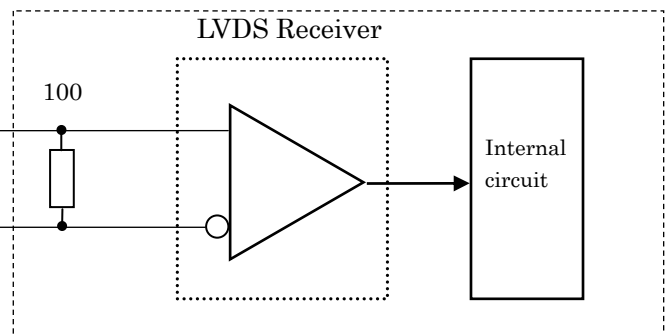
Fig.8-2 (a) Equivalent Circuit of Logic Signal Input

Fuse (2.5A)

EMI Filter

Vcc

GND

Internal Circuit

22uF   10μF   100pF

FG
Frame ground

Fuse: KAB2402 252 NA29010(Matsuo Electric Co., Ltd.)or equivalent.
EMI Filter: SGM20C1E332-2A(SUMITOMO Metal)or equivalent.
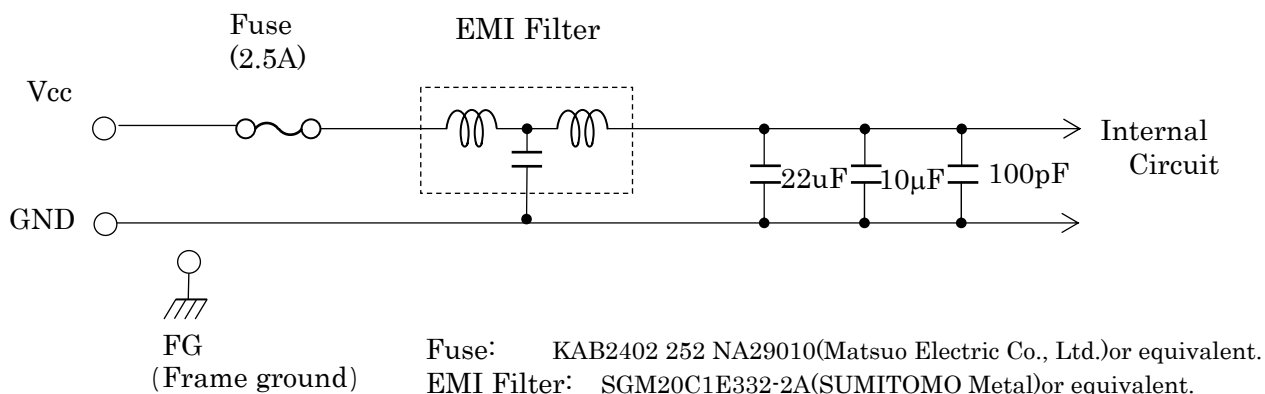
Fig.8-2 (b) Equivalent Circuit of Power Supply

9. OPTICAL SPECIFICATIONS

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

Table 9-1. Optical Specifications   Signal timing=Typ, Ta=25ºC

Item		Symbol	Condition		Specifications MIN.	Specifications TYP.	Specifications MAX	Unit	Remark	Note
Visual Angle	Horizontal	$\theta_{L,R}$	CR≥10	$\theta_{U,D}=0^o$	85	89	—	deg		(1)(2) (3)(5) (6)
	Vertical	$\theta_{U,D}$		$\theta_{L,R}=0^o$	85	89	—	deg		
	all direction	θ_{all}			—	80	—	deg		
Contrast Ratio		CR	$\theta_{L,R,U,D}=0^o$		350	600	—	—	White/ Black	(1)(2) (3)(5)
Response Time (rise+fall) (B→W→B)		rise + fall	$\theta_{L,R,U,D}=0^o$	Ta=25ºC	—	16	—	ms		(1) (4) (5)
				Ta=0ºC	—	34	—	ms		
Response Time (Rise or Fall) (All gray scale)		AVG	$\theta_{L,R,U,D}=0^o$	Ta=25	—	10	—	ms	Average of Response Time, *2	
Brightness		I	$\theta_{L,R,U,D}=0^o$ $V_{CC}=5V$, $I_L=10.5mA$ (at maximum brightness)		350	450	—	cd/m²	White *1	(1)(5)
Brightness Uniformity		ΔI			75	—	—	%		(1)(5) (7)
Chromaticity	W	X			0.283	0.313	0.343	—		(1) (5)
		Y			0.299	0.329	0.359	—		
	R	(x, y)	R,G,B signal=All "H"	Red	(0.64, 0.35 Typ.)					
	G			Green	(0.29, 0.59 Typ.)					
	B			Blue	(0.14, 0.08 Typ.)					
γ-curve					2.4 Typ.					
LCD Panel Type					TFT Color					
Display Mode					Normally Black VA					
Wide Viewing Angle Technology					MVA-Premium					
Optimum Viewing Angle					— (symmetry)					(6)
Display Color					16.2 million (each 6-bit+2-bit FRC)					
Color of non-display area					Black					
Surface Treatment					Anti-glare (Haze value:25%, 3H(at weight of 300g))					

(*1) Specified value is measured in 20~30 minutes after lighting on (LCD module single).
    A required value may not be achieved on condition that LCD module is built in the cabinet because of its radiation.
    All items without "Brightness Uniformity" are measured at the center of display board.
(*2) In case of applying optimized over driving method.
(Note1) *CS-1000 (MINOLTA Co., Ltd.) , Field=2º, L=500mm
      *Be careful that the luminance meter, which you use, may not be able to get correct brightness
      If it's no set correctly.

Note 1) Definition of Viewing Angle (1)

Based on Fig.9-2.

*0º (Front)

θ_R

θ_L

θ_U θ_D

Y^+
Top (12 o'clock Direction)

X^+
Right (3 o'clock Direction)

LCD module

Y^-
Bottom (6 o'clock Direction)

X^-
Left (9 o'clock Direction)

$* \rightarrow \theta_U=0^o, \theta_D=0^o, \theta_L=0^o, \theta_R=0^o$
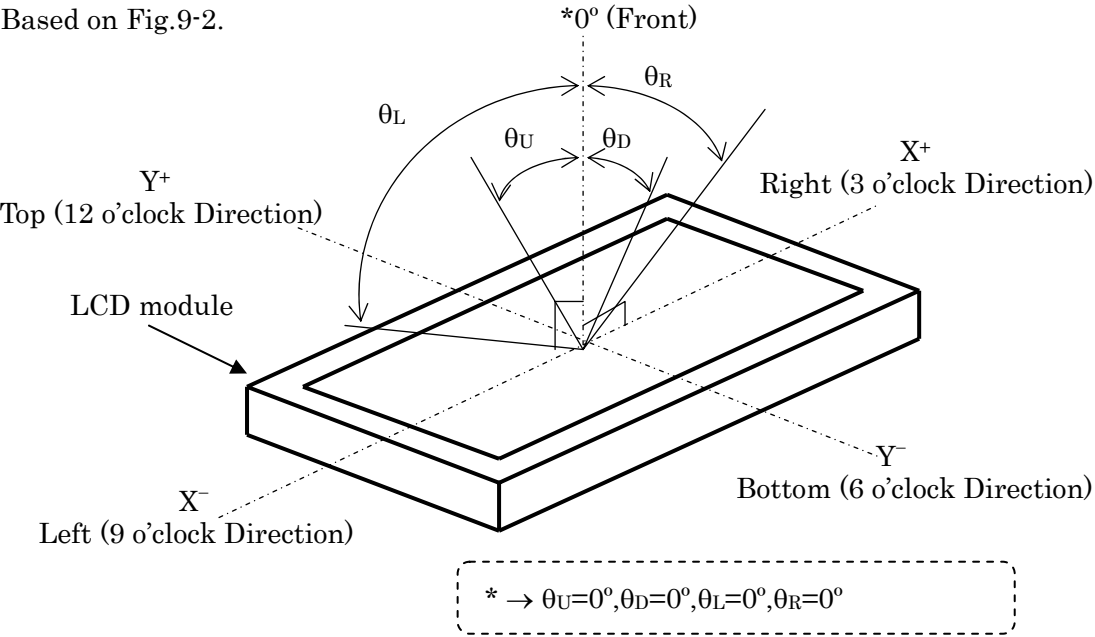
Fig.9-2. Definition of Viewing Angle (1)

