DEVICE SPECIFICATION FOR

TFT-LCD Module

MODEL No.

LQ150U1LH22

☐ CUSTOMER'S APPROVAL

DATE _____

BY _____

PRESENTED

BY *M. Takeda*

M. TAKEDA
Department General Manager
Development Engineering Department II
TFT Division II
TFT LIQUID CRYSTAL DISPLAY GROUP
SHARP CORPORATION

RECORDS OF REVISION

LQ150U1LH22

SPEC No.	DATE	REVISED		SUMMARY	NOTE
		No.	PAGE		
LD-12X07	Oct. 20. 2000	−	−		1st Issue

1. Application

   This specification applies to a color TFT-LCD module,LQ150U1LH22

2. Overview

   This module is a color active matrix LCD module incorporating amorphous silicon TFT (Thin Film Transistor). This module is based on the standards of SPWG(Standard Panels Working Group).

It is composed of a color TFT-LCD panel, driver ICs, control circuit, power supply circuit, and a backlight unit. Graphics and texts can be displayed on a 1600× 3× 1200 dots panel with 262,144 colors by using LVDS (Low Voltage Differential Signaling) to interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving and supply voltage for backlight.

The TFT-LCD panel used for this module has very high aperture ratio. A low-reflection and higher-color-saturation type color filter is also used for this panel. Therefore, high-brightness and high-contrast image, which is suitable for the multimedia use, can be obtained by using this module.

   Optimum viewing direction is 6 o'clock.

   Backlight-driving DC/AC inverter is built in this module.

[Features]

   1) High aperture panel; high-brightness or low power consumption.

   2) Brilliant and high contrast image.

   3) Small footprint and thin shape.

   4) Light weight.

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	38 (15.0")　Diagonal	cm
Active area	304.0 (H)× 228.0 (V)	mm
Pixel format	1600 (H)× 1200 (V)	pixel
	(1 pixel = R+G+B dots)	
Pixel pitch	0.190(H)× 0.190 (V)	mm
Pixel configuration	R,G,B vertical stripe	
Display mode	Normally white	
Unit outline dimensions *1	317.3(W)× 242.0 (H)× 7.0max.(D)	mm
Mass *2	690± 10	g
Surface treatment	Anti-glare and hard-coating 2H Haze Value = 25	

   *1.Note : excluding inverter unit and backlight cables.

   *2.Note : including inverter unit.

   Outline dimensions is shown in Fig.1

4. Input Terminals

4-1. TFT-LCD panel driving

CN1 (LVDS signals and +3.3V DC power supply)

Using connector : FI-XB30S-HF10 (JAE)

Corresponding connector : FI-X30M, or FI-X30H (JAE)

Pin No.	Symbol	Function	Remark
1	GND		
2	Vcc	+3.3V power supply	
3	Vcc	+3.3V power supply	
4	Vedid	DCC +3.3V power supply	
5	NC	Reserved	
6	CLKedid	DDC Clock	
7	DATAedid	DDC Data	
8	R1IN0-	Receiver signal of A side pixels (-)	LVDS
9	R1IN0+	Receiver signal of A side pixels (+)	LVDS
10	GND		
11	R1IN1-	Receiver signal of A side pixels (-)	LVDS
12	R1IN1+	Receiver signal of A side pixels (+)	LVDS
13	GND		
14	R1IN2-	Receiver signal of A side pixels (-)	LVDS
15	R1IN2+	Receiver signal of A side pixels (+)	LVDS
16	GND		
17	CK1IN-	Clock signal of A side pixels (-)	LVDS
18	CK1IN+	Clock signal of A side pixels (+)	LVDS
19	GND		
20	R2IN0-	Receiver signal of B side pixels (-)	LVDS
21	R2IN0+	Receiver signal of B side pixels (+)	LVDS
22	GND		
23	R2IN1-	Receiver signal of B side pixels (-)	LVDS
24	R2IN1+	Receiver signal of B side pixels (+)	LVDS
25	GND		
26	R2IN2-	Receiver signal of B side pixels (-)	LVDS
27	R2IN2+	Receiver signal of B side pixels (+)	LVDS
28	GND		
29	CK2IN-	Clock signal of B side pixels (-)	LVDS
30	CK2IN+	Clock signal of B side pixels (+)	LVDS

Note 1   Relation between LVDS signals and actual data shows below section (4-2).

Note 2   The shielding case is connected with signal GND.

.

4-2 Interface block diagram

Using receiver (THC63LVDF64A(THINE)) Corresponding Transmitter THC63LVDM63A (THINE), DS90C363,DS90C383(National semiconductor


TxIN 18 - 20 must be fixed "Low".

Symbol of CN1 (Pin No.)
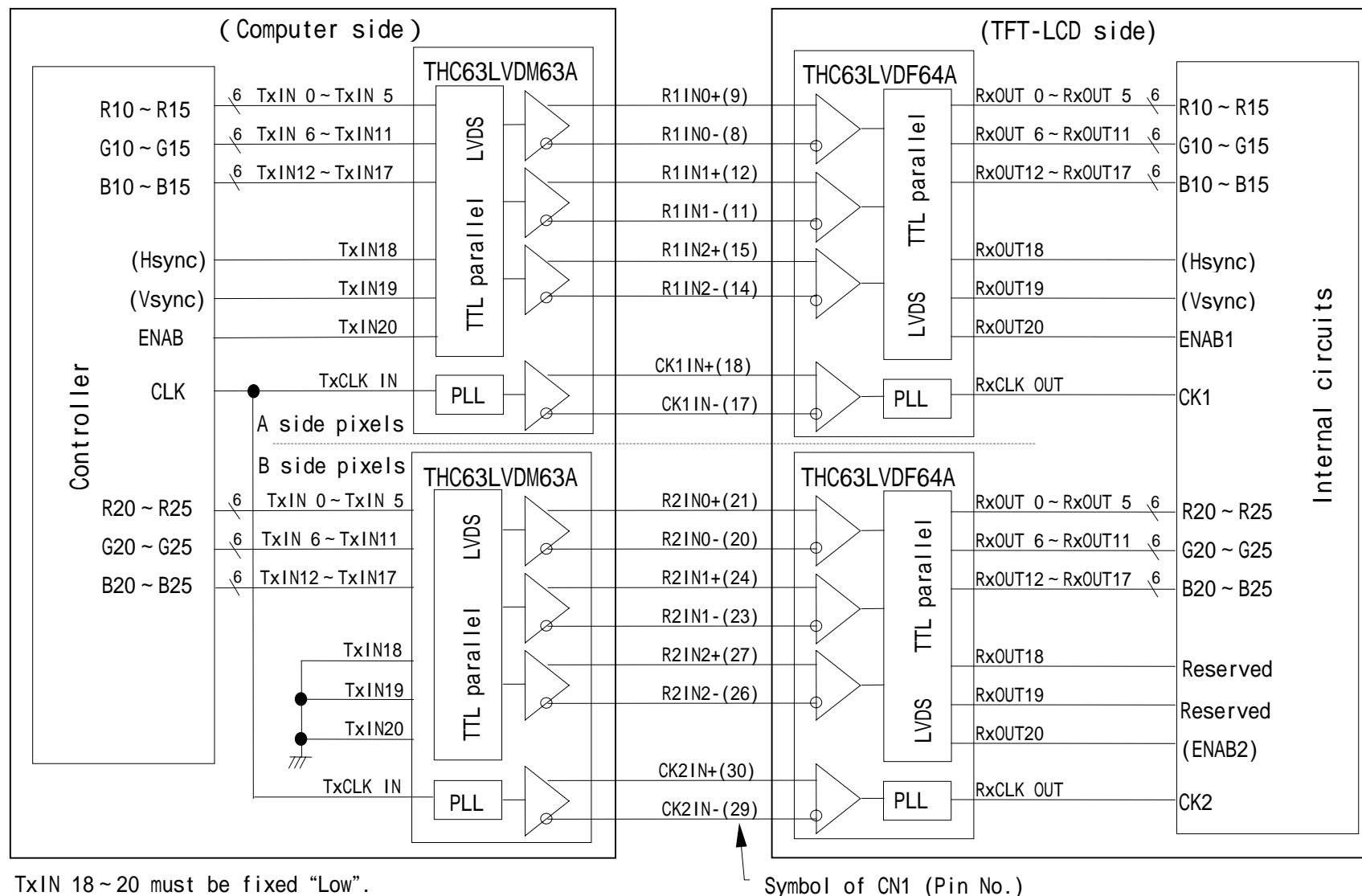
4-3. Inverter connector pin assign

CN2 : (Inverter signals and Inverter Power Supply)

