SHARP

No.	**LD – 17Y59A**
DATE	November 16 2005

TECHNICAL   LITERATURE

FOR

TFT - LCD module

These parts have corresponded with the RoHS directive.

MODEL No. LQ104V1LG61

The technical literature is subject to change without notice.
So, please contact SHARP or its representative before designing
your product based on this literature.

Engineering   department
Mobile LCD design center
MOBILE LIQUID CRYSTAL DISPLY GROUP
SHARP   CORPORATION

RECORDS OF REVISION

LQ104V1LG61

SPEC No.	DATE	REVISED		SUMMARY	NOTE
		No.	PAGE		
LD-17Y59A	Nov. 16. 2005	-	-	-	1 st Issue

1. Application

   This technical literature applies to color TFT-LCD module, LQ104V1LG61

The device listed in these technical literature sheets was designed and manufactured for use in general electronic equipment.

In case of using the device for applications such as control and safety equipment for transportation (conrrols of aircraft, trains, automobiles, etc.), rescue and security equipment and various safety related equipment which require higher reliability and safety, take into consideration that appropriate measures such as fail-safe functions and redundant system design should be taken.

Do not use the device for equipment that requires an extreme level of reliability, such as aerospace applications, telecommunication equipment (trunk lines), nuclear power control equipment and medical or other equipment for life support.

SHARP assumes no responsibility for any damage resulting from the use of the device which does not comply with the instructions and the precautions specified in these technical literature sheets.

Contact and consult with a SHARP sales representative for any questions about this device.

2. Overview

   This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, control circuit and power supply circuit and a backlight unit. Graphics and texts can be displayed on a 640×3×480 dots panel with 262,144 colors by using LVDS(Low Voltage Differential Signaling)system for interface and supplying +3.3V/5.0V DC supply voltage for TFT-LCD panel driving and supply voltage for backlight.

   The TFT-LCD panel used for this module is a low-reflection and higher-color-saturation type.

   Therefore, this module is also suitable for the multimedia use. Viewing angle is 6 o'clock direction.

   This module is the type of wide viewing angle and superhigh brightness (450cd/m^2).

   Backlight-driving DC/AC inverter is not built in this module.

3. Outline specification.

Parameter	Specifications	Unit
Display size	26 (10.4") Diagonal	cm
Active area	211.2(H)×158.4(V)	mm
Pixel format	640(H)×480(V)	pixel
	(1 pixel=R+G+B dots)	-
Number of colors (Number of gray scale level)	262, 144 colors (64 gray scales per color)	
Pixel pitch	0.330(H)×0.330(V)	mm
Pixel configuration	R,G,B vertical stripe	-
Display mode	Normally white	-
Unit outline dimensions *1	246.5(W)×179.4(H)×Max.13.7 (D)	mm
Mass	620 (max)	g
Surface treatment	Anti-glare and hard-coating 3H	-

*1: excluding backlight cables.

Outline dimensions is shown in Fig.1

4. Input Terminals

4-1. TFT-LCD panel driving

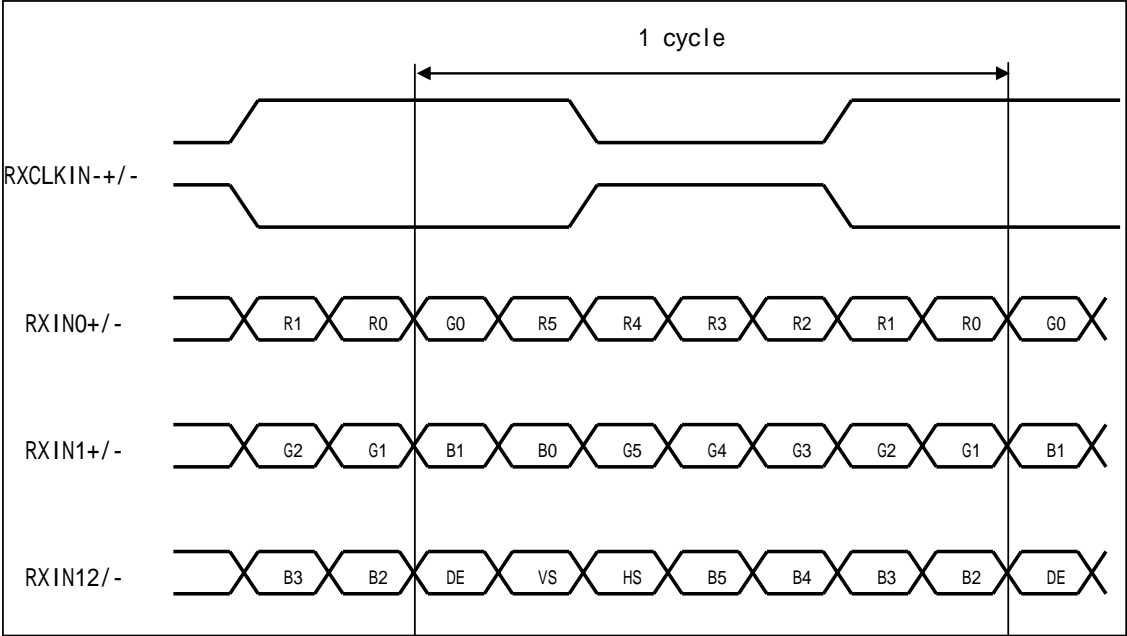CN1 (LVDS signals , +3.3V / +5.0V DC power supply and Contorol signal)

Corresponding connector:FI-SE20M (JAE) or FI-S20S (JAE)

Pin No.	Symbol	Function	Remark
1	V$_{CC}$	+3.3V / +5.0V power supply	
2	V$_{CC}$	+3.3V / +5.0V power supply	
3	GND		
4	GND		
5	RXIN0-	Differential data input, CH0 (negative)	LVDS signal
6	RXIN0+	Differential data input, CH0 (positive)	LVDS signal
7	GND		
8	RXIN1-	Differential data input, CH1 (negative)	LVDS signal
9	RXIN1+	Differential data input, CH1 (positive)	LVDS signal
10	GND		
11	RXIN2-	Differential data input, CH2 (negative)	LVDS signal
12	RXIN2+	Differential data input, CH2 (positive)	LVDS signal
13	GND		
14	RXCLK IN-	Differential clock input (negative)	LVDS signal
15	RXCLK IN+	Differential clock input (positive)	LVDS signal
16	GND		
17	R/L	Horizontal display mode select signal	[Note1]
18	U/D	Vertical display mode select signal	[Note2]
19	GND		
20	GND		

[Note]   To obtain the proper relation between LVDS signals and actual digital data signals,

the digital signals should be inputted into the transmitter as described in the nextsection, 4-2.

