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SPECIFICATION

DEVICE SPECIFICATION FOR

TFT-LCD Module

MODEL No.

LQ125D1JW34

☐ CUSTOMER'S APPROVAL

DATE

BY

PRESENTED

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RECORDS OF REVISION

LQ125D1JW34

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1. Application

This specification applies to a color TFT-LCD module, LQ125D1JW34.

2. Overview

This module is a color active matrix LCD module incorporating Oxide TFT (Thin Film Transistor). It is composed of a color TFT-LCD panel, driver ICs, a control circuit and power supply circuit, and a backlight unit. Graphics and texts can be displayed on a 3840×3×2160 dots panel with 16,777,216 colors by using eDP (Embedded Display Port) Ver1.3 interface and supplying +3.3V DC supply voltage for TFT-LCD panel driving and applying DC supply voltage for LED backlight-driving DC/DC converter.

In this TFT-LCD panel, color filters for excellent color performance and backlights for high brightness are incorporated to realize brighter and clearer pictures, making this model optimum for use in multi-media applications.

Optimum viewings are in all directions.

Backlight-driving LED controller is built in this module.

eDP Transfer rate Specification : 5.4Gbps / 4 lane

3. Mechanical Specifications

Parameter	Specifications	Unit
Display size	31.72 (12.5") Diagonal	cm
Active area	276.48(H)×155.52 (V)	mm
Pixel format	3840 (H)×2160 (V)	pixel
	(1 pixel = R+G+B dots)	
Pixel pitch	0.072 (H) × 0.072 (V)	mm
Pixel configuration	R,G,B vertical stripe	
Display mode	Normally black	
Surface treatment	Anti-glare coating (Haze value 45%) Hard coating (3H)	

Outline dimensions

Parameter		Min.	Typ.	Max.	Unit	Remark
Unit outline dimensions [Note 3-1]	Width	281.78	282.08	282.38	mm	
	Height	178.26	178.76	179.26	mm	w PCB and Tape
	Depth	—	—	2.2	mm	w/o PCB
Mass		—	—	185	g	

[Note 3-1] Outline dimensions is shown in Fig.2

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4. Input Terminals

4 - 1. Symbol

CN1 (eDP signals, +3.3V DC power supply, and B/L power supply)

Pin No.	Symbol	I/O	Function	Remark
1	NC	-	Reserved for LCD manufacturer's use	[Note4-1-1]
2	H_GND	P	High Speed Ground	[Note 4-1-2]
3	Lane3_N	I	Complement Signal Link Lane 3	
4	Lane3_P	I	True Signal Link Lane 3	
5	H_GND	P	High Speed Ground	[Note 4-1-2]
6	Lane2_N	I	Complement Signal Link Lane 2	
7	Lane2_P	I	True Signal Link Lane 2	
8	H_GND	P	High Speed Ground	[Note 4-1-2]
9	Lane1_N	I	Complement Signal Link Lane 1	
10	Lane1_P	I	True Signal Link Lane 1	
11	H_GND	P	High Speed Ground	[Note 4-1-2]
12	Lane0_N	I	Complement Signal Link Lane 0	
13	Lane0_P	I	True Signal Link Lane 0	
14	H_GND	P	High Speed Ground	[Note 4-1-2]
15	AUX_CH_P	I	True Signal Auxiliary Channel	
16	AUX_CH_N	I	Complement Signal Auxiliary Channel	
17	H_GND	P	High Speed Ground	[Note 4-1-2]
18	VDD	P	LCD logic and driver power(3.3V)	
19	VDD	P	LCD logic and driver power(3.3V)	
20	VDD	P	LCD logic and driver power(3.3V)	
21	VDD	P	LCD logic and driver power(3.3V)	
22	NC	-	Reserved for LCD manufacture's usde	[Note4-1-1]
23	LCD_GND	P	LCD logic and driver ground	
24	LCD_GND	P	LCD logic and driver ground	
25	LCD_GND	P	LCD logic and driver ground	
26	LCD_GND	P	LCD logic and driver ground	
27	HPD	O	HPD signal pin	[Note 4-1-3]
28	BL_GND	P	Backlight ground	
29	BL_GND	P	Backlight ground	
30	BL_GND	P	Backlight ground	
31	BL_GND	P	Backlight ground	
32	BL_ENABLE	I	Backlight On/Off	[Note 4-1-4]
33	BL_PWM_DIM	I	System PWM	[Note 4-1-5]
34	HsyncO	O	Hsync Out signal	[Note 4-1-6]
35	NC(SDA)	-	I2C for LCD manufacturer's use	[Note4-1-7]
36	VBL	P	Backlight power	
37	VBL	P	Backlight power	
38	VBL	P	Backlight power	
39	VBL	P	Backlight power	
40	NC(SCL)	-	I2C for LCD manufacturer's use	[Note4-1-1]

※1 I : Input , O : Output , P : Power:

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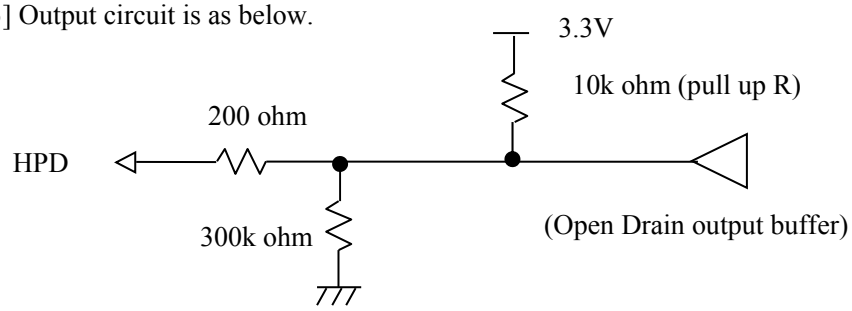
[Note 4-1-1] Don't input any signals or any powers into a NC pin. Keep the NC pin open.