Using connector : 52207-1690 (molex)

Pin no.	Symbol	Function
1,2,3	IN	Inverter power supply voltage
4,5,6	GND	Gnd
7	VBB	Base of Brightness control voltage
8	VBC	Brightness control IC supply voltage
9	SDA	Brightness control serial data signal
10	SCL	Brightness control serial clock signal
11	FPVEE	Backlighgt on/off signal
12	N C	This is electrically opened
13	PANEL_ID3	Panel identity bit3 =0
14	PANEL_ID2	Panel identity bit2 =1
15	PANEL_ID1	Panel identity bit1 =0
16	PANEL_ID0	Panel identity bit0 =1

Applicable recommended FPC layout:
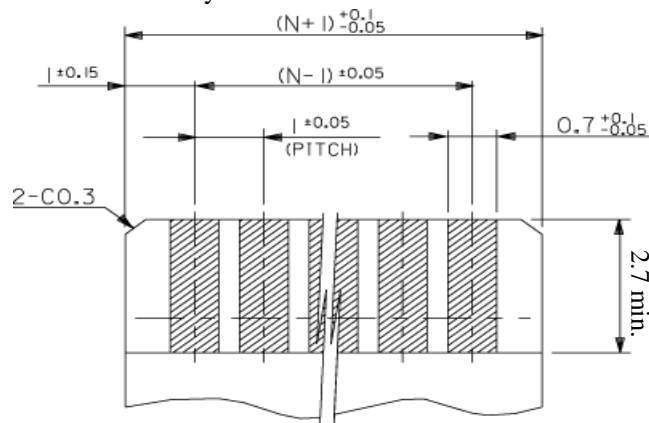
(N=16)
All dimensions are in millimeters.

APPLICABLE RECOMMENDED
FFC/FPC LAYOUT
(THICKNESS : 0.3±0.05)

5. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		Unit	Remark
Input voltage	V_I	Ta=25	0.3	Vcc+0.3		Note1
+3.3V supply voltage	Vcc	Ta=25	0	4		
Storage temperature	Tstg		25	60		Note2
Operating temperature	Topa		0	50		
Inverter supply voltage	V_{IN}	Ta=25	0	25		
Inverter signals	VBB,VBC SDA,SCL FPVEE	Ta=25	0.3	6.8		

Note1　LVDS signals

Note2　Humidity　95%RH Max. at Ta　40　.

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

　　　　　　　　No condensation.

6. Electrical Characteristics

6-1.TFT-LCD panel driving　　　　　　　　　　　　　　　　　　　Ta　25

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Vcc	Supply voltage	Vcc	+3.0	+3.3	+3.6		Note2
	Current dissipation	Icc		730	1210		Note3
Permissive input ripple voltage		V_{RP}			100	mV p-p	Vcc=+3.3V
Input voltage range		V_I	0		2.4	V	LVDS signal
Differential input	High	V_{TH}			+100	mV	V_{CM}=+1.2V
threshold voltage	Low	V_{TL}	−100			mV	Note1
Input current (High)		I_{OH}			± 10	μA	V_I=2.4V Vcc=3.6V
Input current (Low)		I_{OL}			± 10	μA	V_I=0V　Vcc=3.6V
Terminal resistor		R_T		100			Differential input

Note1　V_{CM} : Common mode voltage of LVDS driver.
Note2　On-off conditions for supply voltage

Vcc rise time

　　t1　10 ms

On time Vcc and signal

　　0　t2　50 ms
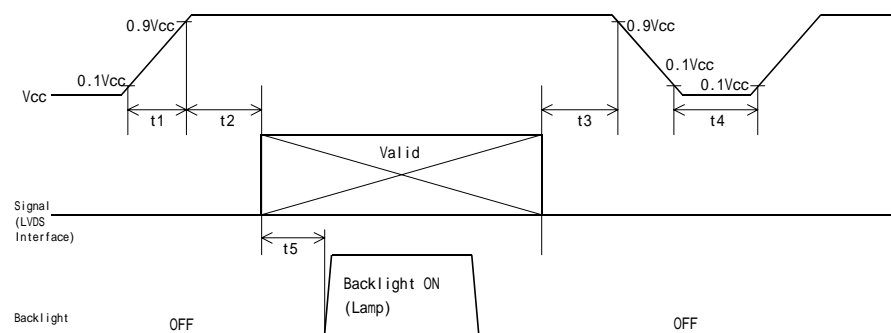
Off time signal and Vcc

　　0　t3　50 ms

Off time Vcc

　　400ms　t4

On time lamp and signal

　　200ms　t5

　　Power sequence for Backlight is not especially specified, however it is recommended to consider some

　　timing difference between LVDS input and Backlight input as shown above.

　　If the Backlight lights on before LCD starting, or if the Backlight is kept on after LCD stopping, the

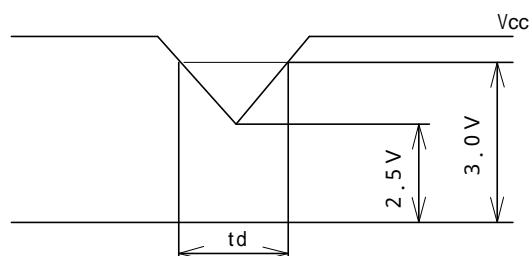　　screen may look white for a moment or abnormal image may be displayed.

　　This is caused by variation in output signal from timing generator at LVDS input on or off.　It does not

　　cause the damage to the LCD module.
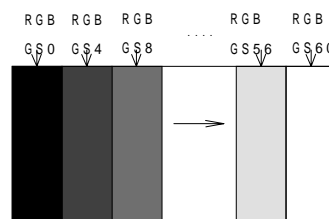
Vcc-dip conditions
1)　2.5 V　Vcc　3.0 V
　　td　10 ms
2)　Vcc　2.5 V

　　　Vcc-dip conditions should also follow the On-off conditions for supply voltage .

Note3 Typical current situation : 16-gray-bar pattern.

Vcc=+3.3V

6-2. Inverter driving

6-2-1. Backlight characteristic

The backlight system is an edge-lighting type with single CCFT (Cold Cathode Fluorescent Tube).

The life time of the lamp are shown in the following table.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Lamp life time	L_L	10000			Hour	Note

Note Lamp life time is defined as the time when occurs in the continuous

operation under the condition of Ta = 25 and SDA data=00_{HEX}.

Brightness becomes 50 % of the original value under standard condition.

6-2-2. Recommended Operating Condition

Parameter	Symbol	Min.	Typ	Max	Unit
Inverter power supply	V_{IN}	9		21	V
Base of brightness control	VBB	4.85	5.0	5.2	V
Brightness control IC power supply	VBC	4.5	5.0	5.5	V
Logic signals	SDA,SCL FPVEE	0		5	V

6-2-3. DC Electrical Conditions   Ta=25

Parameter		Symbol	Condition	Min.	Typ	Max	Unit	Remark
V_{IN} supply current		IV_{IN}	V_{IN}=9V,VBB=5V	330		590	mA	Note
			V_{IN}=21V,VBB=5V	160		280	mA	
Brightness control IC supply current		I_{VBC}	VBC =4.5 5.5V			200	uA	
SDA SCL	Input voltage low	V_{IL}	VBC =4.5 5.5V			0.3× VBC	V	
	Input voltage high	V_{IH}	VBC =4.5 5.5V	0.7× VBC			V	
FPVEE	Input voltage low	V_{IL}	V_{IN}=12V	0.0		0.6	V	
	Input voltage high	V_{IH}	V_{IN}=12V	3.0		5.0	V	

Note Brightness control from minmum to maxmaum

6-2-4. Power ON/OFF sequence

9 V ≤ Vin ≤ 21 V

10 ms ≤ td
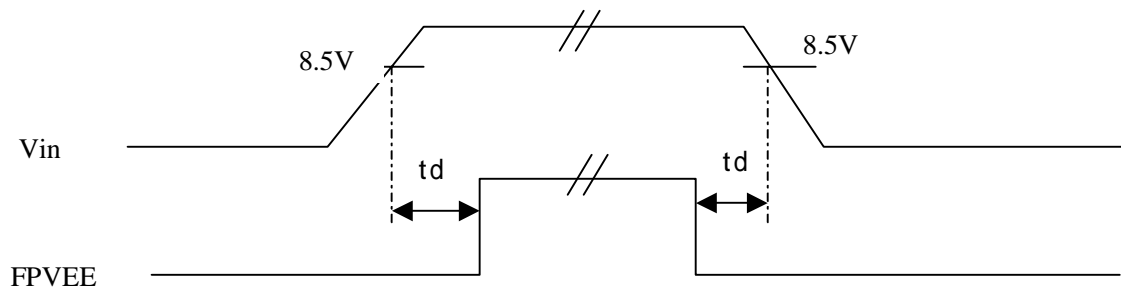
6-2-5. FPVEE ON sequence

Backlight power on/off is possible with FPVEE.
Make sure to have more than 0.2 second-interval between each power-on.