[Note]   The shielding case is connected with signal GND.

[Note]   Data Mapping

[Note 1],[Note 2]

R/L = High, U/D = Low

R/L = Low, U/D = Low

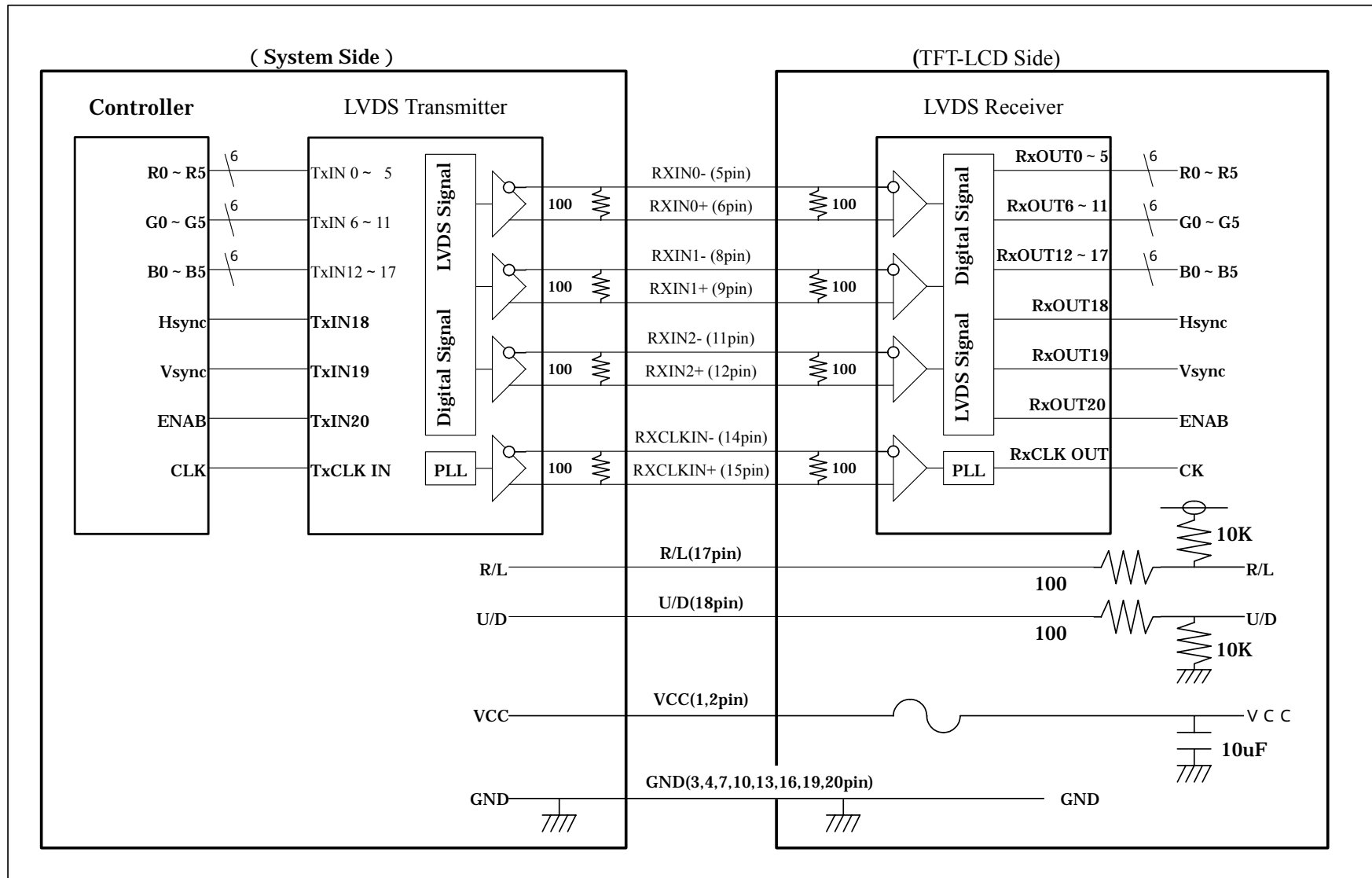R/L = High, U/D = High

R/L = Low, U/D = High

4-2 LVDS Interface block diagram

Using receiver   Single LVDS interface, which equals THC63LVDF64A(THine),contained in a control IC

Corresponding Transmitter   DS90C363, DS90C363A, DS90C383, DS90C383A(National semiconductor),

THC63LVDF63A,THC63LVDM63A(THine), SN75LVDS84(Ti)

System Side   (TFT-LCD Side)

| **Controller** | LVDS Transmitter | | LVDS Receiver |

R0 R5 — TxIN 0   5

G0 G5 — TxIN 6   11

B0 B5 — TxIN12   17

Hsync — **TxIN18**

Vsync — **TxIN19**

ENAB — **TxIN20**

CLK — **TxCLK IN**   PLL

LVDS Signal / Digital Signal

100   RXIN0- (5pin)
100   RXIN0+ (6pin)

100   RXIN1- (8pin)
100   RXIN1+ (9pin)

100   RXIN2- (11pin)
100   RXIN2+ (12pin)

100   RXCLKIN- (14pin)
100   RXCLKIN+ (15pin)

Digital Signal / LVDS Signal   PLL

RxOUT0   5 — R0   R5

RxOUT6   11 — G0   G5

RxOUT12   17 — B0   B5

RxOUT18 — Hsync

RxOUT19 — Vsync

RxOUT20 — ENAB

RxCLK OUT — CK

R/L — **R/L(17pin)** — 100 — 10K — R/L

U/D — **U/D(18pin)** — 100 — 10K — U/D

VCC — **VCC(1,2pin)** — 10uF

GND — **GND(3,4,7,10,13,16,19,20pin)** — GND

4-3. Backlight driving

CN2 ,CN3

Used connector : BHR-02(8.0)VS-1N (JST)

Corresponding connector : SM02(8.0)B-BHS-1-TB or -1N-TB (JST)

Pin no.	symbol	function	Color of FL cable
1	VHIGH	Power supply for lamp (High voltage side)	(Pink Blue)
2	VLOW	Power supply for lamp (Low voltage side)	(White Gray)

5. Absolute Maximum Ratings

Parameter	Symbol	Condition	Pin name	Ratings	Unit	Remark
+3.3V / +5.0V supply voltage	Vcc	Ta=25°C	Vcc	0 to + 6.0	V	
Input voltage	VI1	Ta=25°C	RXINi-/+(i= 0,1,2)	-0.3 to Vcc+0.3	V	Vcc<3.0V
			RXCLK IN-/+	-0.3 to 3.3V	V	3.0V Vcc
	VI2	Ta=25°C	R/L , U/D	-0.3 to Vcc+0.3	V	
Lamp input voltage	VHIGH	-	-	(2000)	Vrms	
Storage temperature	Tstg	-	-	-30 to +80	^{o}C	[Note1]
Operating temperature	Topa	Panel surface	-	-30 to +80	^{o}C	

[Note1] Humidity: 95%RH Max. at Ta 40°C.