Note 2) Definition of Viewing Angle (2)

Based on Fig.9-3.

Display Surface

θ_{MAX}
θ_{TYP}
θ_{MIN}

Display Surface

$\theta_{L,R,U,D}=0^o$
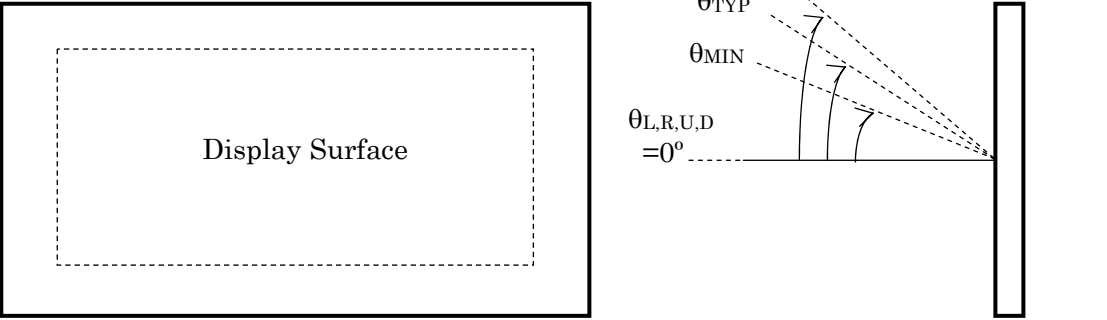
Fig.9-3. Definition of Viewing Angle (2)

Note 3) Definition of Contrast Ratio (CR)
Determined by Formula (1) based on Fig.9-4.Voltage-Brightness Characteristics.

$$= \frac{L_W \text{ (Brightness at white)}}{L_B \text{ (Brightness at black)}} \quad \text{-------- (1)}$$
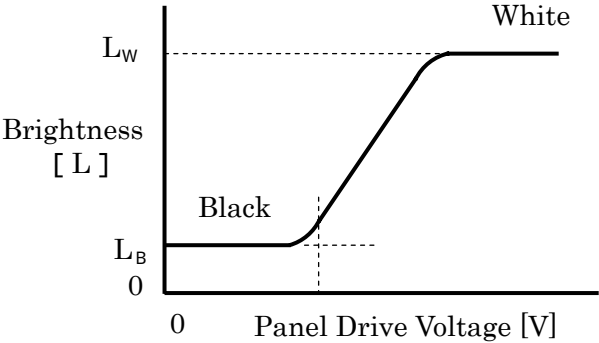
White

L

Brightness L

Black

L

0

0 Panel Drive Voltage [V]

Fig.9-4. Voltage-Brightness Characteristics

Note 4) Definition of Response Time
Based on Fig.9-5.

1 frame

White
(100%)

Relative
Brightness

90%

90%

Black
(0%)

10%

10%

Black
(0%)

on

off

ON Response Time
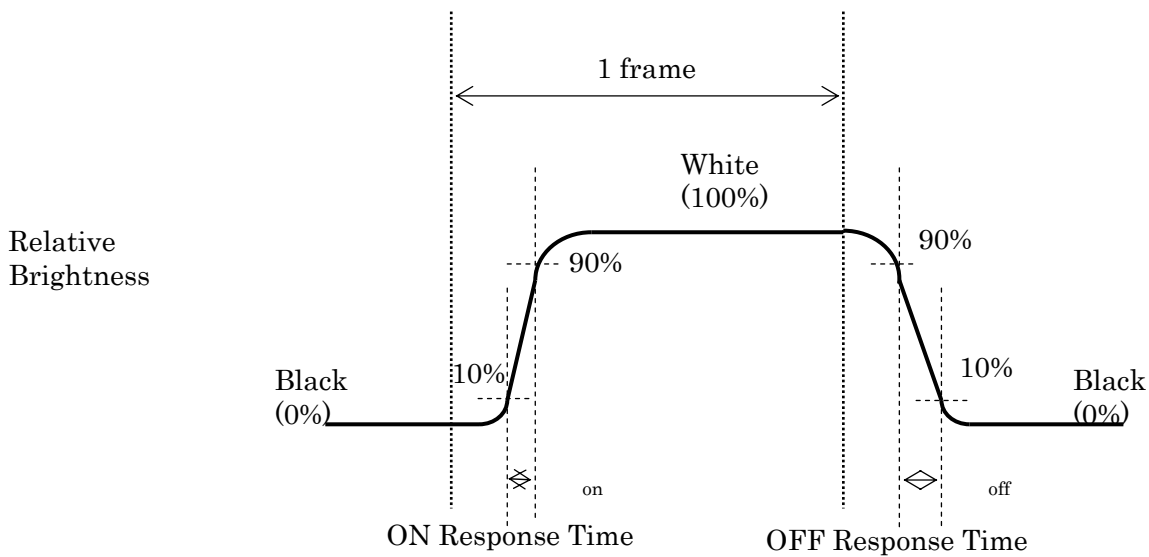
OFF Response Time

Fig.9-5. Definition of Response Time

Note 5) Contrast Ratio and Response Measurement System
Based on Fig.9-6.

Y⁺

X⁺

Z⁻

Z⁺

Brightness Meter or
Luminance Colorimeter
(with luminosity
correction function)