0.2 s ≤ t1

t2 ≥ 30ms
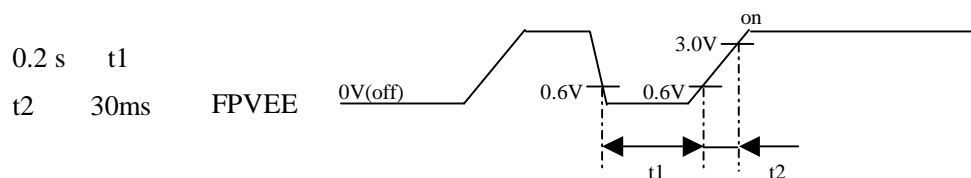
6-2-6. The Condition of Shut Down

Please refer to the figure below for the conditions that will cause the inverter shut down.
If the V_{IN} voltage is higher than 7.0V and there is no enable signal, then the inverter will shut down.
When the input voltage is less than 7.0V and lasts more than 150ms, the same will happen.

The enable signal has to be reset to get the inverter started again.
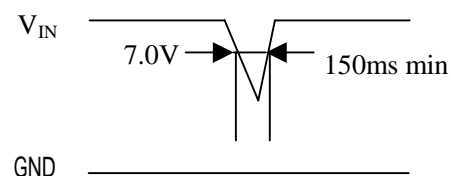
6-2-7. Brightness Control

SDA data	Brightness	Notes
00_{HEX}	Maxmum Brightness	Set on power-up
0 ～ FE_{HEX}		
FF_{HEX}	Minimum Brightness	

Block diagram

Note (A2,A1,A0)=(0,0,0)

WIPER0 is not using

(Brightness control voltage)
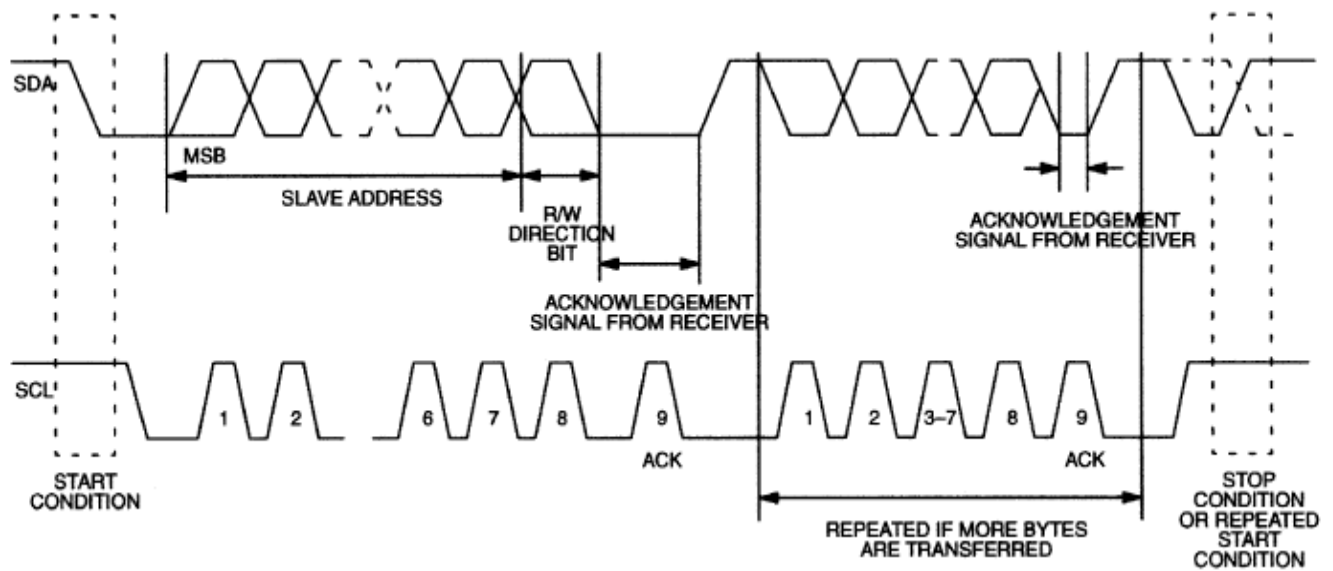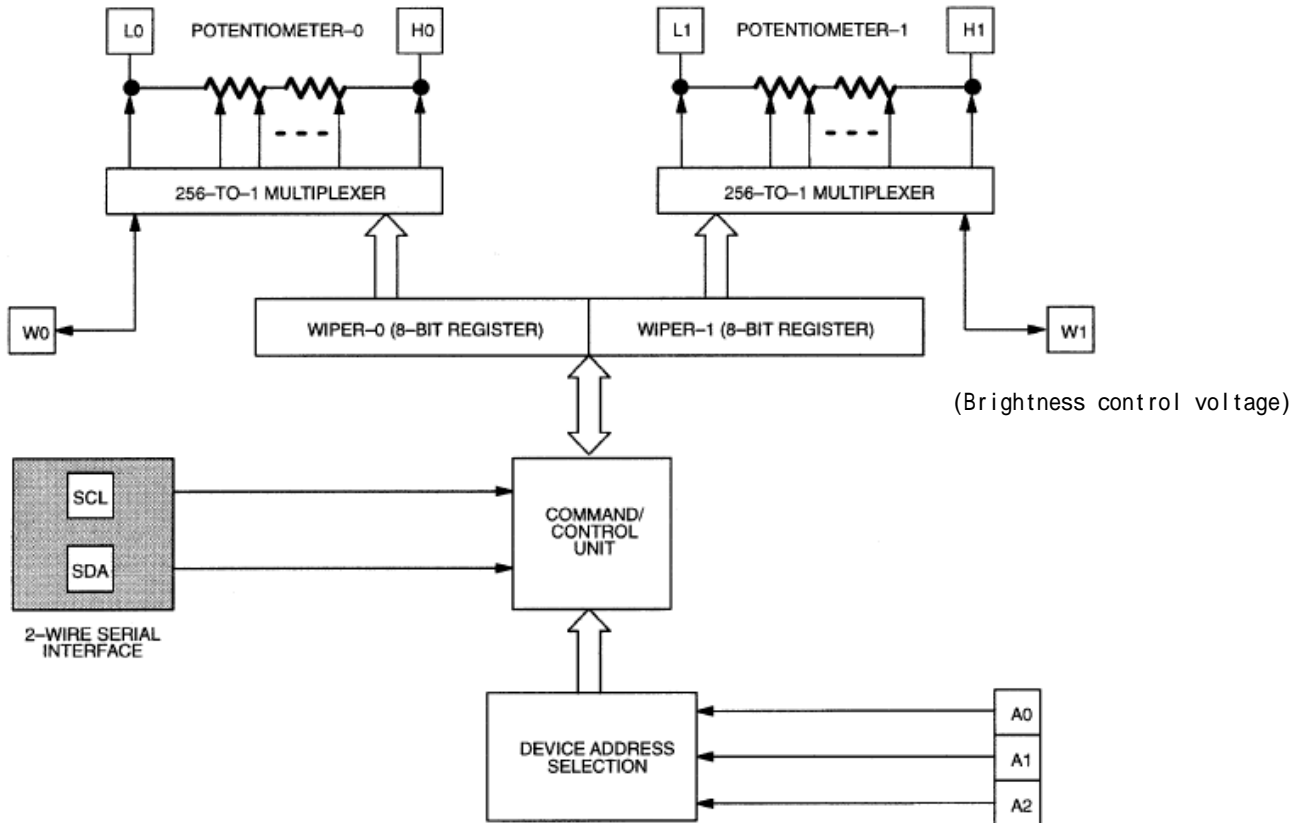
Brightness control byte