Maximum wet-bulb temperature at 39°C or less at Ta>40°C.

No condensation.

6. Recommended operation condition

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	Vcc	3.0	+3.3/+5.0	5.5		[Note1]
LVDS Signals	V_L	0		2.4		[Note2]
Input voltage	VI	0		Vcc		[Note3]
Ambient temperature	Topa	-30		+80		[Note4], [Note5]

[Note1]

Vcc-turn-on conditions

0<t1 15ms

0<t2 10ms

0<t3 100ms

0<t4 1s

t5>200ms

Vcc-dip conditions

1) 2.5V Vcc

td 10ms

2) Vcc<2.5V

Vcc-dip conditions should also follow the Vcc-turn-on conditions.

[Note2] RXIN0-, RXIN0+,RXIN1-,RXIN1+,RXIN2-,RXIN2+,RXCLK IN-,RXCLK IN+

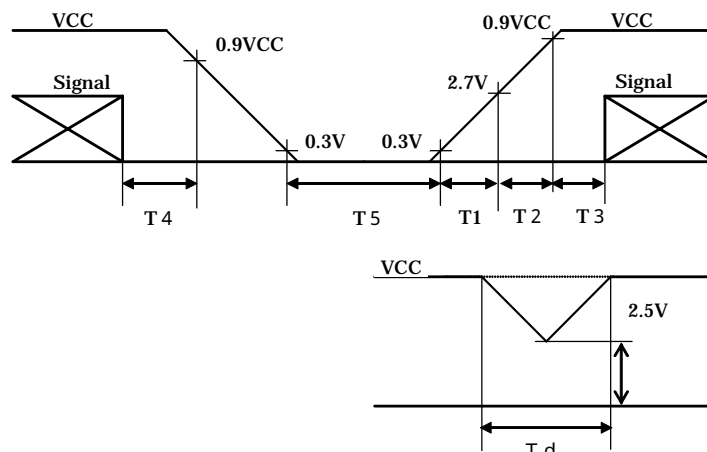[Note3] R/L, U/D

[Note4] Humidity: 95%RH Max. at Ta=<40°C.

Maximum wet-bulb temperature at 39°C or less at Ta>40°C.

No condensation.

[Note5] Maximum value : Panel surface temperature

7. Electrical Characteristics

7-1. TFT-LCD panel driving   Ta=25 °C

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Current dissipation	Vcc=+3.3V	Icc	-	(TBD)	(TBD)	mA	[Note1]
	Vcc=+5.0V	Icc	-	(TBD)	(TBD)	mA	
Permissive input ripple voltage		VRP	-	-	100	mVp-p	
Input voltage range	LVDS signal	VL	0	-	2.4	V	[Note2]
Differential input threshold voltage	High	VTH	-	-	VCM+100	mV	V_{CM}=1.2V [Note3]
	Low	VTL	VCM–100	-	-	mV	
Input impedance (Differential input)		RT	-	100	-		[Note2]
Input voltage	Low	VIL	-	-	0.8	V	[Note4]
	High	VIH	2.1	-	-		[Note5]
Input current1	Low(VI=0V)	IOL1	-800	-	-		[Note4]
	High(VI=Vcc)	IOH1	-10.0	-	10.0		
Input current2	Low(VI=0V)	IOL2	-10.0	-	10.0	uA	[Note5]
	High(VI=Vcc)	IOH2	-	-	800	uA	

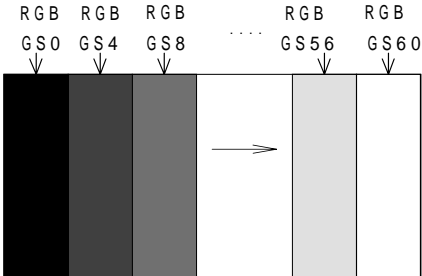[Note1] Typical current situation : 16-gray-bar pattern.

  Vcc=+3.3V / +5.0V

[Note2] LVDS signals

[Note3] V_{CM} : Common mode voltage of LVDS driver.

[Note4] R/L

[Note5] U/D

7-2. Backlight driving

The backlight system is an edge-lighting type with double CCFT (Cold Cathode Fluorescent Tube).
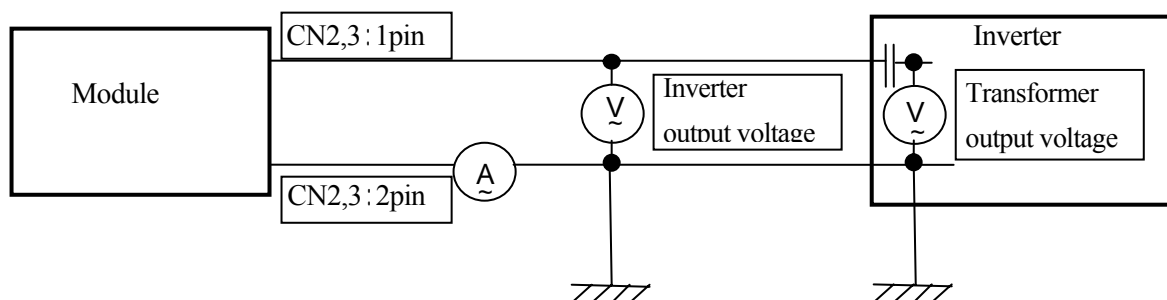
The characteristics of single lamp are shown in the following table.

(It is usually required to measure under the following condition.

condition:IL=6.0mA,Ta=25 ± 2 ,FL=60kHz.)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark	
Lamp current	IL	(3.0)	(6.0)	(6.5)	mA rms	[Note1]	
Lamp power consumption	PL	-	(2.82)	-	W	[Note2]	
Lamp frequency	FL	(35)	(60)	(70)	kHz	[Note3]	
Kick-off voltage	Vs	-	-	(TBD)	V rms	Inverter output	[Note4]
		-	-	(TBD)		(Transformer output)	Ta=-30°C
Lamp life time	LL	(50000)	-	-	Hour	[Note5]	

[Note1] Lamp current is measured with current meter for high frequency as shown below.