[Note 4-1-2] The shielding case is connected with signal GND.

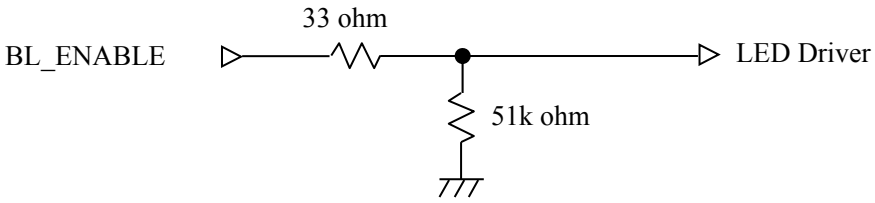
- Connector used : 20525-040E-02 (IPEX)
- Corresponding connector : 20524-140T-01(IPEX)

  (Sharp is not responsible to its product quality, if the user applies a connector not corresponding to the above model.)

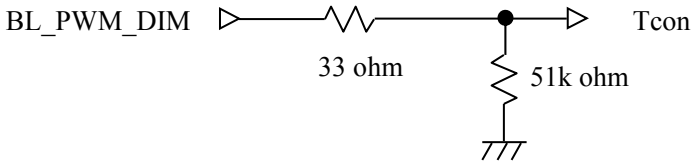
[Note 4-1-3] Output circuit is as below.



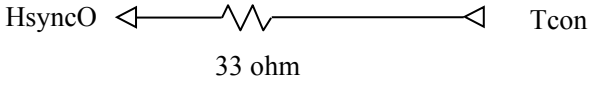
[Note 4-1-4] Input circuit is as below.



[Note 4-1-5] Input circuit is as below.



[Note 4-1-6] Output circuit is as below.



[Note 4-1-7] All terminals except NC terminal must be connected to input signal described as above or supply voltage or GND each.

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4 - 2. eDP interface

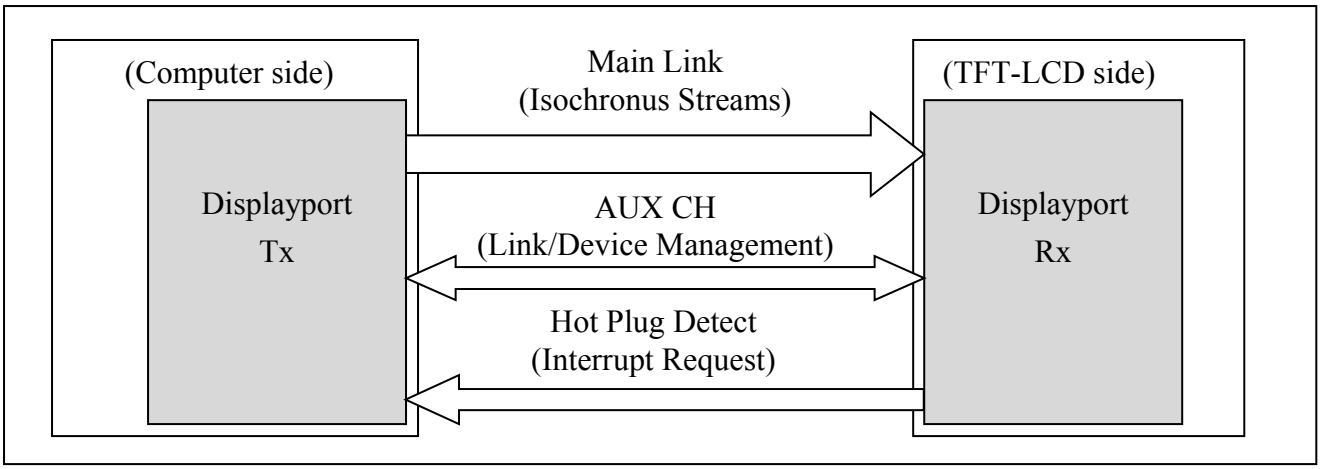

Fig.4-2-1 DP architecture.

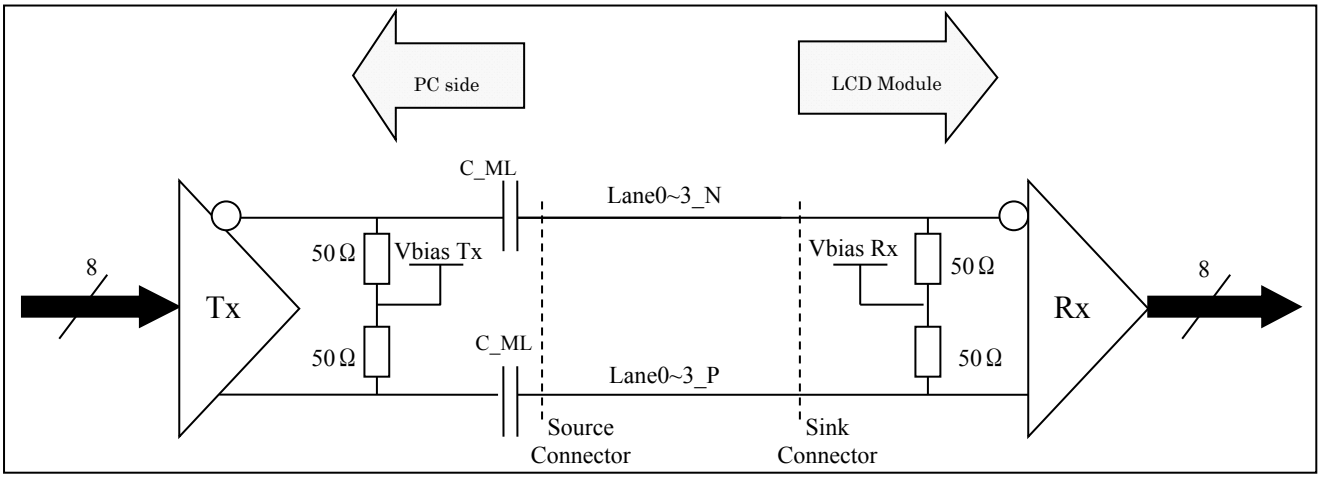

Fig.4-2-2 Main Link differential pair.