Brightness control data read protocols
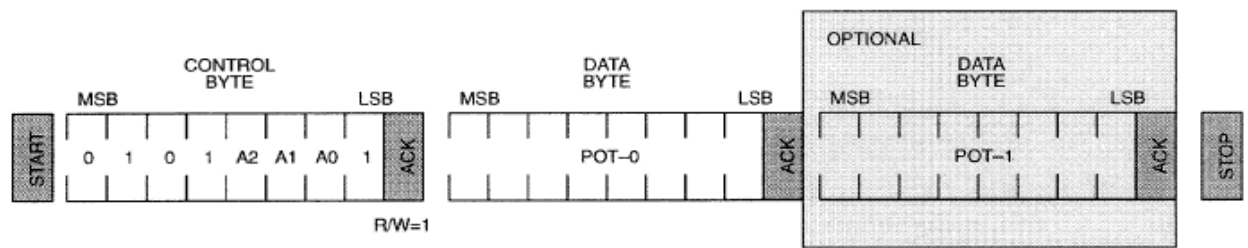
Brightness control data wright protocols
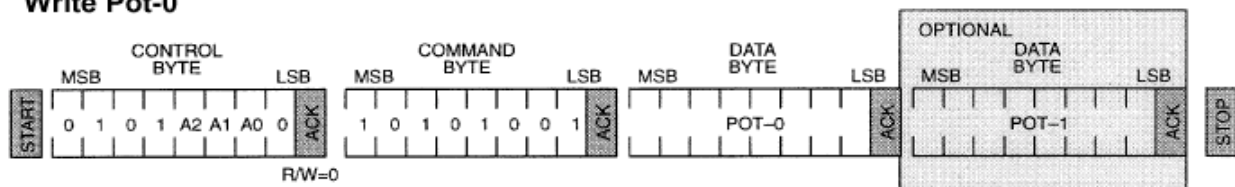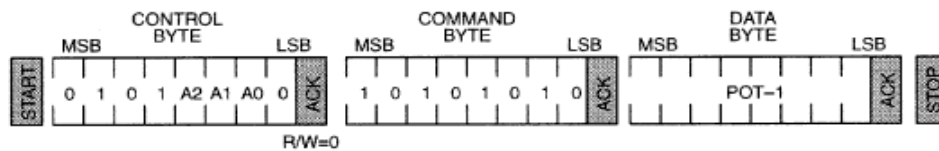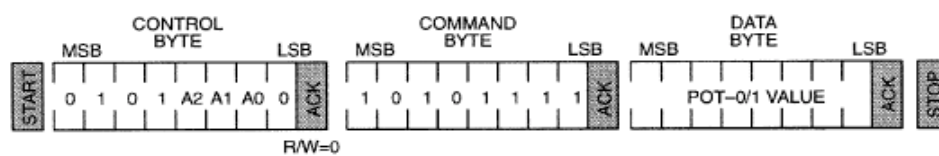
Timing daigram
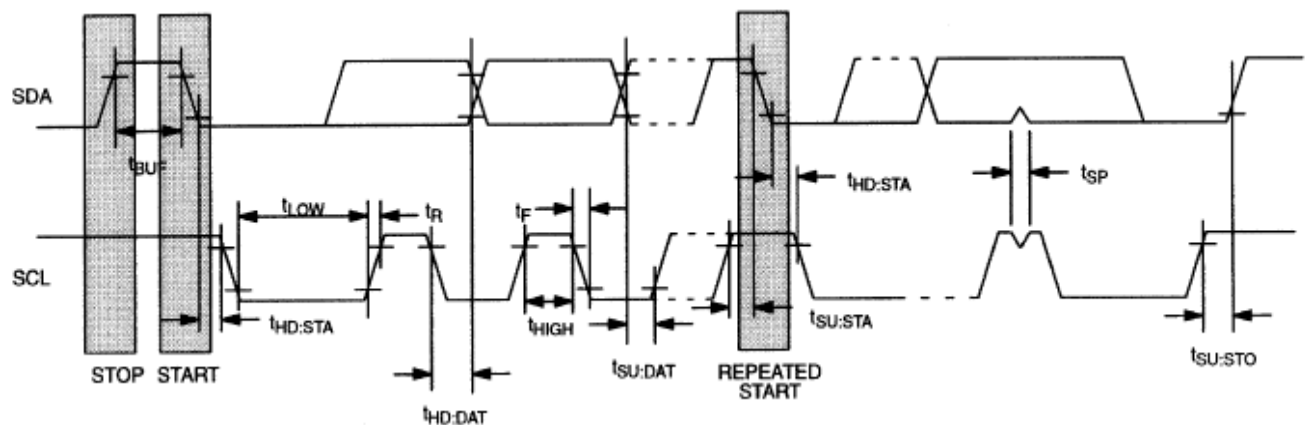
6-2-8. AC Electrical Characteristic   0   50   VBC   5.0V

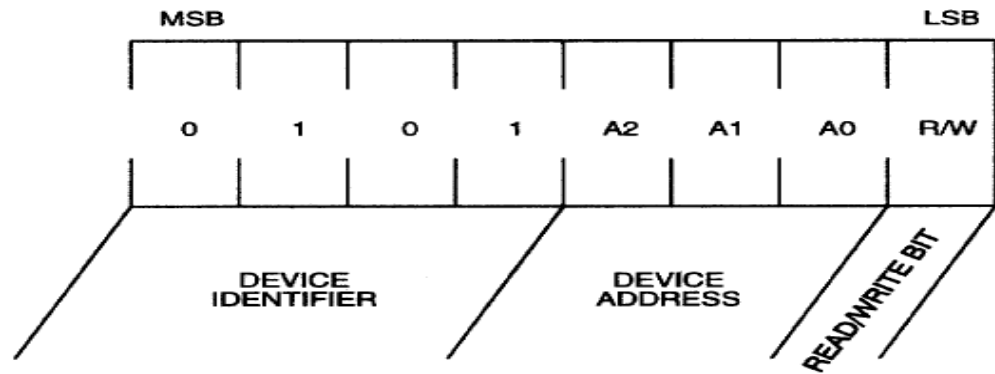| PARAMETER		SYMBOL	MIN.	MAX	UNIT	NOTE
Pulse width of spikes		t_{sp}		50	ns	
SCL clock frequency	fast mode	f_{SCI}	0	400	kHz	1
	Standard mode		0	100		2
BUS free time between STOP and START condition	fast mode	t_{BUF}	1.3		us	
	Standard mode		4.7			
Hold time (Repeated) START condition	fast mode	$t_{HD;STA}$	0.6		us	3
	Standard mode		4.0			
Low Period of SCL CLOCK	fast mode	t_{LOW}	1.3		us	
	Standard mode		4.7			
High Period of SCL CLOCK	fast mode	t_{HIGH}	0.6		us	
	Standard mode		4.0			
Data hold time	fast mode	$t_{HD;DAT}$	0	0.9	us	
	Standard mode		0			
Data setup time	fast mode	$t_{SU;DAT}$	100		ns	
	Standard mode		250			
Rise time of both SDA and SCL signals	fast mode	t_R		300	ns	
	Standard mode			1000		
Fall time of both SDA and SCL signals	fast mode	tr		300	ns	
	Standard mode			300		
Setup time for STOP condition	fast mode	$t_{SU;STO}$	0.6		us	
	Standard mode		4.0			

NOTES:

1.Fast mode.(400kHz clock rate)

2.Standard mode.(100kHz clock rate)

3.After this period, the first clock pulse is generated.

7. Timing characteristics of input signals

7-1. Timing characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	1/Tc	50	80	80	MHz	
	Skew	Tcsq	–2	0	2	ns	Note1
Data enable Signal	Horizontal period	TH	979	1056	1106	clock	
			12.24	13.2		μs	
	Horizontal period (High)	THd	800	800	800	clock	
	Vertical period	TV	1202	1250	1280	line	Note2
			14.71	16.67		ms	
	Vertical period (High)	TVd	1200	1200	1200	line	