[Note2] Referential data per one CCFT by calculation. (I L × VL)
The data don't include loss at inverter. (IL=6.0mArms)

[Note3] Lamp frequency may produce interference with horizontal synchronous frequency,and this may cause beat on the display. Therefore lamp frequency shall be detached as much as possible from the horizontal synchronous frequency and from the harmonics of horizontal synchronous to avoid interference.

[Note4] The open output voltage of the inverter shall be maintained for more than 1s; otherwise the lamp may not be turned on.

[Note5] Above value is applicable when lamp (the long side of LCD module) is placed horizontally.
(Landscape position)
Lamp life time is defined that it applied either   or   under this condition
(Continuous turning on at Ta=25 ^{o}C, IL=6.0mA rms)
Brightness becomes 50% of the original value under standard condition.
Kick-off voltage at Ta=-30 ^{o}C exceeds maximum value, (TBD)Vrms.
(Lamp lifetime may vary if lamp is in portrait position due to the change of mercury density inside the lamp.)
In case of operating under lower temp environment, the lamp exhaustion is accelerated and the brightness becomes lower.
(Continuous operating for around 1 month under lower temp condition may reduce the brightness to half of the original brightness.)
In case of such usage under lower temp environment, periodical lamp exchange is recommended.

[Note6] The performance of the backlight, for example life time or brightness, is much influenced by the characteristics of the DC-AC inverter for the lamp. When you design or order the inverter, please make sure that a poor lighting caused by the mismatch of the backlight and the inverter (miss-lighting,flicker, etc.) never occur. when you confirm it, the module should be operated in   the same condition as it is installed in your instrument.
Be sure to use a back light power supply with the safety protection circuit such as the detection circuit for the excess voltage, excess current and or electric discharge waveform.
Be sure to use the detect circuit by which one side of the CCFT lamps can be controlled independently. Otherwise, when one side of the CCFT is open, the excess current may possibly be applied to the other side of the lamp.
Recommended inverter is "(TBD)".

[Note7] It is required to have the inverter designed so that to allow the impedance deviation of the two CCFT lamps and the capacity deviation of barast capacitor.

[Note8] Under the environment of 10lx or less, miss-lighting delay may occur.

8. Timing Characteristics of input signals

These are specified at the digital inputs/outputs of LVDS transmitter/receiver.

Timing diagrams of input signal are shown in Fig.2.

8-1. Timing characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	1/Tc	-	25.18	28.33	MHz	-
Horizontal sync. signal	Cycle	TH	30.00	31.78	-	µs	-
			750	800	900	clock	-
	Pulse width	THp	2	96	200	clock	-
Vertical sync. signal	Cycle	TV	515	525	560	line	-
	Pulse width	TVp	1	-	34	line	-
Horizontal display period		THd	640	640	640	clock	-
Hsync-Vsync phase difference		TVh	0	-	TH-THp	clock	-
Vertical data start position		TVs	34	34	34	line	-

[Note]   In case of lower frequency, the deterioration of display quality, flicker etc.,may be occurred.

8-2. Horizontal display position

The horizontal display position is determined by ENAB signal and the input data corresponding to the rising edge of ENAB signal is displayed at the left end of the active area.

Parameter		symbol	Min.	Typ.	Max.	Unit	Remark
Enable signal	Pulse width	Tep	2	640	TH-10	clock	-
Hsync-Enable signal phase difference		THe	44	-	TH—664	clock	-

[Note] When ENAB is fixed "Low", the display starts from the data of C104(clock) as shown in Fig.2.

Be careful that the module does not work when ENAB is fixed "High".

When the phase difference is below 104 clock, keep the "High level of ENAB is signal longer than 104-The. If it will not be keeped, the display starts from the data of C104(clock).

8-3. Vertical display position

The vertical display position, TVs is fixed "34" (line).

8-4. Input Data Signals and Display Position on the screen

Display position of input data

(H , V

D1,DH1	D2,DH1	D3,DH1		D640,DH1
D1,DH2	D2,DH2			
D1,DH3				

R G B

| D1,DH480 | | | | D640, DH480 |

Horizontal
Sync.signal

(Hsync)

THp

0.8V 0.8V

TH

0.8V

0.8V

*Only when enable terminal is fixed "LOW"

Clock signal
(CK)

2.1V

Tc

0.8V

0.8V 0.8V 0.8V 0.8V

C1*   C2*   C104*
Number of clock

Number of H data line

Data signal
(R0～R5, G0～G5,
B0～B5)

Horizontal invalid data period

D1   D2   D3   D639   D640

Horizontal invalid data period

THe

THl

2.1V

Data
Enable signal
(ENAB)

Tep

0.8V

Vertical
Sync. signal

(Vsync)

0.8V

TV

TVp

2.1V

0.8V

TVh

Horizontal
Sync. signal
(Hsync)

2.1V

1 line   2 line   34 line

TVs

TVd

Data signal
(R0～R5, G0～G5,
B0～B5)