X⁻

θ

Y⁻

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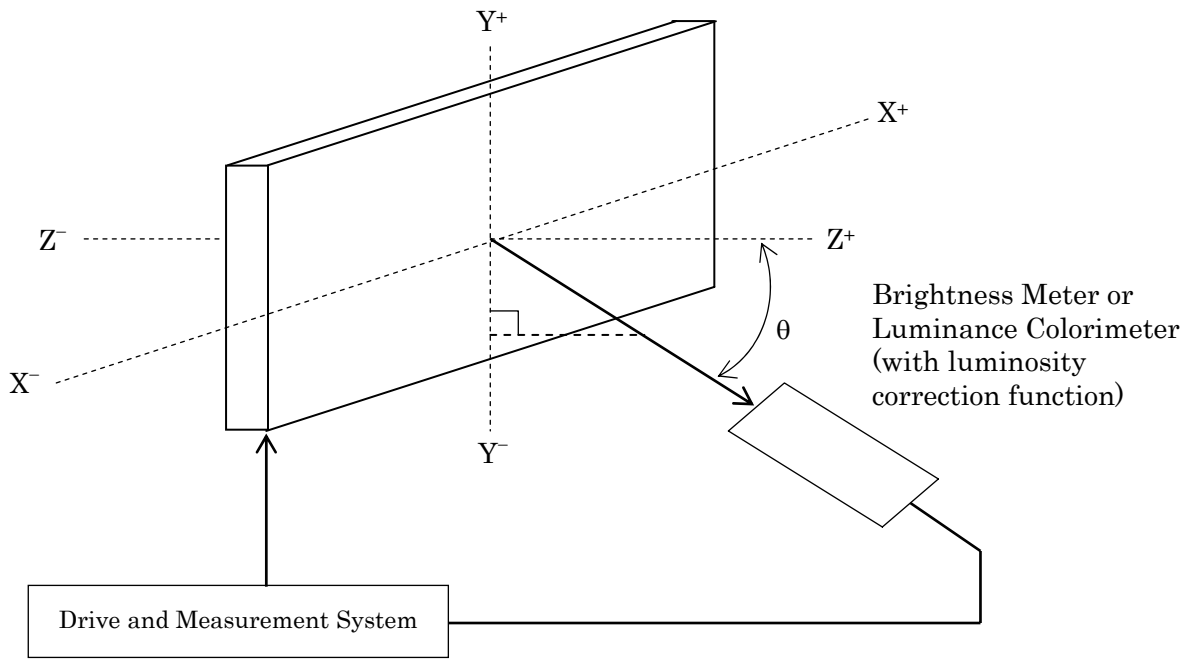
Fig.9-6. Contrast Ratio and Response Time Measurement System

Note 6) Definition of Optimum Viewing Angle

Based on Fig.9-7.

MAX

Contrast Ratio

10

(-)　　　　0　　　　(+)

6 o'clock ←　Viewing Angle θ　→ 12 o'clock
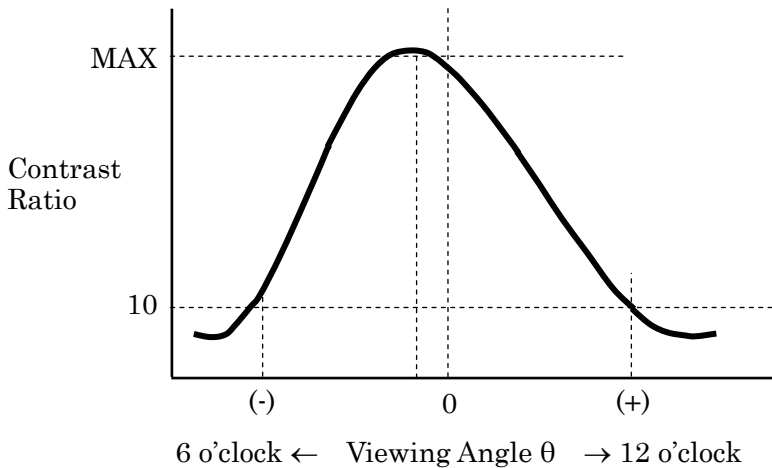
Fig.9-7. Definition of Viewing Angle

Note 7) Definition of Brightness Uniformity

Brightness uniformity is defined by the following formula.

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

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

192　　　　640　　　　1088

① —— ④ —— ⑦ —— 115

② —— ⑤ —— ⑧ —— 384

③ —— ⑥ —— ⑨ —— 653
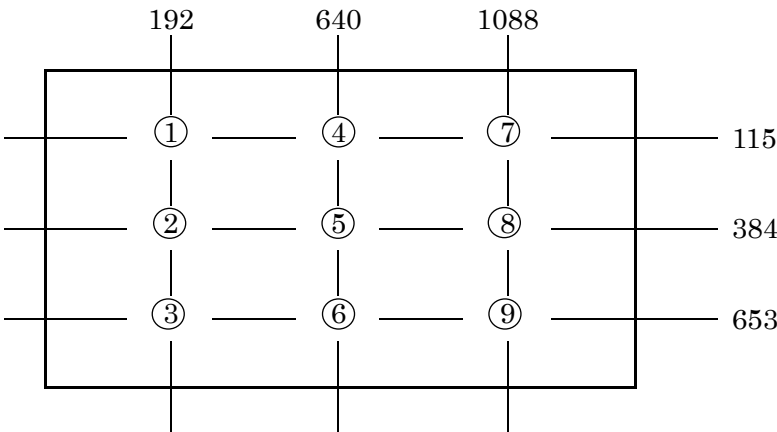
Note) Each measurement point (① ~ ⑨) defines the center spot of Brightness Meter view. The tolerance of measurement position is ±3mm.

Fig.9-8. Measurement Points

10. INTERFACE SPECIFICATIONS

10-1-1. Signal descriptions

Table 10-1 shows the description and configuration of Interface signals (CN1).

Table 10-1-1. Interface signals (CN1)

Pin	Symbol	I/O	Function
1	VCC		+5V Power suply
2	VCC		+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

Note) Hi evel of Data Mapping Select Input is 3.3V. (Refer to Table 8-1)

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 reliabiliting may occur.

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

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10-1-3. LVDS Data Mapping 2

Table 10-1-3 shows the LVDS data mapping 2.(DataMappingSelectInput = Open or Hi)

Table 10-1-3. LVDS Data Mapping 2

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

10-2. Color Data Assignment

Table 10-2 shows the color data assignment.

Table 10-2. Color Data Assignment

Color and Brightness			Input data								Low level								High level							
			R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	**Black**		0	0	0	0	0	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	0	0	0	0	1	1	1	1	1	1	1	1
	Green		0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan		0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red		1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta		1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Red	**Black** ⇧ Darker ⇧ ⇩ Brighter ⇩ **Red**	0 1 2 ⋮ 253 254 255	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
			1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green	**Black** ⇧ Darker ⇧ ⇩ Brighter ⇩ **Green**	0 1 2 ⋮ 253 254 255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
			:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
			0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Blue	**Black** ⇧ Darker ⇧ ⇩ Brighter ⇩ **Blue**	0 1 2 ⋮ 253 254 255	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	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	0	0	0	0	0	1	0
			:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note.1) Definition of gray scale : Color (n) ---"n" indicates gray scale level.

The gray scale is brighter as the number is larger.

Note.2) Data; 1: High, 0: Low

Note.3) By inputting 8-bit data signal for each red, green and blue, this module can display 256 gray scale independently for each color.
Therefore, the module is able to display 16 million colors. Color data are 24 lines.

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		LD17437
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10-3. Input Signal Timing

Table 10-3 and Fig.10-3 shows the input signal timing.

Table 10-3. Timing Characteristics　　　　　　　　　　(T=0~50ºC, Vcc=5±0.25V)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK signal (Clock)	Period	Tc	12.195	15.382	20.000	ns	
	Frequency	fc	50.00	65.01	82.00	MHz	fc=1/Tc
	Duty	Tch/Tc	45	50	55		*1
	High time	TclkH	5.0	—	—	ns	
	Low time	TclkL	5.0	—	—	ns	
	Rise time	Tclkr	—	—	5.0	ns	
	Fall time	Tclkf	—	—	5.0	ns	
DCLK-Data Timing	Setup time	Tset	4	—	—	ns	
	Hold time	Thold	4	—	—	ns	
Data-ENAB timing — Horizontal	Period	Th	1310	1344	1688	DCLK	
	Frequency	fh	35.0	48.3	75.0	kHz	
	Display period	Thd	1280	1280	1280	DCLK	*2,3
Vertical	Period	Tv	776	806	806	Th	16.67ms
	Frequency	1/Tv	50	60	75	Hz	WXGA mode
	Display period	Tvd	768	768	768	Th	*2,3
Data-ENAB timing		Tdn	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.