Note1   Lvds (A Side data)– Lvds (B side data) phase difference

Note2   In case of using the long vertical period, the deterioration of display quality, flicker, etc.,
may occur.
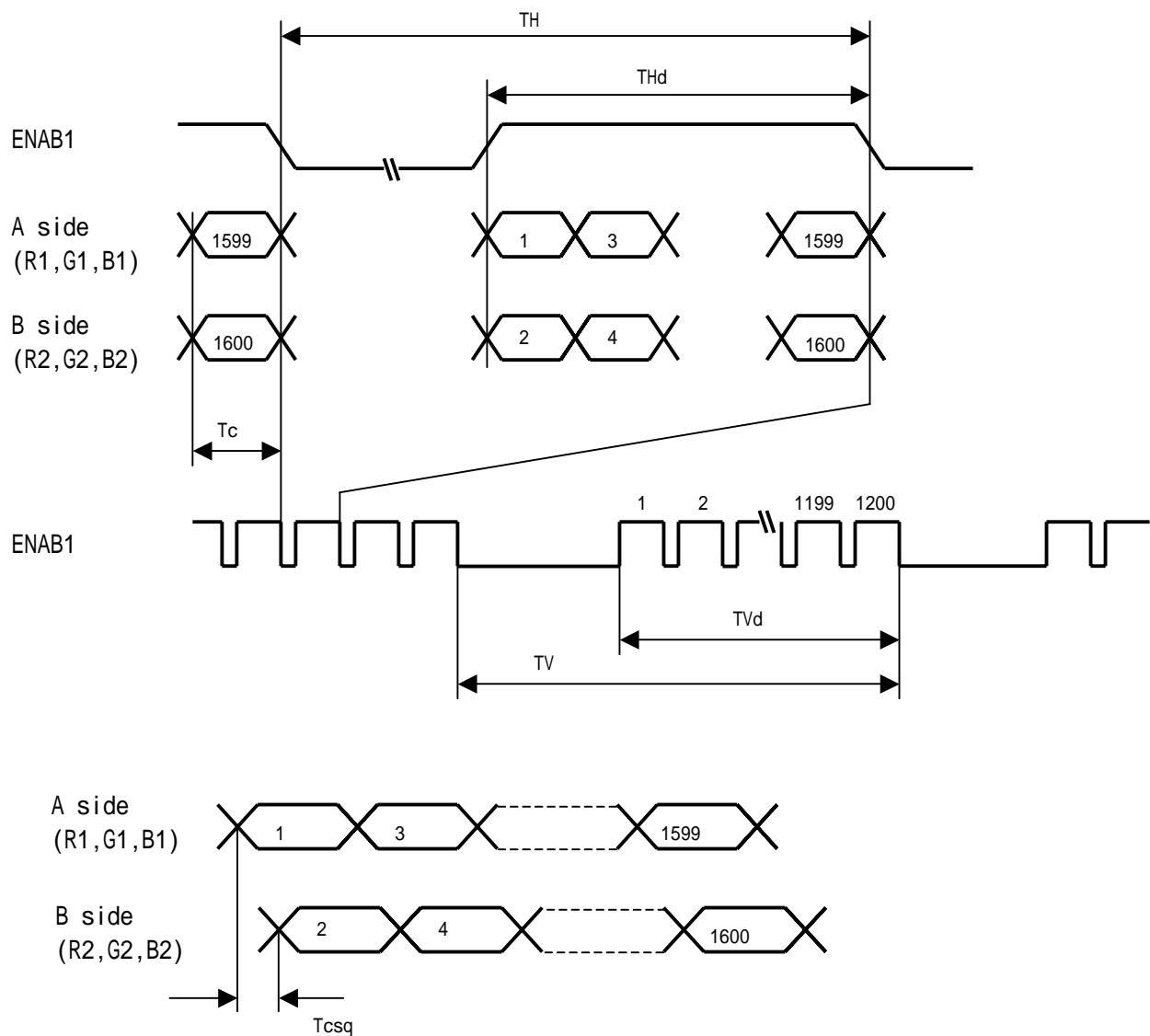
7-2. Input Data Signals and Display Position on the screen

R1	G1	B1	R2	G2	B2
(		)	(		)

Two pixels-data are sampled at the same time.

A side	R10	R15, G10	G15, B10	B15
B side	R20	R25, G20	G25, B20	B25

```
                          1 1600
  1200 1                         1200 1600
```

1 1600

1200 1600

1200 1
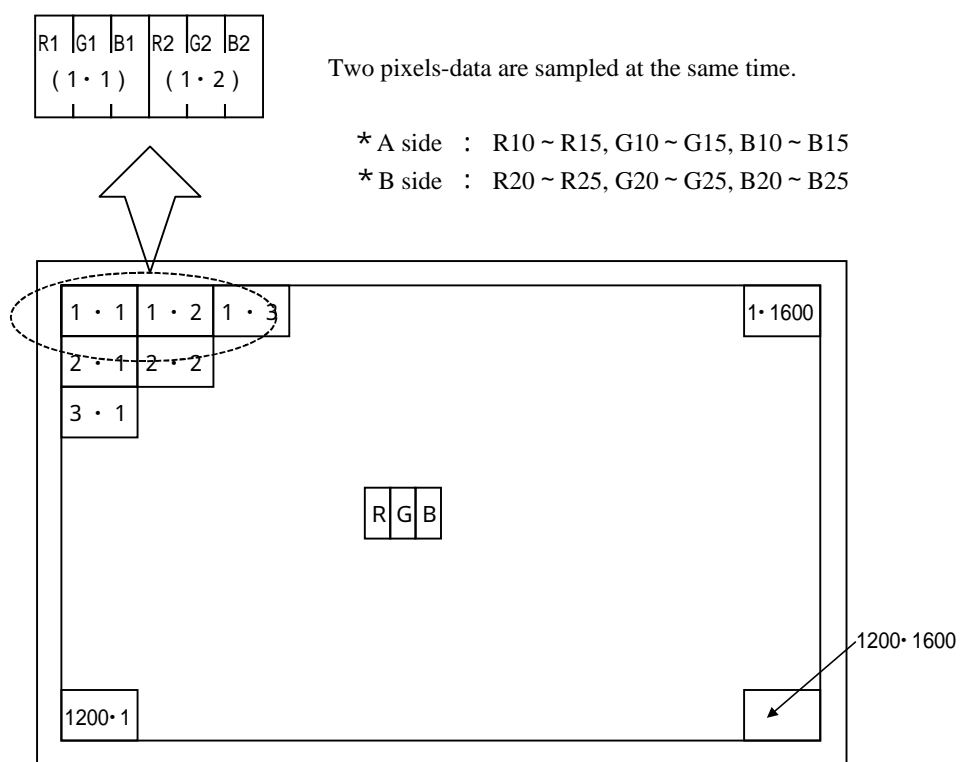
Display position of input data

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

Colors & Gray scale		GrayScale	R10 R11 R12 R13 R14 R15 / R20 R21 R22 R23 R24 R25	G10 G11 G12 G13 G14 G15 / G20 G21 G22 G23 G24 G25	B10 B11 B12 B13 B14 B15 / B20 B21 B22 B23 B24 B25
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.

9. EDID data structure

This is the EDID(Extended Display Identification Data) data formats to support displays as defined in the VESA Plug & Display .

Byte (decimal)	Byte (hex)	Field Name and Comments	Value (hex)	Value (binary)
0	00	Header	00	00000000
1	01	Header	FF	11111111
2	02	Header	FF	11111111
3	03	Header	FF	11111111
4	04	Header	FF	11111111
5	05	Header	FF	11111111
6	06	Header	FF	11111111
7	07	Header	00	00000000
8	08	EISA manufacture code = SHP	4D	01001101
9	09	EISA manufacture code (Compressed ASCII)	10	00010000
10	0A	Product code (LQ150U1LH22 : ”5002”)	8A	10001010
11	0B	Product code (hex,LSB first)	13	00010011
12	0C	LCD module Serial No (fixed "0")	00	00000000
13	0D	LCD module Serial No (fixed "0")	00	00000000
14	0E	LCD module Serial No (fixed "0")	00	00000000
15	0F	LCD module Serial No (fixed "0")	00	00000000
16	10	Week of manufacture (fixed "0")	00	00000000
17	11	Year of manufacture - 1990 (ex 2000 – 1990 = 10) (fixed "0")	00	00000000
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 3	03	00000011
20	14	Video i/p definition = Digital i/p	80	10000000
21	15	Max H image size(cm) = 30cm	1E	00011110
22	16	Max V image size(cm) = 23cm	17	00010111
23	17	Display gamma $(2.2 \times 100) - 100 = 120$	78	01111000
24	18	Feature support(stanby,suspend,RGB color/Prefer Time)	CA	11001010
25	19	Red/Green Low bit(RxRy/GxGy)	EC	11101100
26	1A	Blue/White Low bit(BxBy/WxWy)	50	01010000
27	1B	Red X(Rx) (written value "0.605")	9A	10011010
28	1C	Red Y(Ry) (written value "0.319")	51	01010001
29	1D	Green X(Gx) (written value "0.296")	4B	01001011
30	1E	Green Y(Gy) (written value "0.571")	92	10010010
31	1F	Blue X(Bx) (written value "0.138")	23	00100011
32	20	Blue Y(By) (written value "0.134")	22	00100010
33	21	White X(Wx) (written value "0.313")	50	01010000
34	22	White Y(Wy) (written value "0.329")	54	01010100
35	23	Established timings 1 (800× 600@60Hz)	00	00000000
36	24	Established timings 2 (1024× 768@60Hz)	00	00000000
37	25	Established timings 3(Manufacture's reserved timing)	00	00000000
38	26	Standard timing ID1 (Horizontal active pixels)	A9	10101001
39	27	Standard timing ID1 (Aspect ratio 4:3)	40	01000000