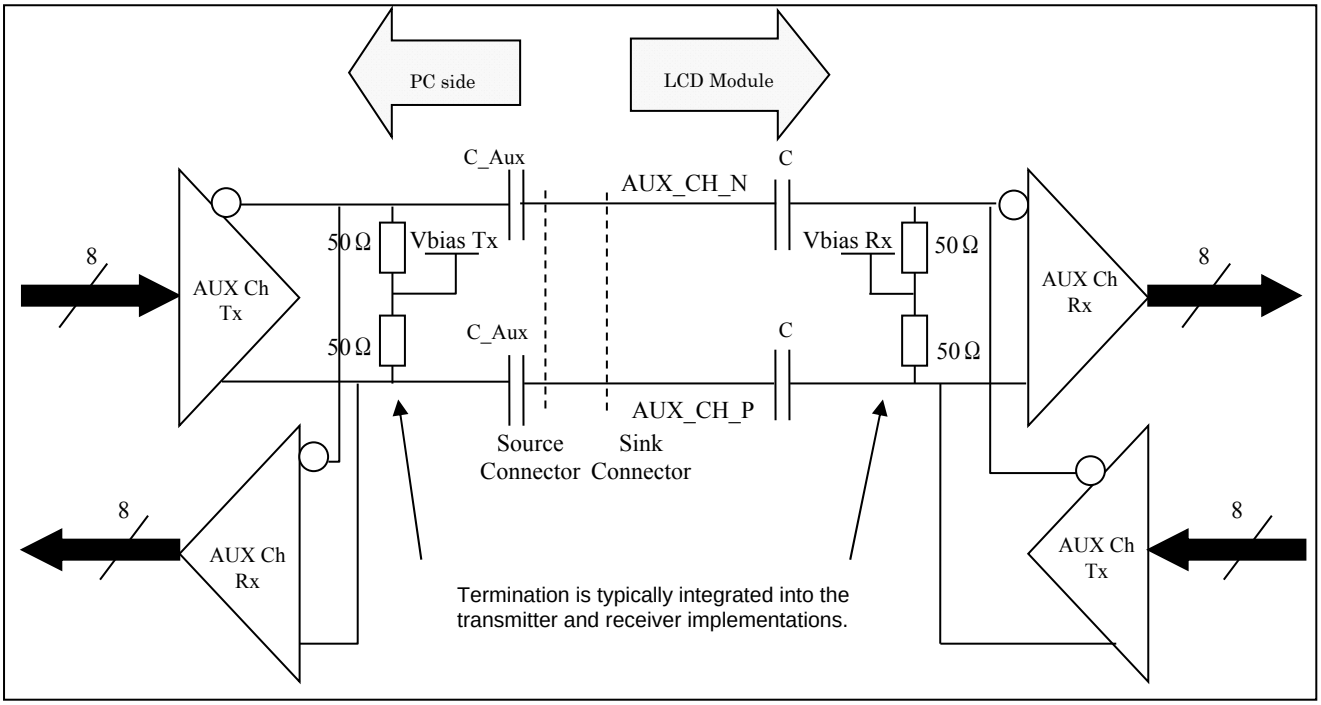

Fig.4-2-3 AUX Link differential pair.

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Lane0	Lane1	Lane2	Lane3
R0-7:0	R1-7:0	R2-7:0	R3-7:0
G0-7:0	G1-7:0	G2-7:0	G3-7:0
B0-7:0	B1-7:0	B2-7:0	B3-7:0
R4-7:0	R5-7:0	R6-7:0	R7-7:0
G4-7:0	G5-7:0	G6-7:0	G7-7:0
B4-7:0	B5-7:0	B6-7:0	B7-7:0
R8-7:0	R9-7:0	R10-7:0	R11-7:0
G8-7:0	G9-7:0	G10-7:0	G11-7:0
B8-7:0	B9-7:0	B10-7:0	B11-7:0

Fig.4-2-4 eDP 4 lane 8 bit input data mapping.

5. Absolute Maximum Ratings

Parameter	Symbol	Condition	Ratings		Unit	Remark
			Min.	Max.		
+3.3V supply voltage	VDD	Ta=25℃	-0.3	+4.0	V	
Back Light supply voltage	VBL	Ta=25℃	-0.3	+26.5	V	
Input voltage(eDP)	VI	Ta=25℃	-0.3	+1.8	V	[Note 5-1]
Input voltage(BL)	BL_I	Ta=25℃	-0.3	VDD+0.3	V	[Note 5-2]
Storage temperature (ambient)	Tstg	—	-20	+60	℃	[Note 5-3]
Operating temperature(ambient)	Topa	—	0	+50	℃	

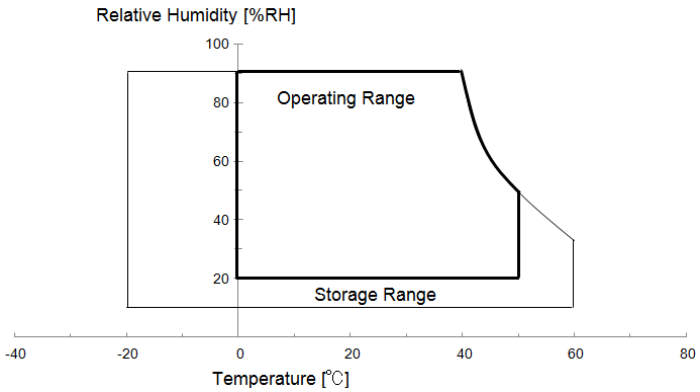
[Note 5-1] eDP signals

[Note 5-2] Back light control signals (BL_ENABLE, BL_PWM_IN)

[Note 5-3] Humidity：90%RH Max. at Ta≦+40℃

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

No condensation.