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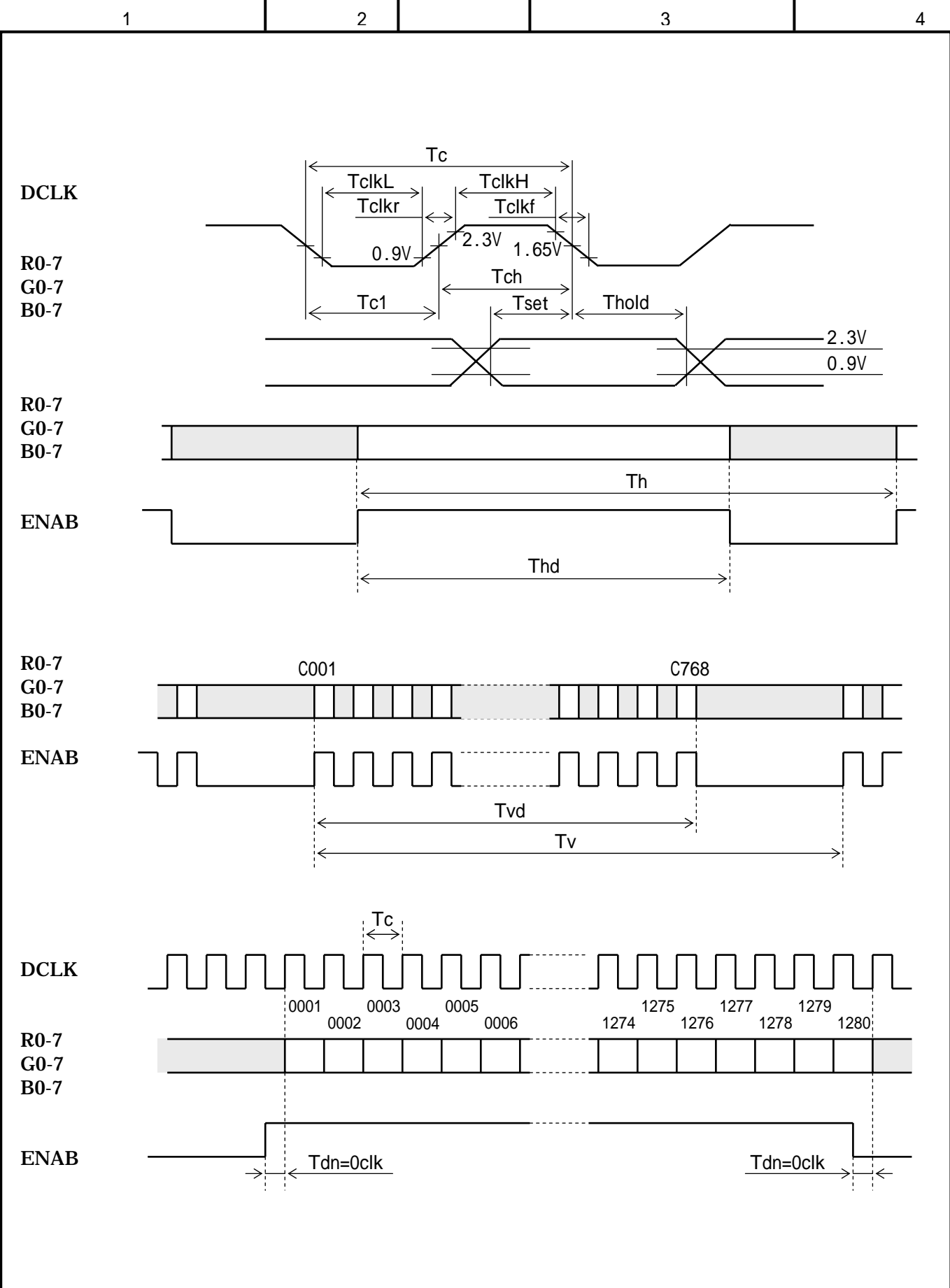
Fig.10-3.Input Signal Timing Chart

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10-4. Correspondence between Data and Display Position

Fig.10-4 shows the Correspondence between Data and Display Position.

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

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.10-5 to prevent latch-up of the driver ICs and DC driving of the LCD panel.

T4   20ms(Voltage descent)

Vcc   ON
4.75V
4.75V
(4.5V)
4.75V   4.75V
0.5V
OFF
(0V)
T1   20ms
T6   20ms
0.1s   T7

LVDS   H
Differential   L
Input
Tri-state
90%
10%
Tri-state

T2

DCLK should be in a range of the spec.(Frequency etc. of the LCD.
0ms   T5   40ms

0ms   T2   40ms
Inputs should be in a range of the spec. of the LVDS.

Fig.10-5. Power Supply Sequence

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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	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	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± 5ºC
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 1600Vvms.
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 : LQ0DDB5466

(FLCL-39)

12. APPEARANCE SPECIFICATIONS

12-1. Zone

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 unharmful 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.

12-2. Bright spots

(1) Bright spots by the defect of TFT.

• Visible under bias of 2% ND filter ....High 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 filter ....Not 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 50μm ....High bright spot
• 50μm or less ....Not counted

12-3. Test condition

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.

12-4. Specifications

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

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 (2 dot connection in horizontal)		(Note 1)
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)
7	Total of dot defect(bright and dark)		≤ 8 dots		
8	Distance of bright spot	high-high high	≥15mm		
		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
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)

Applied area	Item	Condition	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.

Opening dimension of bezel

Dot display width

E → F

Effective display area

A

D

Opening dimension of bezel

Dot display width

Dot display area

Width of display frame

B

C

H → ← → ← G

Y → X

Bezel

Width of display frame

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.

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13. ENVIRONMENTAL SPECIFICATIONS

Table 13-1 shows the environmental specifications.

Table 13-1. Environmental Specifications

Item	Condition		Remark
Temperature	Operation	0~57ºC (Note1)	Temperature on surface of LCD panel (display area.)
	Storage	-20~60ºC	
Humidity	Operation	20~85%RH	Maximum wet-bulb temperature should not exceed 29ºC. 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
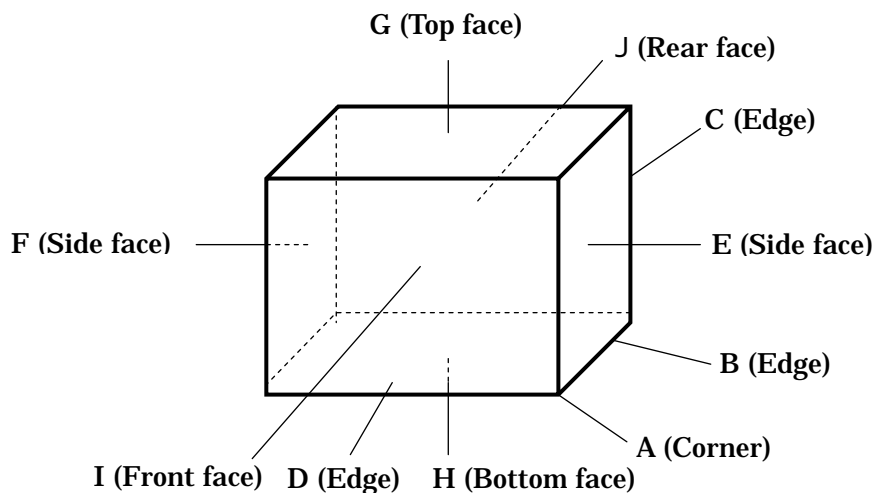
Fig.13-1. Direction to apply shock to package

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14. INDICATIONS

This module has the following indications.