Vertical invalid data period

DH1   DH2   DH3   DH479   DH480
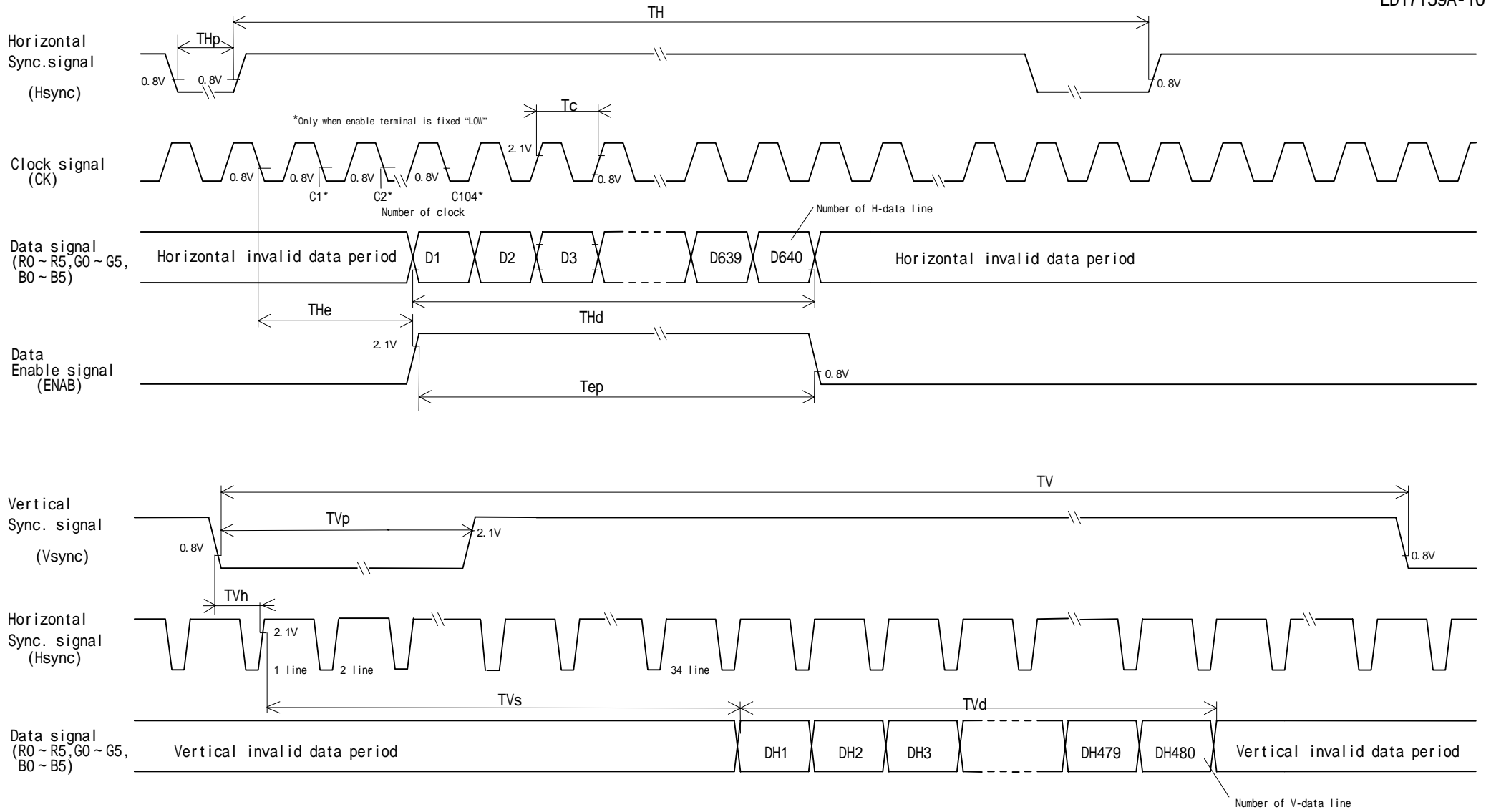
Vertical invalid data period

Number of V-data line

Fig. 2 Input signal waveforms

9. Input Signals, Basic Display Colors and Gray Scale of Each Color

	Colors & Gray scale	Gray Scale	R0	R1	R2	R3	R4	R5	G0	G1	G2	G3	G4	G5	B0	B1	B2	B3	B4	B5
Basic Color	Black		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	1	1	1	1	1	1	0	0	0	0	0	0
	Cyan		0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Red		1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta		1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow		1	1	1	1	1	1	1	1	1	1	1	1	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
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇑	GS1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇑	↓			↓						↓						↓			
	⇓	↓			↓						↓						↓			
	Brighter	GS61	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	⇓	GS62	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS63	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇑	GS1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	⇑	↓			↓						↓						↓			
	⇓	↓			↓						↓						↓			
	Brighter	GS61	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0
	⇓	GS62	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0
	Green	GS63	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Black	GS0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇑	GS1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	⇑	↓			↓						↓						↓			
	⇓	↓			↓						↓						↓			
	Brighter	GS61	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1
	⇓	GS62	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	Blue	GS63	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

0 :Low level voltage, 1 : High level voltage

Each basic color can be displayed in 64 gray scales from 6 bit data signals. According to the combination of total 18 bit data signals, the 262,144-color display can be achieved on the screen.

10. Optical Characteristics

Ta=25 , Vcc=+3.3V / +5.0V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	21, 22	CR>10	60	70	-	Deg.	[Note1]
	Vertical	11		35	50	-	Deg.	[Note4]
		12		55	60	-	Deg.	
Contrast ratio		CRn	=0°	300	-	-		[Note2]
		CRo	Optimum viewing angle	-	(600)	-		[Note4]
Response time	Rise	r		-	10	-	ms	[Note3]
	Decay	d		-	25	-	ms	[Note4]
Chromaticity of white		x		0.263	0.313	0.363		
		y		0.279	0.329	0.379		
Chromaticity of red		x	=0°	(0.546)	(0.596)	(0.646)		
		y		(0.279)	(0.329)	(0.379)		[Note4]
Chromaticity of green		x		(0.260)	(0.310)	(0.360)		IL=6.0mArms
		y		(0.502)	(0.551)	(0.602)		f=60kHz
Chromaticity of blue		x		(0.117)	(0.167)	(0.217)		
		y		(0.132)	(0.182)	(0.232)		
Luminance of white		Y_{L1}		360	450	-	cd/m^2	
White Uniformity		δW		-	-	1.25		[Note5]

[Note] The measurement shall be executed 30 minutes after lighting at rating. (condition:IL=6.0mA rms)

The optical characteristics shall be measured in a dark room or equivalent state with

the method shown in Fig.3 below.

Photodetector

Viewing angle/Response time : BM-5A (TOPCON)