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6. Electrical Characteristics

6 - 1. TFT-LCD panel driving

Ta=25℃

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	VDD	+3.0	+3.3	+3.6	V	[Note 6-1-1]
Current dissipation	IDD	—	570	1300	mA	[Note 6-1-2]
Power dissipation	PDD	—	1.88	2.08	W	[Note 6-1-2]
		—	—	3.9	W	[Note 6-1-3]
Permissive input ripple voltage	V_{RP}	—	—	100	mV_{P-P}	VDD = +3.3V
eDP AUX Channel Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Unit Interval for AUX channel	UI_{AUX}	0.4	0.5	0.6	μs	
AUX peak-to-peak voltage at a transmitting device	$V_{AUX-DIFFp-p}$	0.39	0.6	1.38	V	
AUX peak-to-peak voltage at a receiving device		0.32	0.6	1.32	V	
AUX DC Common Mode Voltage	$V_{AUX-DC-CM}$	—	0.5	—	V	
AUX Short Circuit Current Limit	I_{AUX_SHORT}	—	—	90	mA	
AUX CH termination DC resistance	R_{AUX-_TERM}	—	100	—	Ω	
AUX AC Coupling Capacitor	C_{AUX}	75	—	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	—	16	—	
eDP Main Link Receiver Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Link clock down spreading	Down_Spread_Amplitude	—	0	—	%	
Differential Peak-to-peak Input Voltage at RX package pins	$V_{RX-DIFFp-p}$	90	—	1200	mV	
Differential Return Loss at 1.35 GHz at RX package pins	$RL_{RX-DIFF}$	9	—	—	dB	
RX DC Common Mode Voltage	$V_{RX-DC-CM}$	0	—	2.0	V	
Differential termination resistance	$V_{RX-TERM}$	—	100	—	Ω	
RX Short Circuit Current Limit	$I_{RX-SHORT}$	—	—	50	mA	
Lane Intra-pair Skew at RX package pins	$L_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$	—	—	50	ps	

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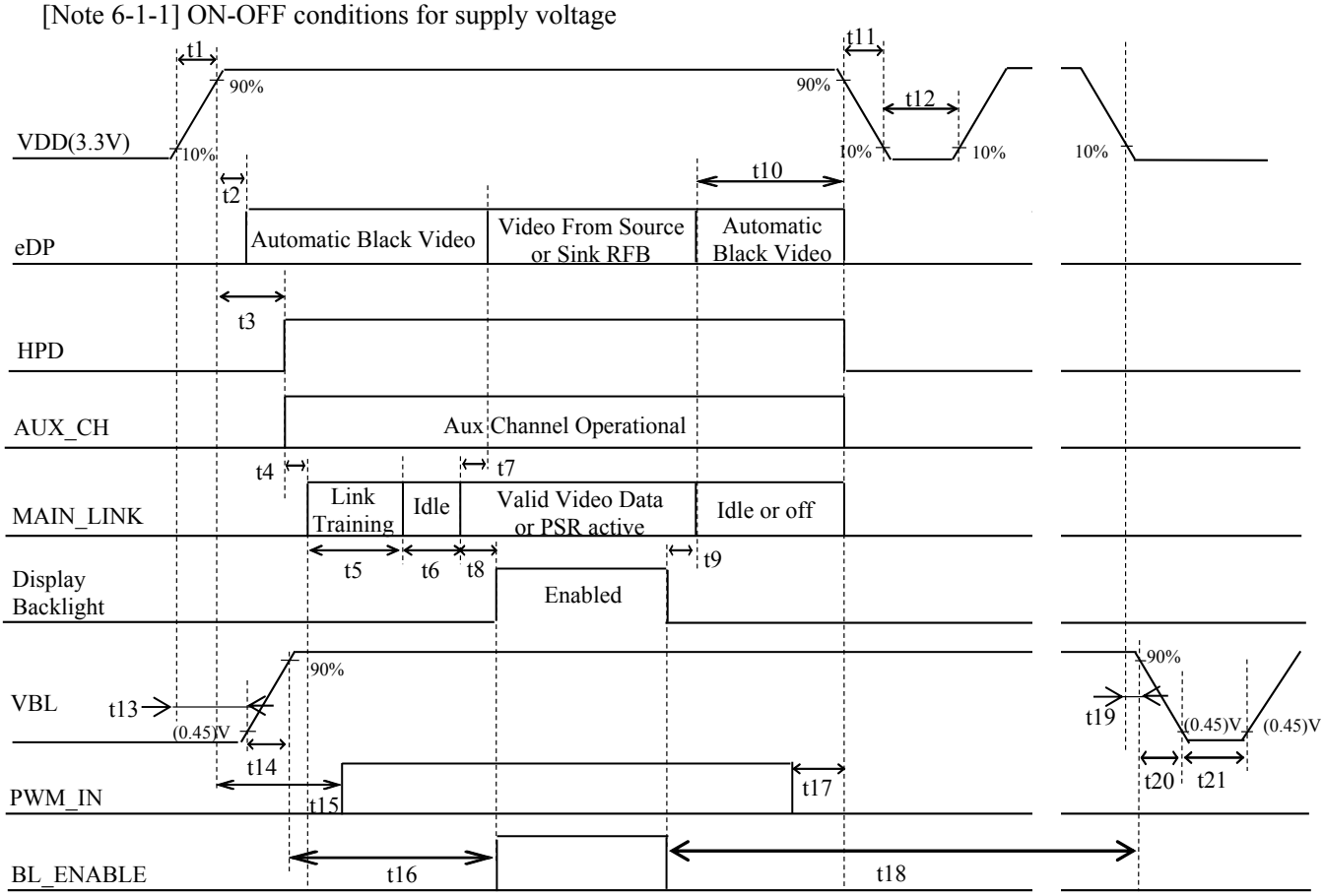
[Note 6-1-1] ON-OFF conditions for supply voltage