(1) Product name : LCD unit

(2) SHARP Model number : LQ170K1LW01

(3) Model number : FLC43XWC8V-06A

(4) Manufacturing number : 5　7　0　0　0　0　1

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

(7) Company name : SHARP CORPORATION

(8) Caution when changing cold-cathode tubes and disposal method of them. (See Fig. 14-1)

```
LCD unit                    MADE IN TAIWAN

████████████████████████████████████████

FLC43XWC8V      -06      A      5701234
LQ170K1LW01                     01A
SHARP CORPORATION
```
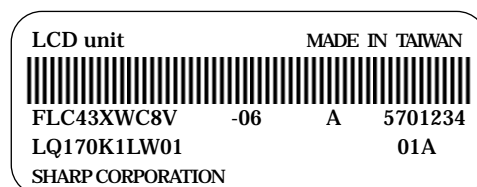
Fig.14-2 Product label (example)

						LQ170K1LW01 (FLC43XWC8V-06A)		
						LD17437		CUST.
06	20050509				Change product label format			
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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 : 509mm(W)× 250(D)× 398mm(H)

15-2. Packaging method

Fig.15-2 (a),(b),(c),(d),(e),(f),(g) show the packing method.

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

LCD module

Rear side

Scotch tape
(3M:#421)

Detail of cable section

Put LCD module into an anti-static bag

Front side

Fig.15-2(a) Packaging Method

EDIT.	DATE	DESIG.	CHECK	DESCRIPTION							TITLE	LQ170K1LW01		
DESIG.			CHECK				APPR.				(FLC43XWC8V-06A)		

TITLE LQ170K1LW01
(FLC43XWC8V-06A)

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93.04 FDNC-4902-3

Packing

Set a corrugated carton onto bottom holders(2 pieces)

Partition box
(NA19002-7251)

Marking of insertion direction
of LCD module

Marking of LCD module size

Marking of FJL model number

Holders
(NA19002-7247)
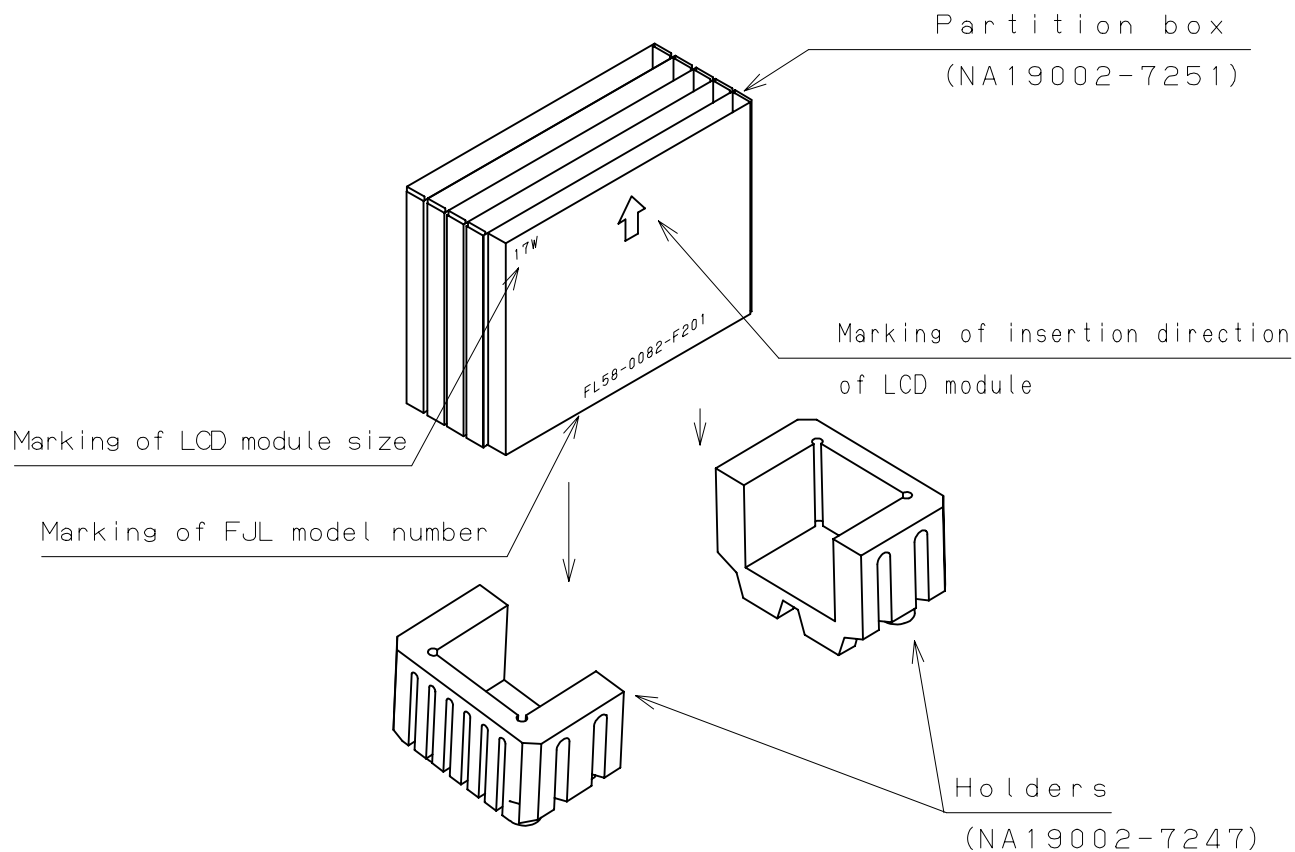
Set the holders so that the insertion side of partition box faces up.

Fig.15-2(b) Packaging Method

| TITLE | LQ170K1LW01 |
| (FLC43XWC8V-06A) |

DRAW. NO. LD17437   CUST.

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| DESIG. | | CHECK | | APPR. |

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Place the partition box with holders into the corrugated carton.