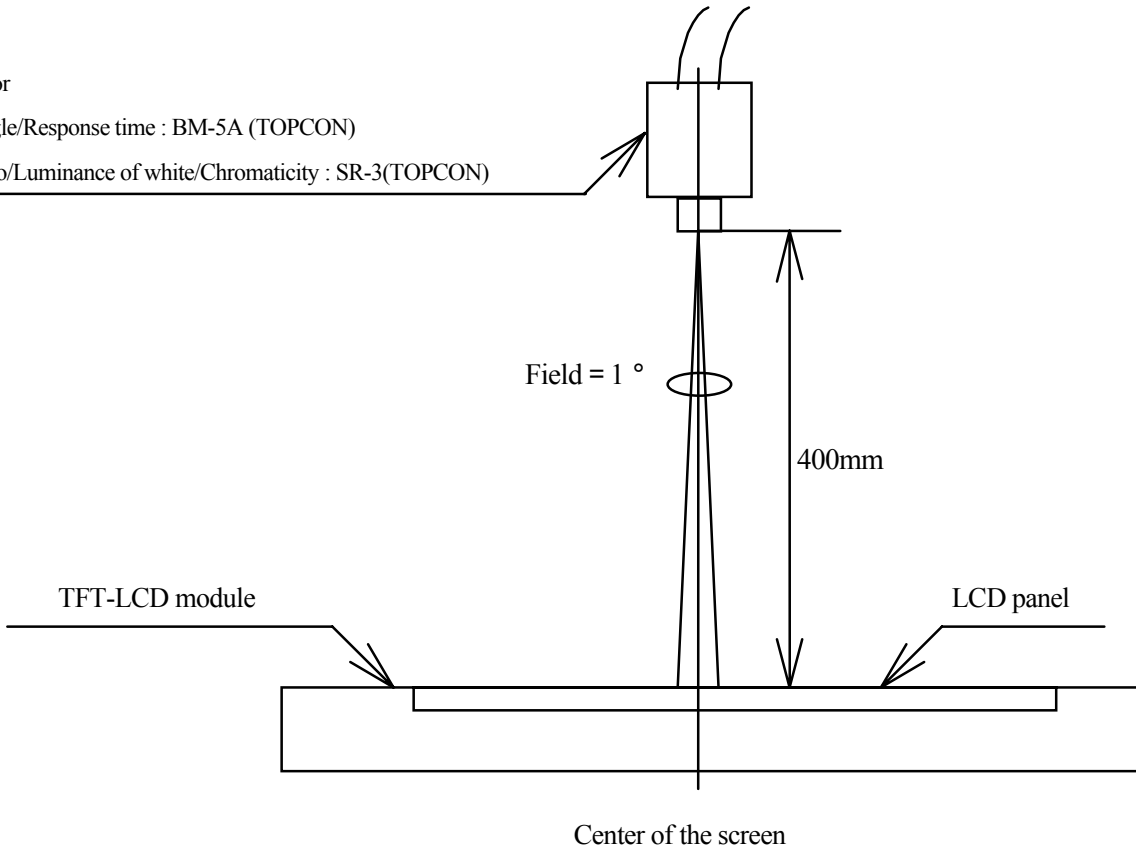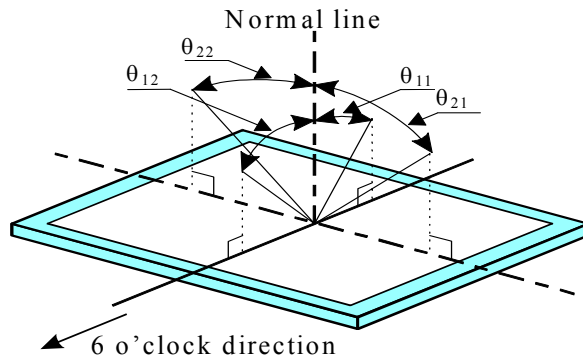Contrast ratio/Luminance of white/Chromaticity : SR-3(TOPCON)

Field 1°

400mm

TFT-LCD module

LCD panel

Center of the screen

Fig.3 Optical characteristics measurement method

[Note1] Definitions of viewing angle range:

Normal line

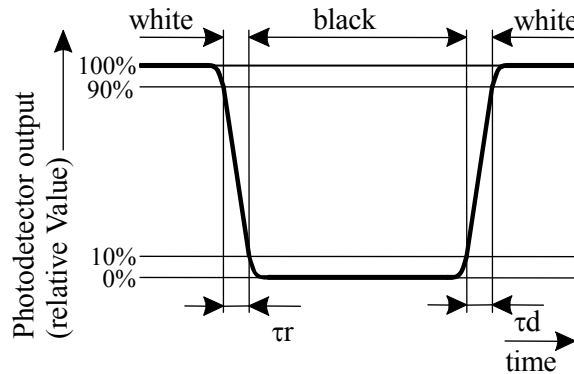θ_{22} θ_{12} θ_{11} θ_{21}

6 o'clock direction

[Note2] Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$
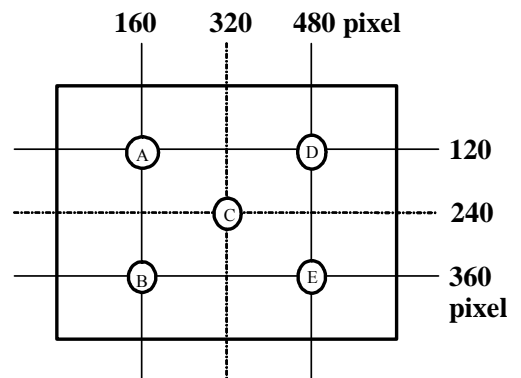
[Note3] Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .

white   black   white

Photodetector output (relative Value)

100%
90%

10%
0%

τr τd

time

[Note4] This shall be measured at center of the screen.

[Note5] Definition of white uniformity:

White uniformity is defined as the
following with five measurements
(A   E).

160   320   480 pixel

A   D   120

C   240

B   E   360 pixel

$$\text{w} \quad \frac{\text{Maximum Luminance of five points (brightness)}}{\text{Minimum Luminance of five points (brightness)}}$$

11. Display Quality

The display quality of the color TFT-LCD module shall be in compliance with the Incoming Inspection Standard.

12.Handling Precautions

   a) Be sure to turn off the power supply when inserting or disconnecting the cable.

   b) Be sure to design the cabinet so that the module can be installed without any extra stress such as
       warp or twist.

   c) Since the front polarizer is easily damaged, pay attention not to scratch it.
       Blow away dust on the polarizer with antistatic $_2$ blow. It is undesirable to wipe off because a polarizer is sensitive.
       It is recommended to peel off softly using the adhesive tape when soil or finger oil is stuck to the polarizer.
       When unavoidable, wipe off carefully with a cloth for wiping lenses.

   d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

   e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

   f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
       Handle with care.

   g) Since CMOS LSI is used in this module, take care of static electricity and injure the human earth
       when handling.Observe all other precautionary requirements in handling components.

   h) Since there is a circuit board in the module back, stress is not added at the time of a design assembly.
       Please make it like. If stress is added, there is a possibility that circuit parts may be damaged.

   i) Protection film is attached to the module surface to prevent it from being scratched .
       Peel the film off slowly , just before the use, with strict attention to electrostatic charges.
       Blow off 'dust' on the polarizer by using an ionized nitrogen.

   j) The polarizer surface on the panel is treated with Anti-Glare for low reflection. In case of attaching
       protective board over the LCD, be careful about the optical interface fringe etc. which degrades
       display quality.

   k) Do not expose the LCD panel to direct sunlight. Lightproof shade etc. should be attached when LCD
       panel is used under such environment.