[Note] Do not keep the interface signal high-impedance or unusual signal when power is on.

Symbol	Min	Max	Unit	Note
t1	0.5	10	ms	
t2	0	200	ms	
t3	0	200	ms	
t4	-	-	ms	allows for the source to read link capability and initialize
t5	-	-	ms	[Note 3]
t6	-	-	ms	[Note 3]
t7	0	50	ms	
t8	-	-	ms	[Note 4]
t9	-	-	ms	[Note 5]
t10	0	500	ms	
t11	1	50	ms	[Note 1]
t12	500	-	ms	[Note 2]
t13	-	-	ms	[Note 6]
t14	1	10	ms	
t15	100		ms	
t16	0	-	ms	[Note 7]
t17	0	-	ms	
t18	0	-	ms	[Note 7]
t19	-	-	ms	
t20	0.1	-	ms	
t21	100		ms	

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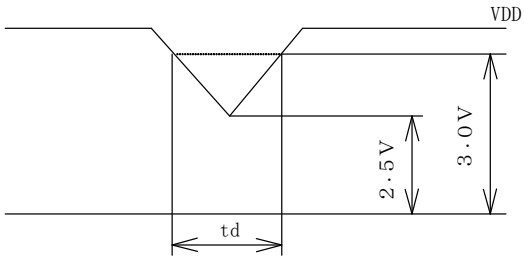
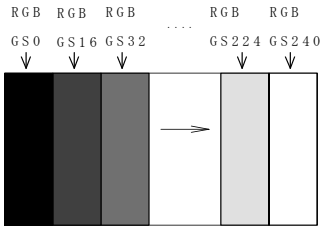
[Note 1] As for the power off sequence for VDD (t11), Be sure to keep above mentioned timing.
If the VDD power off sequence timing is other than shown above, LCD may cause permanent damage.
As for the power sequence for backlight, it is recommended to apply above mentioned input timing.
If the backlight is light on and off at a timing other than shown above, displaying image may get disturbed.
[Note 2] As for the power off-on sequence for VDD (t12), Be sure to keep above mentioned timing.
If the VDD power off-on sequence timing is other than shown above, LCD may cause permanent damage.
[Note 3] Dependant on the Source Link training protocol and Link idle.
[Note 4] The Source must assure display video is stable.
[Note 5] The Source must assure backlight is no longer illuminated.
[Note 6] Even if VBL Power is on earlier than VDD, It is not have any problem.
[Note 7] Prohibit the BL_ENABLE input of the period when it is not VBL Power on.

VDD-dip conditions

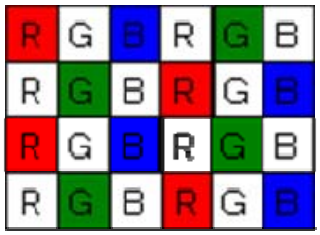
1) 2.5 V≦VDD＜3.0 V
td≦10 ms
Under above condition, the display image should return to an appropriate figure after VDD voltage recovers.
2) VDD＜2.5 V
VDD-dip conditions should also follow the ON-OFF conditions for supply voltage



[Note 6-1-2] Typical current condition: 16-gray-bar pattern.
VDD=+3.3V



[Note 6-1-3] Maximum current condition: Dot checker pattern.
VDD=+3.0V



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6 - 2. Backlight driving

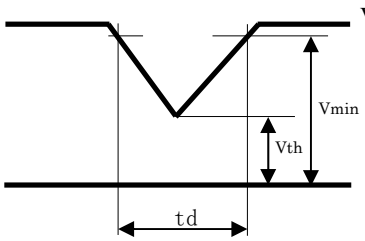
The backlight system is an edge-lighting type with white-LED.
(It is usually required to measure under the following condition. : Ta=25℃±2℃)

Parameter	Symbol	Min.	Typ.	Max	Unit	Remark
Supply voltage	VBL	5.0	12.0	18.0	V	
Current dissipation	I_{BL}	—	342	387	mA	V_{BL}= 12.0V(TYP)
Power dissipation	P_{BL}	—	4.1	4.64	W	V_{BL}= 12.0V(TYP)
Modulated light signal voltage	VPWMH	2.2	3.3	3.6	V	
	VPWML	0	—	0.7	V	
Brightness Control Duty Ratio	Duty	1	—	100	%	[Note6-2-1]
Brightness Control pulse width	T_{PWM}	5	—	—	us	[Note6-2-2]
Brightness Control frequency	f_{PWM}	150	200	2000	Hz	
LED-BL ON/OFF High voltage	VCNTH	1.8	3.3	3.6	V	[Note6-2-3]
LED-BL ON/OFF Low voltage	VCNTL	—	—	0.5	V	[Note6-2-3]
Input signal pin current	I_{IN}	—	V_{IN}/51KΩ	—	μA	BL_ENABLE
Input signal pin current	I_{IN}	—	V_{IN}/51KΩ	—	μA	BL_PWM_DIM
LED lifetime	-	—	15,000	—	h	LED

[Note6-2-1] PWM_IN Input : 100%= Max luminance 1%= Min luminance
[Note6-2-2] The minimum value of the dimming signal pulse width is assumed regulations of the width of high and the width of low.