17W

Display Side ▲

Marking of indication
of display surface

Corrugated carton
(NA19002-7250)
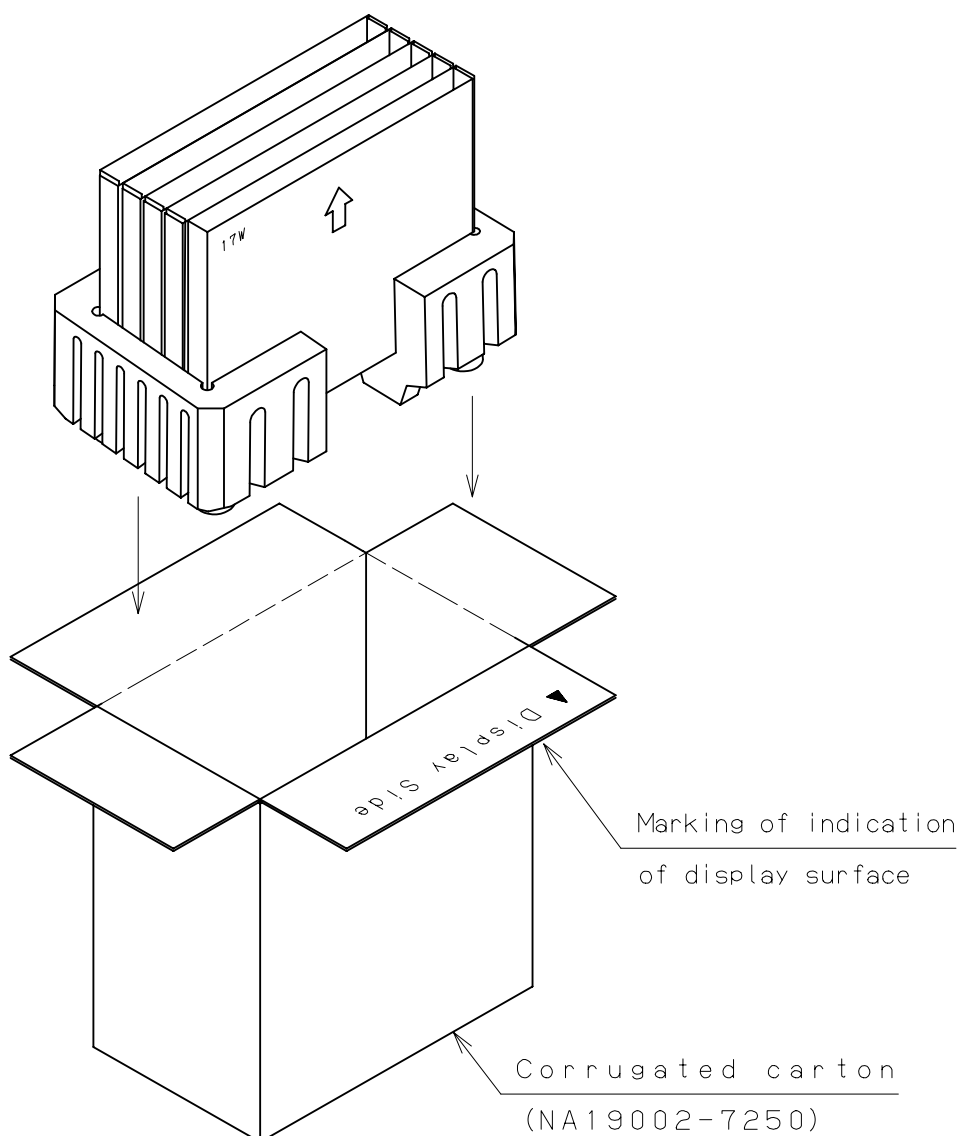
Cross section after insertion

Corrugated carton

Partition carton

Holders
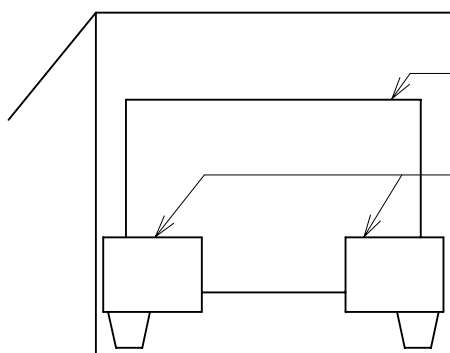
Note1) Insert the partition box so that
its marking side will corresponds with
the direction mark of display side on
the inside of the corrugated carton.

Fig.15-2(c) Packaging Method

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DESIG.			CHECK	APPR.

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

Display
surface
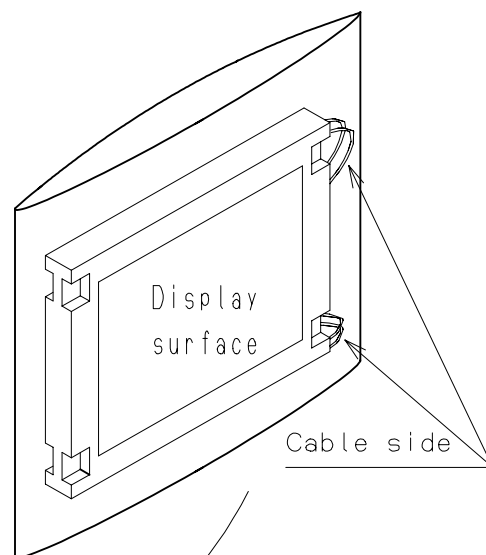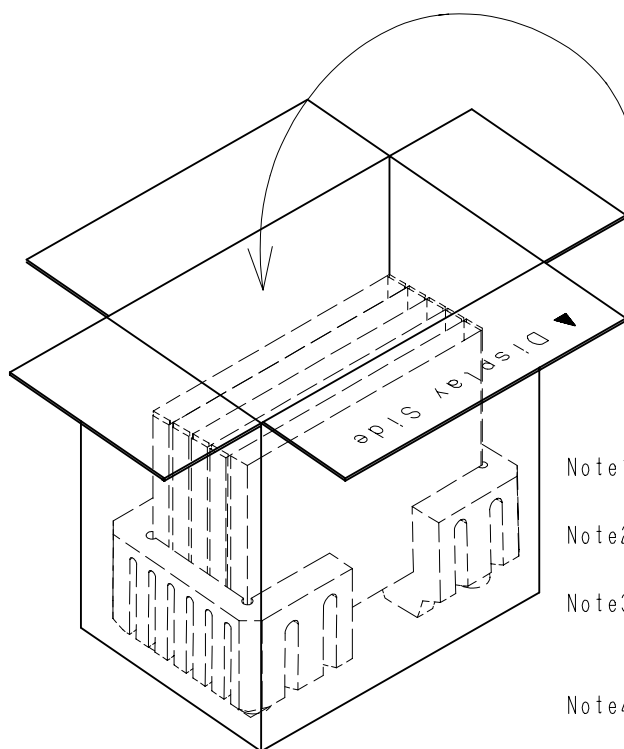
Cable side

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.
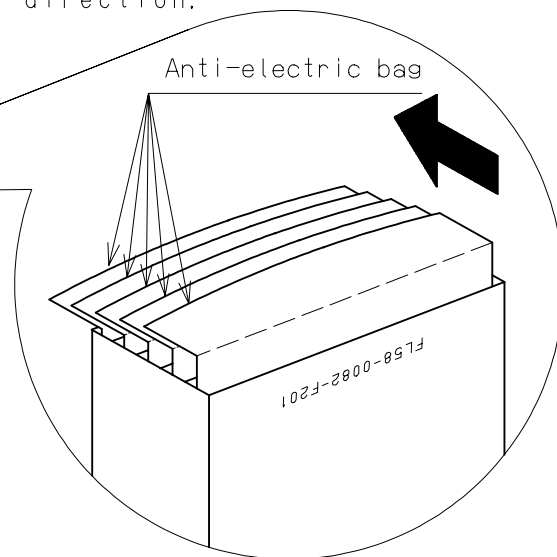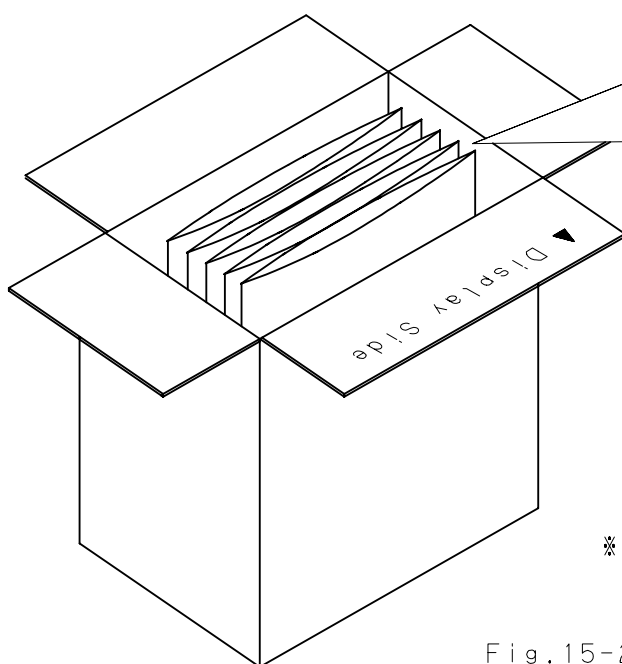
Anti-electric bag

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

Fig.15-2(d) Packaging Method

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DESIG.			CHECK		APPR.	