40	28	Standard timing ID2	01	00000001
41	29	Standard timing ID2	01	00000001
42	2A	Standard timing ID3	01	00000001
43	2B	Standard timing ID3	01	00000001
44	2C	Standard timing ID4	01	00000001
45	2D	Standard timing ID4	01	00000001
46	2E	Standard timing ID5	01	00000001
47	2F	Standard timing ID5	01	00000001
48	30	Standard timing ID6	01	00000001
49	31	Standard timing ID6	01	00000001
50	32	Standard timing ID7	01	00000001
51	33	Standard timing ID7	01	00000001
52	34	Standard timing ID8	01	00000001
53	35	Standard timing ID8	01	00000001
54	36	Detailed timing descriptor#1 fck/10000 = 16000=3E80h	80	10000000
55	37	#1 fck	3E	00111110
56	38	#1 Horizontal active 1600 = 640h "40"	40	01000000
57	39	#1 Horizontal blanking 512 = 200h "00"	00	00000000
58	3A	#1 Horizontal active/Horizontal blanking "62h"	62	01100010
59	3B	#1 Vertical active 1200 = 4B0h "B0"	B0	10110000
60	3C	#1 Vertical blanking 50 = 032h "32"	32	00110010
61	3D	#1 Vertical active/Vertical blanking "40h"	40	01000000
62	3E	#1 Horizontal sync , offset 64 = 040h "40"	40	01000000
63	3F	#1 Horizontal sync , width 192 = 0C0h "C0"	C0	11000000
64	40	#1 Vertical sync,offset / Vertical sync,width	13	00010011
65	41	#1 Horizontal sync offset/width/Vertical sync offset/width	00	00000000
66	42	#1 Horizontal image size 304mm = 130h "30"	30	00110000
67	43	#1 Vertical image size 228mm = 0E4h "E4"	E4	11100100
68	44	#1 Horizontal image size / Vertical image size	10	00010000
69	45	Horizontal boader	00	00000000
70	46	Vertical boader	00	00000000
71	47	Flags	18	00011000
72	48	Detailed timing descriptor #2	00	00000000
73	49	Flag	00	00000000
74	4A	Reserved	00	00000000
75	4B	Dummy Descriptor	10	00010000
76	4C	Flag	00	00000000
77	4D	1st dummy	00	00000000
78	4E	2nd dummy	00	00000000
79	4F	3rd dummy	00	00000000
80	50	4th dummy	00	00000000
81	51	5th dummy	00	00000000
82	52	6th dummy	00	00000000
83	53	7th dummy	00	00000000

84	54	8th dummy	00	00000000
85	55	9th dummy	00	00000000
86	56	10th dummy	00	00000000
87	57	11th dummy	00	00000000
88	58	New line character #2 indicates end	0A	00001010
89	59	Padding with "blank" character	20	00100000
90	5A	Detailed timing descriptor #3	00	00000000
91	5B	Flag	00	00000000
92	5C	Reserved	00	00000000
93	5D	Dummy Descriptor	10	00010000
94	5E	Flag	00	00000000
95	5F	1st Dummy	00	00000000
96	60	2nd Dummy	00	00000000
97	61	3rd Dummy	00	00000000
98	62	4th Dummy	00	00000000
99	63	5th Dummy	00	00000000
100	64	6th Dummy	00	00000000
101	65	7th Dummy	00	00000000
102	66	8th Dummy	00	00000000
103	67	9th Dummy	00	00000000
104	68	10th Dummy	00	00000000
105	69	11th Dummy	00	00000000
106	6A	New line character #3 indicates end	0A	00001010
107	6B	Padding with "blank" character	20	00100000
108	6C	Detailed timing descriptor #4	00	00000000
109	6D	Flag	00	00000000
110	6E	Reserved	00	00000000
111	6F	Dummy descriptor	10	00010000
112	70	Flag	00	00000000
113	71	1st Dummy	00	00000000
114	72	2nd Dummy	00	00000000
115	73	3rd Dummy	00	00000000
116	74	4th Dummy	00	00000000
117	75	5th Dummy	00	00000000
118	76	6th Dummy	00	00000000
119	77	7th Dummy	00	00000000
120	78	8th Dummy	00	00000000
121	79	9th Dummy	00	00000000
122	7A	10th Dummy	00	00000000
123	7B	11th Dummy	00	00000000
124	7C	New line character #4 indicates end	0A	00001010
125	7D	Padding with "blank" character	20	00100000
126	7E	Extension flag	00	00000000
127	7F	Checksum	AE	10101110

10. Optical Characteristics

Ta=25 , Vcc=+3.3V

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	21, 22	CR>10	45			Deg.	Note1,4
	Vertical	11		10			Deg.	
		12		30			Deg.	
Contrast ratio		n	=0°	150				Note2,4
		o	Optimum viewing angle		300			
Response time	Rise	r	=0°		15		ms	Note3,4
	Decay	d			30		ms	
Chromaticity of white					0.313			Note4
					0.329			
Note4				120	150		cd/m^2	Vin= 21V SDA 00$_{HEX}$
White Uniformity						1.45		Note5

The measurement shall be executed 30 minutes after lighting at rating. (typical condition: SDA 00$_{HEX}$)

The optical characteristics shall be measured in a dark room or equivalent state with the method shown in Fig.2 below.
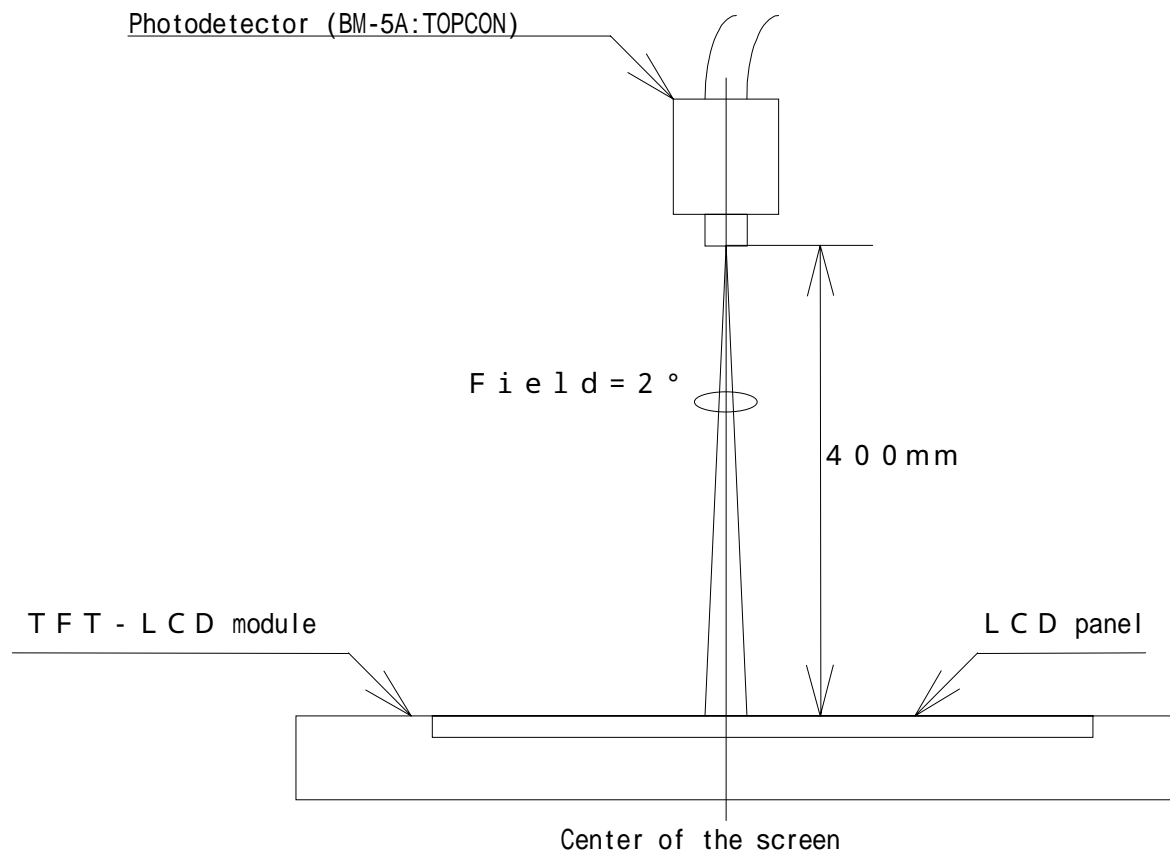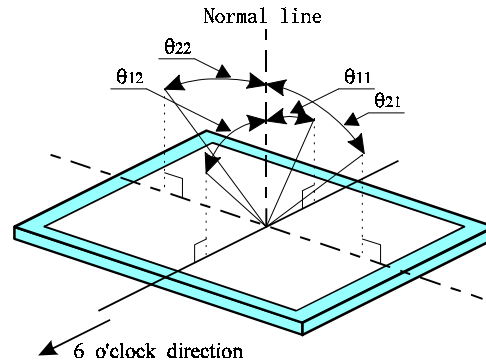

Fig.2 Optical characteristics measurement method

Note1　Definitions of viewing angle range:

Note2　Definition of contrast ratio:

The contrast ratio is defined as the following.