[Note6-2-3] BL_ENABLE Input : High = BL turn on, Low or OPEN =BL turn off

VBL-dip conditions



Vmin : 5.0V
Vth : 0.9V_{BL}

1) Vth ≦ V_{BL} ＜ Vmin : td ≦ 20ms
2) V_{BL} ＜ Vth : The condition of instantaneous voltage drop is apply to input voltage sequences

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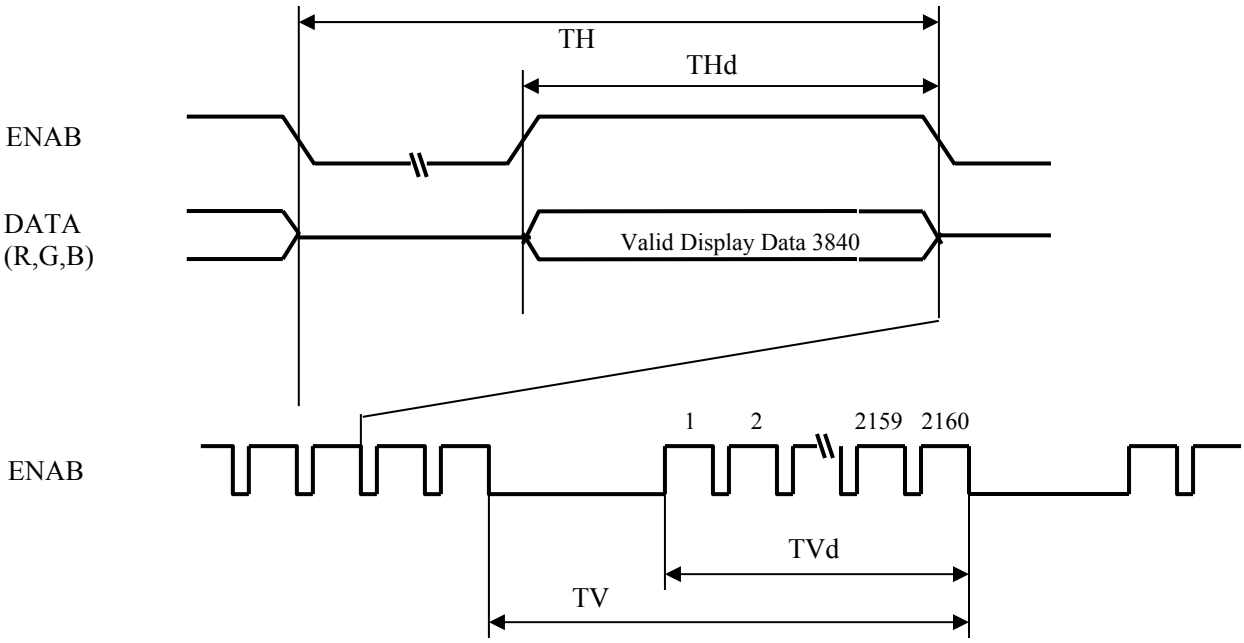
7. Timing Characteristics of Input Signals

7 - 1. Timing characteristics

60Hz VDD=+3.0V～+3.6V, Ta＝0℃～+50℃

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
Clock	Frequency	1/Tc	520.0	533.25	540.0	MHz	[Note 7-1-1]
Data enable Signal	Horizontal period	TH	3960	4000	4140	clock	
			—	7.501	—	μs	
	Horizontal period (High)	THd	3840	3840	3840	clock	
	Vertical period	TV	2200	2222	3600	Line	
			—	16.67	—	ms	
	Vertical period (High)	TVd	2160	2160	2160	line	

[Note 7-1-1] In case of using the long vertical period, the deterioration of display quality, flicker, etc, may occur.



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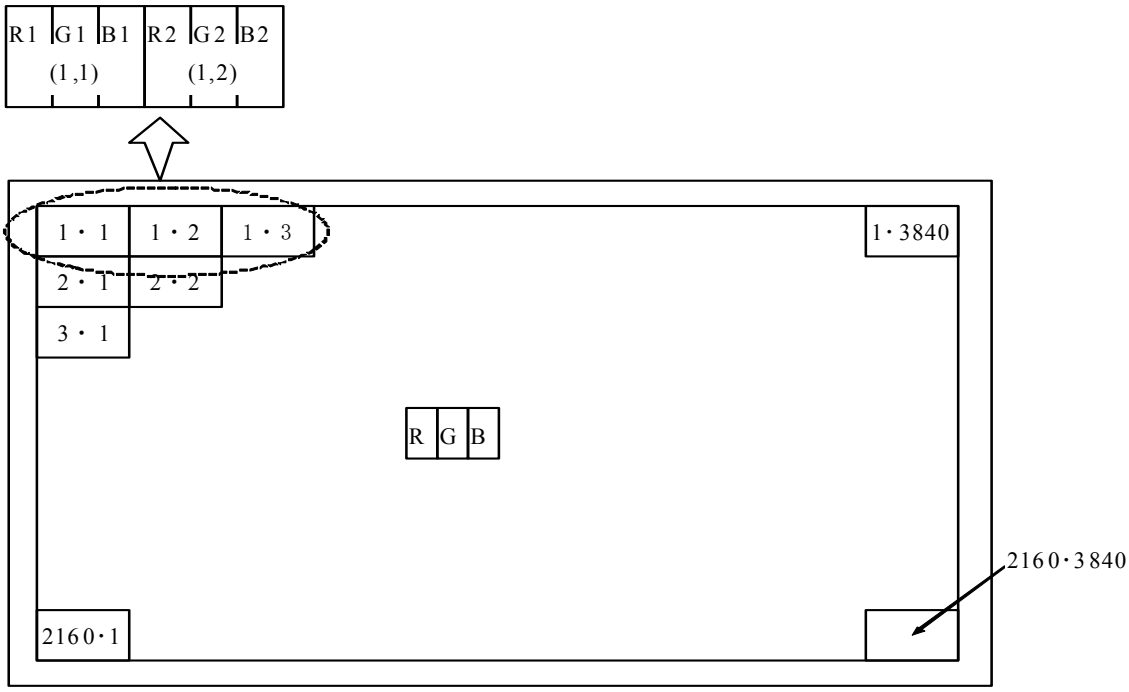
7 - 2. Input data signals and display position on the screen