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93.04 FDNC-4902-3

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

Holder
(NA19002-7247)

Holder
(NA19002-7247)

Display Side ▶
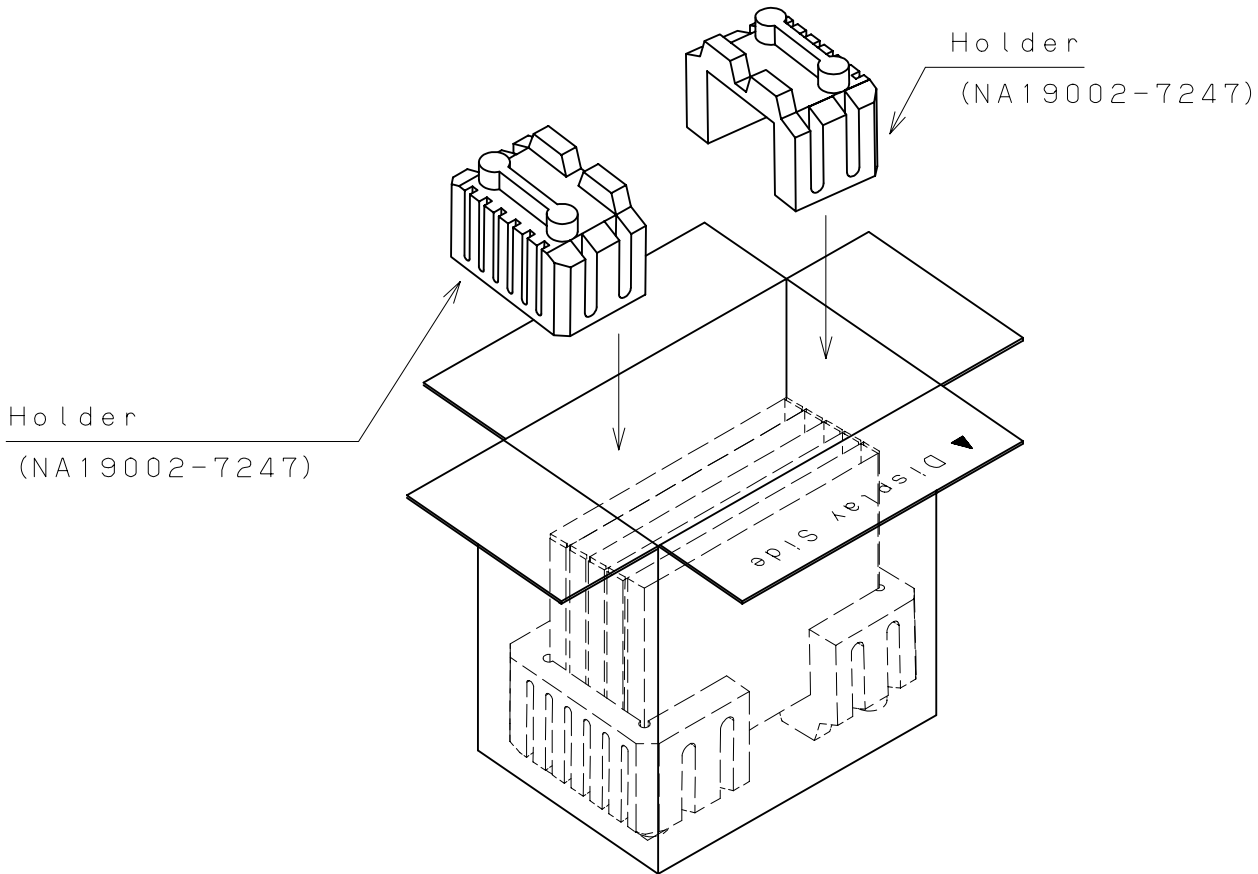
After putting the cover, seal the carton with OPP tape or vinycloth tape.

OPP tape

(equivalent to FL01-0020-E311:FJL)

Vinycloth tape

(equivalent to No.750:SEKISUI)
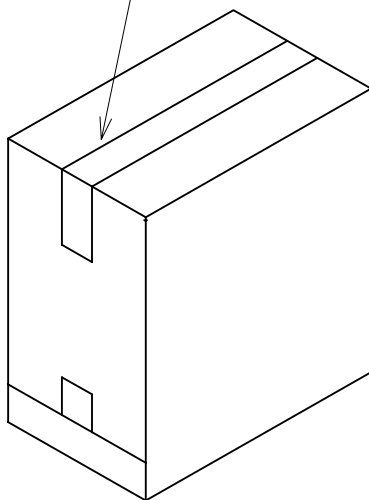
•When using OPP tape
  Bottom: H method
  Top: I method
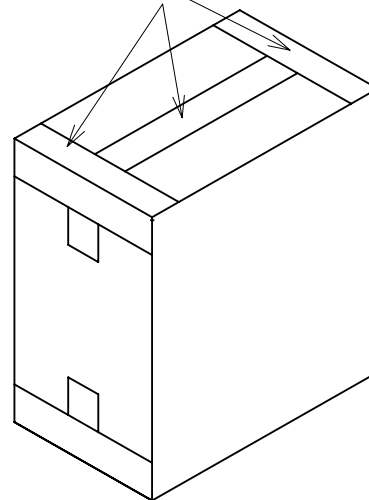
•When using vinycloth tape
  Top, Bottom: H method

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

型名(TYPE)	FLC43XWC8V-06A	数量(QTY.)	5
図番	LQ170K1LW01	版数	01A
(DRWG. NO.)		(REV. NO.)	