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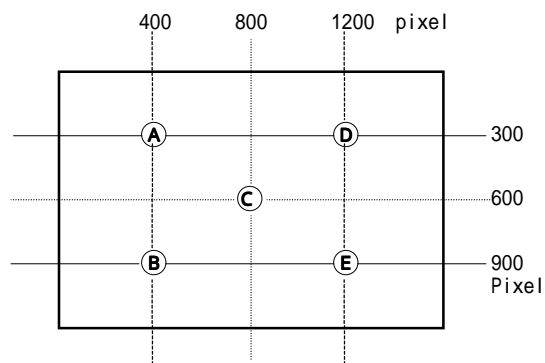
Note3　Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .
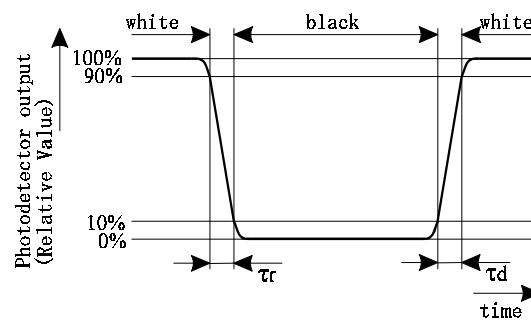
Note4　This shall be measured at center of the screen.

Note5　Definition of white uniformity:

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

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

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.

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.

h) Observe all other precautionary requirements in handling components.

i) This module has its circuitry PCBs on the rear side and should be handled carefully in order not
to be stressed.

j) Laminated 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. Ionized air shall
be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen
gun, etc..

13. Packing form (See Fig.3)

a) Piling number of cartons : 5 cartons

b) Package quantity in one carton : 10 pcs

c) Carton size : 438(W)× 372(D)× 307(H)mm

d) Total mass of one carton filled with full modules : 8400g

14 Reliability test items

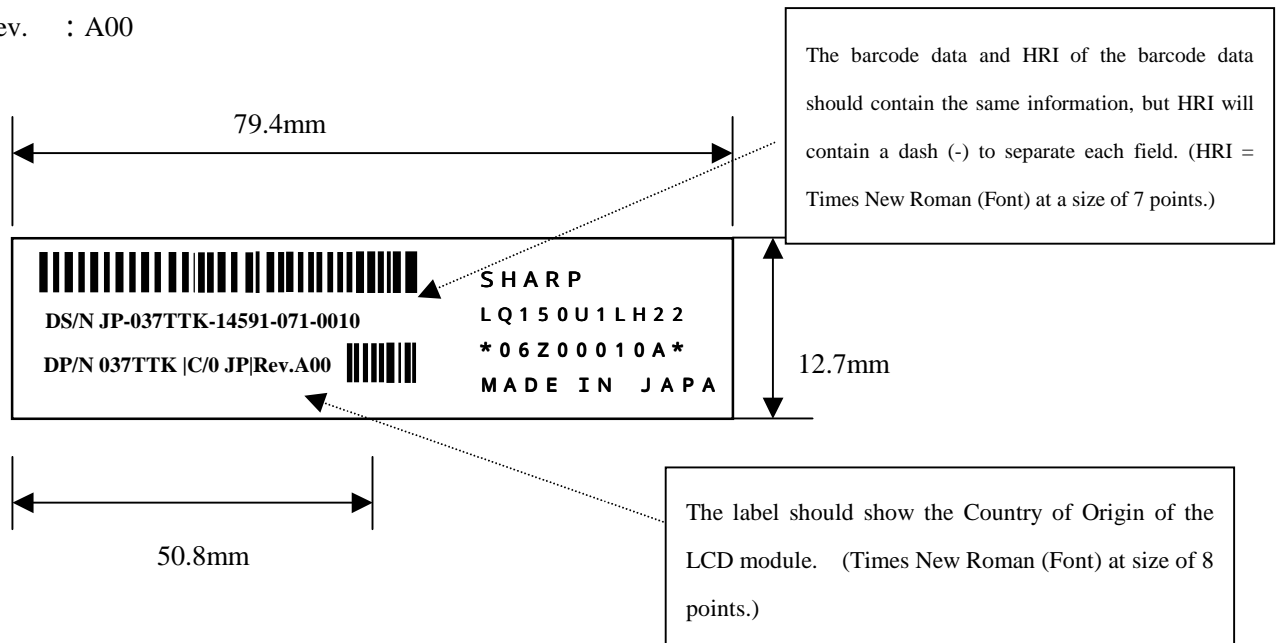| No.	Test item	Conditions
1	High temperature storage test	Ta = 60 240h
2	Low temperature storage test	Ta = 25 240h
3	High temperature & high humidity operation test	Ta = 40 ; 95 %RH 240h (No condensation)
4	High temperature operation test	Ta = 50 240h (The panel temp. must be less than 60)
5	Low temperature operation test	Ta = 0 240h
6	Vibration test (non- operating)	Frequency : 10 57Hz/Vibration width (one side):0.075mm : 58 500Hz/Gravity:9.8m/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 : 490 m/s^2 Pulse width : 11 ms, sine wave Direction : ± X,± Y,± Z once for each direction.

15 Bar code label

1 Printing Specification of module label

Model   LQ150U1LH22…DP/N037TTK

Production Lot No.   (e.g.) Japan Product, 2000/6 Production Lot the 10th unit

Rev.   A00

The barcode data and HRI of the barcode data should contain the same information, but HRI will contain a dash (-) to separate each field. (HRI = Times New Roman (Font) at a size of 7 points.)

79.4mm

‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖‖

DS/N JP-037TTK-14591-071-0010

DP/N 037TTK |C/0 JP|Rev.A00   ‖‖‖‖

12.7mm

50.8mm

The label should show the Country of Origin of the LCD module.   (Times New Roman (Font) at size of 8 points.)

The bar code size and information to be included:

-    DS/N: 20-digit barcode(The longer and larger barcode on the upper side)   Code 128B

-    DP/N: Rev(revision) barcode(The smaller barcode on the lower side)   Code 39

-    Wide to narrow element ratio of 3 to 1

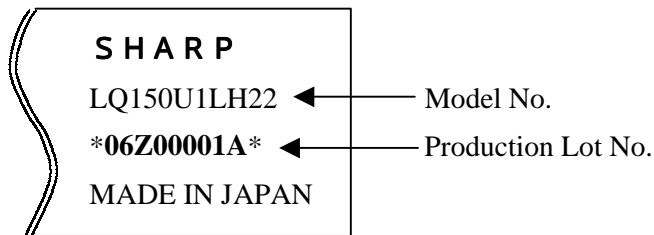-   The narrow element must be a minimum of 5 mils (0.127mm)

BAR CODE (UPPER SIDE)

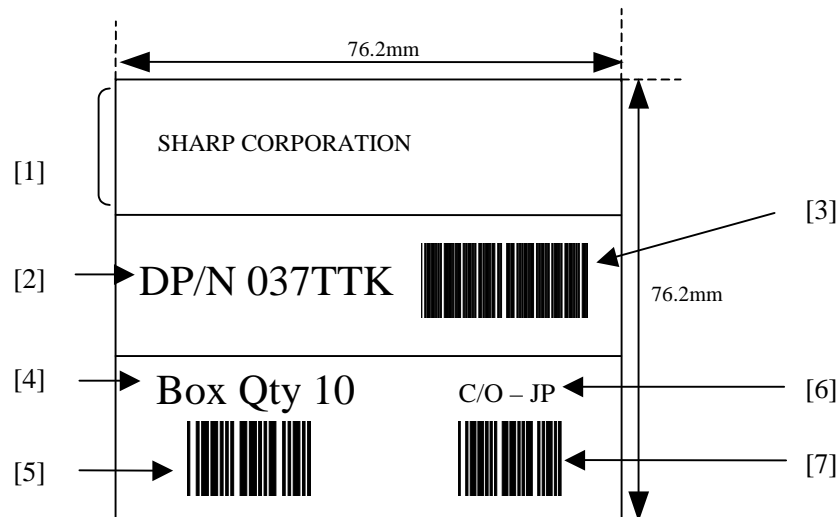|	
1st to 2th digit	(1)Country of Origin : "JP" for Japan made
3st to 8th digit	(2) DELL Part Number: "(has been changed to 6-digit with only 1 leading "0")"
9th to 13th digit from the left	(3) Supplier ID: "14591"
14th digit	(4) the last digit of the year
15th digit	(5) the month (1 to 9, A=OCT, B=NOV, C=DEC)
16th digit	(6) "1" (One) fixed
17th to 20nd digit	(7) 16 Repeated Counting Numbers (0000 to FFFF)

(1)   (2)   (3)   (4)(5)(6)   (7)

BAR CODE (LOWER SIDE)

Rev: Letter and Barcode = Fixed to "A00" for the moment

The right side of the bar code label shows Sharp's Specification:

LQ150U1LH22 ◄——— Model No.