Display position of input data(V・H)

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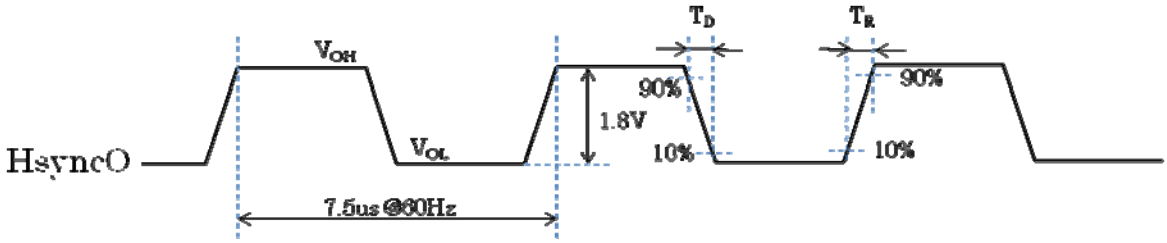
8. Timing Characteristics of Output Control Signal

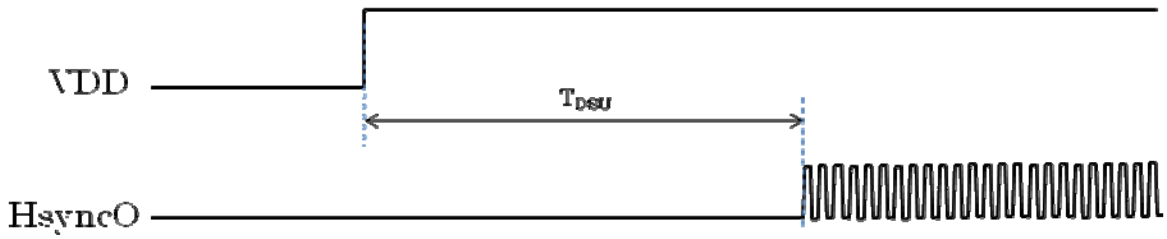
DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
High voltage level	V_{OH}	1.65	1.8	1.95	V	HsyncO [Note8-1]
Low voltage level	V_{OL}	0	0	0.15	V	
AC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Rise time	T_R	—	—	20	ns	HsyncO [Note8-1] [Note8-2]
Fall time	T_F	—	—	20	ns	
Start-up delay time	T_{DSU}	—	—	100	ms	HsyncO [Note8-3]

[Note 8-1] HsyncO is output signal with following voltage and frequency



[Note 8-2] HsyncO keeps toggling during vertical blanking period

[Note 8-3] Start-up delay time when VDD power on



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

	Colors & Gray Scale	Gray Scale	Date signal																							
			R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7
			LSB							MSB	LSB							MSB	LSB							MSB
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
Gray Scale of Red	Black	GS0	0	0	0	0	0	0	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	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	0	0	0	0	0	0
	⇧	↓					↓							↓								↓				
	⇩	↓					↓							↓								↓				
	Brighter	GS253	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇩	GS254	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	GS255	1	1	1	1	1	1	1	1	0	0	0	0	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	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	⇧	↓					↓							↓								↓				
	⇩	↓					↓							↓								↓				
	Brighter	GS253	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	⇩	GS254	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Green	GS255	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	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	0	0	0	0	0	0
	⇧	GS1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	Darker	GS2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	⇧	↓					↓							↓								↓				
	⇩	↓					↓							↓								↓				
	Brighter	GS253	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1
	⇩	GS254	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	Blue	GS255	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 : Low level voltage, 1 : High level voltage

Each basic color can be displayed in 256 gray scales from 8 bit data signals.

According to the combination of 24 bit data signals, the 16.7M color display can be achieved on the screen.