   l) Connect GND to 4 place of mounting holes to stabilize against EMI and external noise.

   m) There are high voltage portions on the backlight and very dangerous. Careless touch may lead to
       electrical shock. When exchange lamps or service, turn off the power without tail.

   n) When handling LCD modules and assembling them into cabinets, please be noted that long-term
       storage in the environment of oxidization or deoxidization gas and the use of such materials as
       reagent,solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and
       discoloration of the LCD modules.

   o) Cold cathode fluorescent lamp in LCD panel contains a small amount of mercury, please follow local
       ordinances or regulations for disposal.

   p) Be careful of a back light lead not to pull by force at the time of the wiring to an inverter, or line processing.

   q) When install LCD modules in the cabinet, recommended torque value is "0.294± 0.02N m (3.0± 0.2kgf cm)".
       Be sure to confirm it in the same condition as it is installed in your instrument.

   r) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye
       or mouth by mistake.

   s) Notice:Never dismantle the module , because it will cause failure.

   t) Be careful when using it for long time with fixed pattern display as it may cause afterimage.

   u) Adjusting volume have been set optimally before shipment, so do not change any adjusted value.
       If adjusted value is changed, the specification may not be satisfied.

   v) If a minute particle enters in the module and adheres to an optical material, it may cause display non-uniformity issue,
       etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

13. Packing form

Product countries / Areas	JAPAN	TAIWAN	CHINA
Piling number of cartons	TBD		
Package quantity in one carton	TBD		
Carton size	TBD		
Total mass of one carton filled with full modules	TBD		
Packing form is shown	TBD		

14.Reliability test items

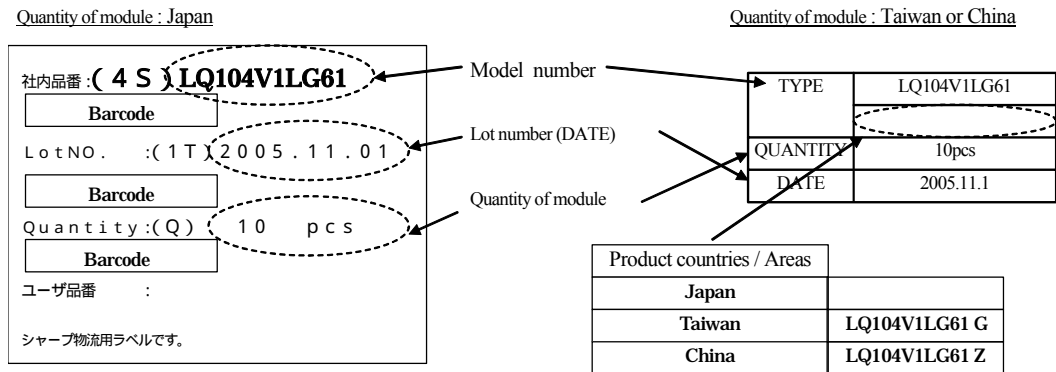| No.	Test item	Conditions	Remark
1	High temperature storage test	Ta=80　　　240h	Panel surface
2	Low temperature storage test	Ta= -30　　　240h	
3	High temperature & high humidity operation test	Ta=40　　; 95%RH　240h (No condensation)	
4	High temperature operation test	Ta=80　　　240h	Panel surface
5	Low temperature operation test	Ta= -30　　　240h	
6	Vibration test (non- operating)	Frequency: 10　57Hz/Vibration width (one side): 0.153mm 　　　　　: 57　500Hz/Gravity: (19.6) m/s^2 Sweep time : 11 minutes Test period : 3 hours 　　　　　(1 hour for each direction of X,Y,Z)	
7	Shock test (non- operating)	Max. gravity : 490m/s^2 Pulse width : 11ms, half sine wave Direction : $\pm$ X,$\pm$ Y,$\pm$ Z　　　once for each direction.	
8	ESD test	Contact discharge　　　(150pF 330) 　　　non-operating = $\pm$ 10kV,　operating = $\pm$ 8kV Atmospheric discharge　(150pF 330) 　　　non-operating = $\pm$ 20kV,　operating = $\pm$ 15kV	
9	EMI	Measurement in 10m site Display position on the screen = "H" (full-screen), GND to 4 place = un-connect,　Vcc / Vsignal = typ.	VCCI (Class B)

[Result Evaluation Criteria]

Under the display quality test conditions with normal operation state, these shall be no change

which may affect practical display function. (normal operation state　Temperature:15　35　,

　Humidity:45　75　, Atmospheric pressure:86　106kpa)

15.Others

15-1 Lot No. Label:

Product countries / Areas	
Japan	MADE IN JAPAN
Taiwan	MADE IN TAIWAN
China	MADE IN CHINA

Lot Number
* Discernment code

Product countries / Areas	
Japan	
Taiwan	G
China	Z

Serial No. (5 digits)

Assembly site code

Production month (1-9X, Y, Z)

Production year (Last digit of dominical year)

15-2 Packing box Label:

Quantity of module : Japan

Quantity of module : Taiwan or China

TYPE	LQ104V1LG61
QUANTITY	10pcs
DATE	2005.11.1

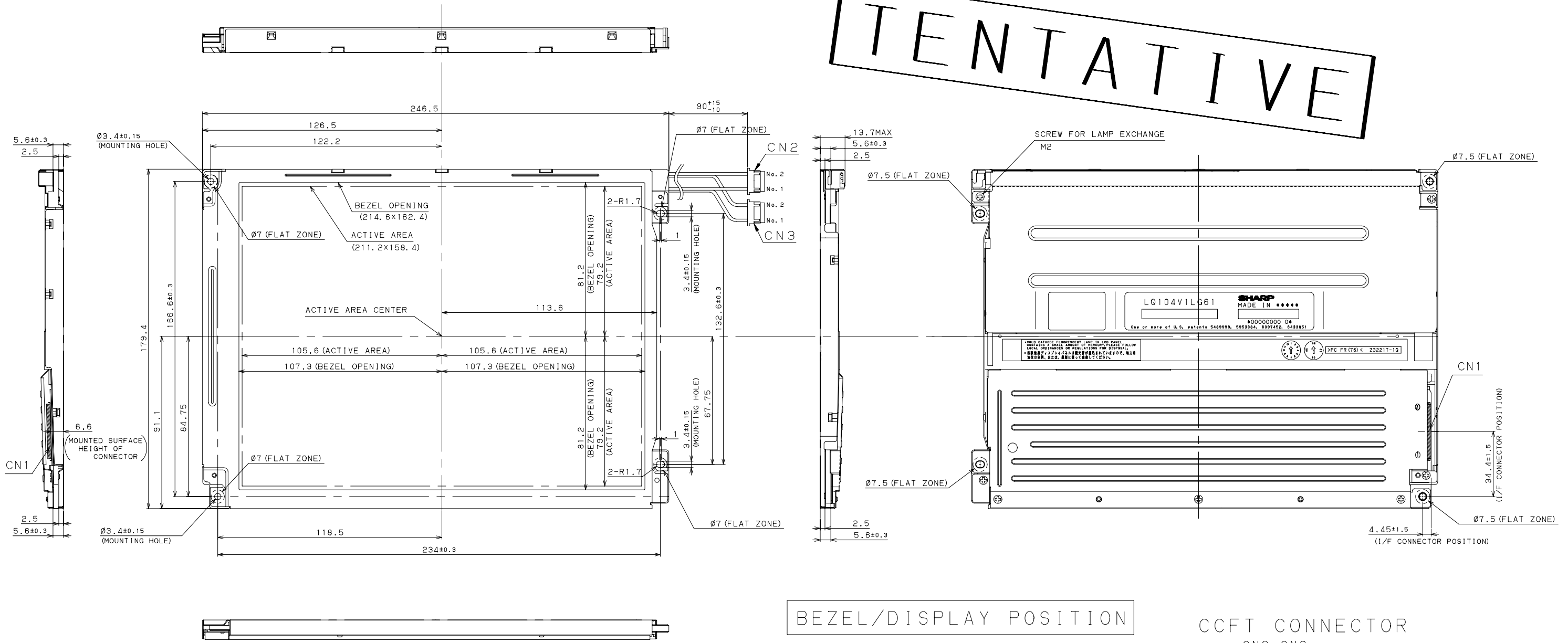| Product countries / Areas	
Japan	
Taiwan	LQ104V1LG61 G
China	LQ104V1LG61 Z

15-3 If any problem occurs in relation to the description of this technical literature, it shall be resolved through discussion with spirit of cooperation.
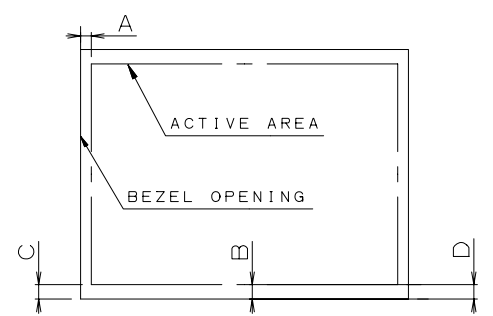
TENTATIVE

246.5
126.5
122.2
90 +15 −10

Ø7 (FLAT ZONE)

CN2
No.2
No.1
No.2
No.1
CN3

BEZEL OPENING
(214.6×162.4)

ACTIVE AREA
(211.2×158.4)

Ø7 (FLAT ZONE)

ACTIVE AREA CENTER

113.6

81.2 (BEZEL OPENING)
79.2 (ACTIVE AREA)

2-R1.7

3.4±0.15 (MOUNTING HOLE)

132.6±0.3

Ø3.4±0.15 (MOUNTING HOLE)

5.6±0.3
2.5

105.6 (ACTIVE AREA)
107.3 (BEZEL OPENING)

105.6 (ACTIVE AREA)
107.3 (BEZEL OPENING)

179.4
166.6±0.3
91.11
84.75

81.2 (BEZEL OPENING)
79.2 (ACTIVE AREA)

67.75

3.4±0.15 (MOUNTING HOLE)

6.6
(MOUNTED SURFACE HEIGHT OF CONNECTOR)

CN1

2-R1.7

Ø7 (FLAT ZONE)

Ø7 (FLAT ZONE)

2.5
5.6±0.3

Ø3.4±0.15
(MOUNTING HOLE)

118.5
234±0.3

13.7MAX
5.6±0.3
2.5

Ø7.5 (FLAT ZONE)

SCREW FOR LAMP EXCHANGE
M2

Ø7.5 (FLAT ZONE)

LQ104V1LG61 SHARP
MADE IN *****
One or more of U.S. patents 5489999, 5953064, 6097452, 6433651

*COLD CATHODE FLUORESCENT LAMP IN LCD PANEL CONTAINS A SMALL AMOUNT OF MERCURY. PLEASE FOLLOW LOCAL ORDINANCES OR REGULATIONS FOR DISPOSAL.

00000000 0

PC FR (76) < Z3221T-1Q

CN1

34.4±1.5 (I/F CONNECTOR POSITION)

Ø7.5 (FLAT ZONE)

Ø7.5 (FLAT ZONE)

4.45±1.5
(I/F CONNECTOR POSITION)

2.5
5.6±0.3

BEZEL/DISPLAY POSITION

A

ACTIVE AREA

BEZEL OPENING

C   B   D

1) TOLERANCE X-DIRECTION A:1.7±0.8
2) TOLERANCE Y-DIRECTION B:2.0±0.8
3) OBLIQUITY OF DISPLAY AREA |C-D|<0.8

CCFT CONNECTOR

CN2,CN3:
BHR-02(8.0)VS-1N(JST)

1	High
2	GND

NOTES
1) UNSPECIFIED TOLERANCE TO BE ±0.5
2) WARP AND FLOATING FOR PRINTED WIRING BOARD AND CHASSIS ARE EXCLUDED FROM THE THICKNESS OF THE UNIT
3) FRONT SIDE:REGARDING THE SIZE OF USER'S BOSSES. PLEASE DESIGN THEM FROM Ø6mm TO Ø7mm.
4) REAR SIDE:REGARDING THE SIZE OF USER'S BOSSES. PLEASE DESIGN THEM FROM Ø6mm TO Ø7.5mm.
5) RECOMMENDED TIGHTEN TORQUE FOR MOUNTING 0.294±0.02N・m(3.0±0.2kgf・cm)

INTERFACE CONNECTOR

PIN LAYOUT

pin	1	2	3	4	5	6
	VCC	VCC	GND	GND	RXIN0-	RXIN0+
7	8	9	10	11	12	13
GND	RXIN1-	RXIN1+	GND	RXIN2-	RXIN2+	GND
14	15	16	17	18	19	20
RCLKIN-	RCLKIN+	GND	R/L	U/D	GND	GND

CORRESPONDING CONNECTOR:FI-SE20M, FI-S20S

Fig1.LQ104V1LG61 OUTLINE DIMENSIONS

CN1