Bar-code	5700001　バーコード
	5700002　バーコード
	5700003　バーコード
	5700004　バーコード
	5700005　バーコード

Bar-code

5mm max

5mm max

Shipping label
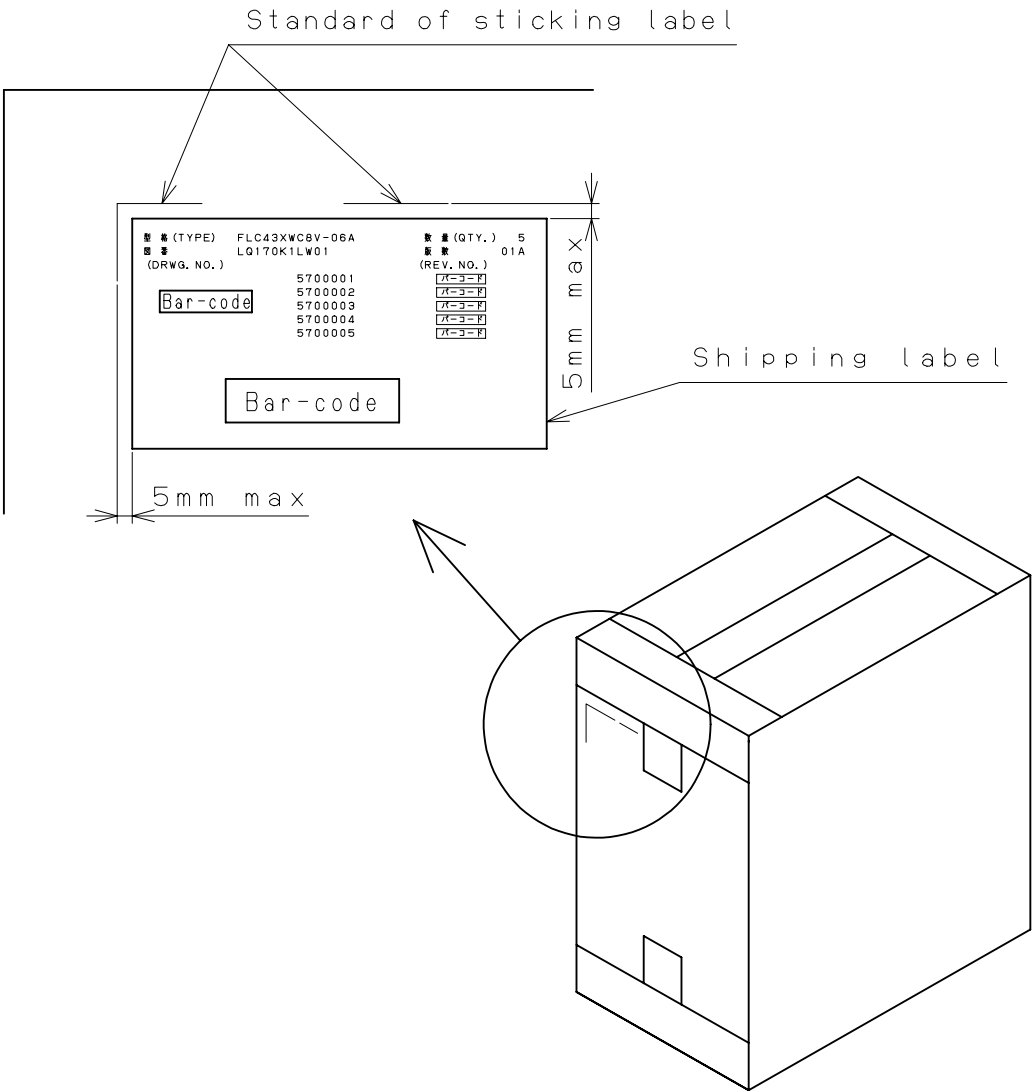
Fig.15-2(f) Packaging Method

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| | (FLC43XWC8V-06A) |

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| DESIG. | | | CHECK | | | APPR. | |

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Standard of LCD collected oversea packing

Corrugated carton
(FL58-0082-A201)

398
(368)

250
(234)

508
(483)

Silicagel equivarent to 1kg
FL01-0036-Y301×2pcs

Polyethylene sheet (FL58-0082-C304)
by airplane 1500×1500

Corner angle ④ FL44-0057-Y218 length 1950 :by ship
Corner angle ④ FL44-0057-Y317 length 1250 :by airplane

Polyethylene bag
(FL58-0082-C301:1120×1120×2000) :by ship

PP belt (FL01-0150-E303)
(For 2 sections
Second, Third
layers)

1996
1532

by airplane
by ship

Should be taped and sealed
by ship

Palette (FL58-0082-D201)

Polyethylene sheet (FL58-0082-C303)
by ship 1150×1150

1100

1100

Stretch film:for wrapping by hand
(FL01-0092-C203)
Up and Down: 3 times wrap
Middle: 2 times wrap

Note1) Dimension in ( ) denotes inside dimension
Note2) 8 boxes × 5 layers (maximum 40 boxes) :by ship
       8 boxes × 3 layers (maximum 24 boxes) :by airplane
Note3) This drawing shows marine transportation specification.

Figure.15-2( ) Packaging Method

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.

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. (Max 2.0kg/cm^2)
In the LCD panel, the gap between two glass plates is kept precisely and uniformly to maintain display's characteristics and reliability.
If the pressure is over 2.0kg/cm^2, the problem don't return to normal condition.
(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.

Do not scratch the polarizer film on the LCD panel surface.
•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.)
•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.

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.

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(3) Handling of LCD module

Do not pull the cold-cathode tube cable strongly.
If the cable is pulled with the loaf of 2kg or more, the cable may be damaged or reliability may decrease.

Assemble the module into user's system in a dust free environment.
If conductive foreign matter adheres to the module, failures may occur.

Take anti-static measures for assembling the module.
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($>60°C$)   :Display colors shift to blue.

- Storage at high temperature ($>60°C$) :The polarizer film deteriorates and contras decreases.

- Operation at low temperature ($<0°C$) :The response speed decreases considerably.

- Storage at low temperature ($<-20°C$) :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.

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(5) Precautions on designing module mounting

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.

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.

The power cable length between the LCD module and inverter should not be extended.
Otherwise the backlight may not light or flickering may occur.

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.

When Mounting LCD module with M4 screw(x4) should be screw up under 5.75kgf·cm torque.

(6) Storage method

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.

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.

It is recommended that the storage environment should be humidity controlled, cool and dark.
Recommended storage environment
- •Place   :Dark (avoid direct sunlight)
- •Temperature : 10~35℃
- •Humidity   : 50~60%RH

Note) If the module is left in an environment of 60   or more for a long period of time, optical characteristics may deteriorate.

(7) Storage method

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.

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.

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(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.

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18. PRECAUTIONS FOR USE

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, SHARP 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.

19. MISCELLANEOUS

Specifications of the TFT-LCD panel and other components used in the LCD module are subject to change. Both parties shall discuss together before change.
If any doubt is raised in the content of the specifications, both parties shall discuss and make best effort for the agreement.

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Front View

15.0±1.0
10.8±0.5
6.5±0.3

15.0±1.0

374.6±0.8(Bezel Opening)
369.6(Active Area)
202.45(Active Area Center)

95 +10 -5

15.0±1.0
10.8±0.5
6.5±0.3

BHR-04VS-01

Ø4.5

Ø4.5×6.0

6.35

183.0±0.5

258.95±0.5
226.80±0.5(Bezel Opening)
221.76(Active Area)
218.6±0.5
110.0(Active Area Center)

Ø3.0
Ø4.5

Ø4.5×6.0
Ø3.0×4.5

6.15
7.0

7.0

6.5±0.3
10.8±0.5
11.8±1.0

20.9

4.8

404.5±0.8
402.8±0.8
413.8±1.0

95±10

19±0.2

6.5±0.3
10.8±0.5
11.8±1.0

BHR-04VS-01

(15.0)

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91.924±1.0 (Connector)

(15.0)　　　　(15.0)

A　　　　　B

180.35±1.0 (Connector)

204.55　　　　177.55

(Cautions)

Product
Label

A　　　　　B

Section A-A　　　Section B-B

Rear View

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