06Z00001A ◄——— Production Lot No.

MADE IN JAPAN

2) Printing Specification of packing label

76.2mm

[1] SHARP CORPORATION

[3]

[2] ▶ DP/N 037TTK

76.2mm

[4] ▶ Box Qty 10   C/O – JP ◄   [6]

[5] ▶   [7]

[1] Supplier Name [HRI]

[2] Dell Part Number[HRI]

[3] Dell Part Number[Barcode]:Code128B
   - LQ150U1LH22 ➔ 037TTK

[4] Box Quantity[HRI]

[5] Box Quantity[Barcode(Lower Left Side)]:Code 128B
   - LQ150U1LH22 ➔ 10

[6] Country of Origin[HRI]

[7] Country of Origin[Barcode(Lower right Side)]:Code 128B
   - Japan ➔ JP

16 Others

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

2) Disassembling the module can cause permanent damage and should be strictly avoided.

3) Please be careful since image retention may occur when a fixed pattern is displayed for a long time.

4) If any problem occurs in relation to the description of this specification, it shall be resolved through
   discussion with spirit of cooperation.
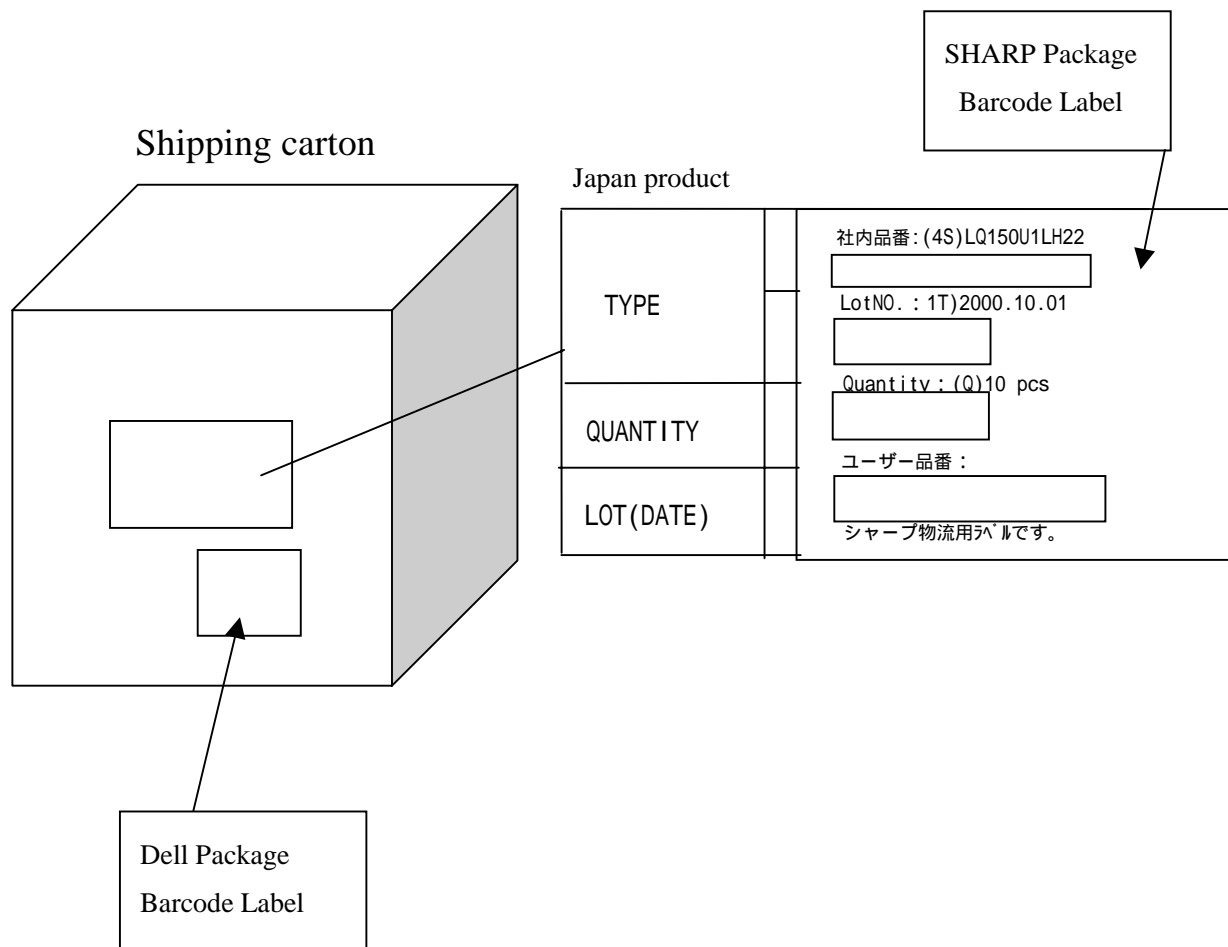
Fig3-1. Packing Form

SHARP Package
Barcode Label

Shipping carton

Japan product

: (4S) LQ150U1LH22

TYPE

Lot NO.   1T) 2000. 10. 01

QUANTITY

Quantity (Q 10 pcs

LOT(DATE)

Dell Package
Barcode Label

Fig3-2. Location of barcode label attachment

Fig1. Outline Dimensions

Top Tray

TFT-LCD Module

Sleeve Tray

Tray

Sleeve Tray

Master Carton

OPP Tape

PP Band

Fig3-1. Packing Form

Fig1. LQ150U1LH22 OUTLINE DIMENSIONS

229.8 $^{+0}_{-0.8}$
217.2 ±0.3
160.4 ±0.3
56.9 ±0.3
12.8 $^{+0}_{-0.8}$
7MAX
4.1 ±0.3
159.35 ±0.3
317.3

BEZEL OPENING
304.00x228.00

ACTIVE AREA
307.5x231.5

108.65 ±0.3
242.0(242.6MAX)

10MAX
11MAX
11.5MAX
11.5MAX (oblique)

8-M2.0mm USER HOLD
Depthe=2.3mmMAX

185.8MAX
126.65MIN
4MAX
50MAX
45MAX
17.6MAX
CN2
90MAX
303.92MIN
226.45 ±1
149.35MIN
30MAX
30
CN1
1
134.4
47.2
175.65 ±1

BEZEL/DISPLAY POSITION

ACTIVE AREA

BEZEL OPENING

1)TOLERANCE X-DIRECTION A:1.75±0.5
2)TOLERANCE Y-DIRECTION B:1.75±0.5
3)OBLIQUITY OF DISPLAY AREA 1C-D)<0.5

CN1:INTERFACE CONNECTOR
IF-XB30P-HF10(JAE)
CN2:FPC CONNECTOR
52207-1690(MOLEX)

NOTES
1.UNSPECIFIED TOLERANCE TO BE ±0.5
2.WARP AND PLATING FOR
PCB AND CHASSIS ARE EXCLUDED FROM
THICKNESS AND DIMENSION OF THE UNIT.

CN1 Pin Assign

No.	Signal
1	GND
2	VCC
3	VCC
4	VEDID
5	NCEDID
6	CLKEDID
7	DATAEDID
8	GND
9	RLIN0-
10	RLIN0+
11	RLIN1-
12	RLIN1+
13	GND
14	RLIN2-
15	RLIN2+
16	GND
17	CKLIN-
18	CKLIN+
19	GND
20	R2IN0-
21	R2IN0+
22	GND
23	R2IN1-
24	R2IN1+
25	GND
26	R2IN2-
27	R2IN2+
28	GND
29	CK2IN-
30	CK2IN+