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10. EDID Specifications

10 - 1. 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	0	Header	00	00000000
1	1	Header	FF	11111111
2	2	Header	FF	11111111
3	3	Header	FF	11111111
4	4	Header	FF	11111111
5	5	Header	FF	11111111
6	6	Header	FF	11111111
7	7	Header	00	00000000
8	8	EISA manufacture code =3 Characer ID " SHP"	4D	01001101
9	9	EISA manufacture code (Compressed ASCII)	10	00010000
10	0A	Product code (LQ125D1JW34 : 5206)	56	01010110
11	0B	Product code (hex,LSB first)	14	00010100
12	0C	LCD module Serial No	00	00000000
13	0D	LCD module Serial No	00	00000000
14	0E	LCD module Serial No	00	00000000
15	0F	LCD module Serial No	00	00000000
16	10	Week of manufacture	2D	00101101
17	11	Year of manufacture	19	00011001
18	12	EDID structure version # = 1	01	00000001
19	13	EDID revision # = 4	04	00000100
20	14	Video I/P definition = Digital I/P(A5h)	A5	10100101
21	15	Max H image size = (Rounded to cm)=27.648cm=1Ch	1C	00011100
22	16	Max V image size = (Rounded to cm)=15.552cm=10h	10	00010000
23	17	Display gamma=(gamma×100)-100= (2.2×100) – 100 = 120=78h	78	01111000
24	18	Feature support(no DPMS,Active off, sRGB,Prefer Time)	0E	00001110
25	19	Red/Green Low bit(RxRy/GxGy)	DF	11011111
26	1A	Blue/White Low bit(BxBy/WxWy)	50	01010000
27	1B	Red X Rx = 0.64	A3	10100011
28	1C	Red Y Ry = 0.33	54	01010100
29	1D	Green X Gx = 0.21	35	00110101
30	1E	Green Y Gy = 0.71	B5	10110101
31	1F	Blue X Bx = 0.15	26	00100110

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32	20	Blue Y By = 0.06	0F	00001111
33	21	White X Wx = 0.313	50	01010000
34	22	White Y Wy = 0.329	54	01010100
35	23	Established timings 1	00	00000000
36	24	Established timings 2	00	00000000
37	25	Manufacture's timings	00	00000000
38	26	Standard timing ID1	01	00000001
39	27	Standard timing ID1	01	00000001
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	Pixel clock/10000 (LSB) (533.25MHz : 53325 = D04Dh)	4D	01001101
55	37	Pixel clock/10000 (MSB)	D0	11010000
56	38	Horizontal active =3840 pixels(lower 8bits) (3840 = F00h)	00	00000000
57	39	Horizontal blanking(Thbp)=160 pixels(lower 8bits)(Thbp=160=0A0h)	A0	10100000
58	3A	Horizontal active/Horizontal blanking (Thbp) (upper4:4 bits)	F0	11110000
59	3B	Vertical active =2160 lines(lower 8bits) (2160 = 870h)	70	01110000
60	3C	Vertical blanking (Tvbp) =62 lines(DE Blanking min for DE only panels)	3E	00111110
61	3D	Vertical active:Vertical blanking (Tvbp) (upper4:4bits)	80	10000000
62	3E	Horizontal sync , offset (Thfp) =48 pixels (48 = 30h)	30	00110000
63	3F	Horizontal sync , Pulse Width = 32 pixels (32 = 20h)	20	00100000
64	40	Vertical Sync,Offset(Tvfp) = 3 lines:Sync Width = 5 lines	35	00110101
65	41	Horizontal Vertical Sync Offset/Width upper 2 bits	00	00000000
66	42	Horizontal image size = 276 mm (lower 8bits)(276.48mm = 114h)	14	00010100
67	43	Vertical image size = 156 mm (lower 8bits)(155.52mm = 09Ch)	9C	10011100
68	44	Horizontal image size / Vertical image size (upper 4bits)	10	00010000
69	45	Horizontal Boader = 0 (Zero for Notebook LCD)	00	00000000

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70	46	Vertical Boader = 0 (Zero for Notebook LCD)	00	00000000
71	47	Non-interlaced,Normal,Digtal without Serrations,Negative	18	00011000
72	48	Detailed timing descriptor#2 fck/10000	4D	01001101
73	49	#2 fck	D0	11010000
74	4A	#2 Horizontal active	00	00000000
75	4B	#2 Horizontal blanking	A0	10100000
76	4C	#2 Horizontal active/Horizontal blanking	F0	11110000
77	4D	#2 Vertical active	70	01110000
78	4E	#2 Vertical blanking	94	10010100
79	4F	#2 Vertical active/Vertical blanking	84	10000100
80	50	#2 Horizontal sync , offset	30	00110000
81	51	#2 Horizontal sync , width	20	00100000
82	52	#2 Vertical sync,offset / Vertical sync,width	35	00110101
83	53	#2 Horizontal sync offset/width/Vertical sync offset/width	0	00000000
84	54	#2 Horizontal image size	14	00010100
85	55	#2 Vertical image size	9C	10011100
86	56	#2 Horizontal image size / Vertical image size	10	00010000
87	57	Horizontal boader	00	00000000
88	58	Vertical boader	00	00000000
89	59	Flags	18	00011000
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

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106	6A	New line character #3 indicates end	00	00000000
107	6B	Padding with “blank” character	00	00000000
108	6C	Detailed timing descriptor #4	00	00000000
109	6D	Flag	00	00000000
110	6E	Reserved	00	00000000
111	6F	Display Product name	02	00000010
112	70	Flag	00	00000000
113	71	Supplier P/N#1 (L)	0A	00001010
114	72	Supplier P/N#2 (Q)	2A	00101010
115	73	Supplier P/N#3 (1)	FF	11111111
116	74	Supplier P/N#4 (2)	0F	00001111
117	75	Supplier P/N#5 (5)	3C	00111100
118	76	Supplier P/N#6 (D)	C8	11001000
119	77	Supplier P/N#7 (1)	28	00101000
120	78	Supplier P/N#8 (J)	12	00010010
121	79	Supplier P/N#9 (W)	32	00110010
122	7A	Supplier P/N#10 (3)	C8	11001000
123	7B	Supplier P/N#11 (4)	00	00000000
124	7C	Supplier P/N#12 ("Space")	00	00000000
125	7D	(If<13 char,then terminate with ASCII code 0Ah,set remaining char 20h)	00	00000000
126	7E	Extension flag	00	00000000
127	7F	Checksum	4E	01001110

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11. Optical Characteristics

Ta=+25℃, VDD=+3.3V

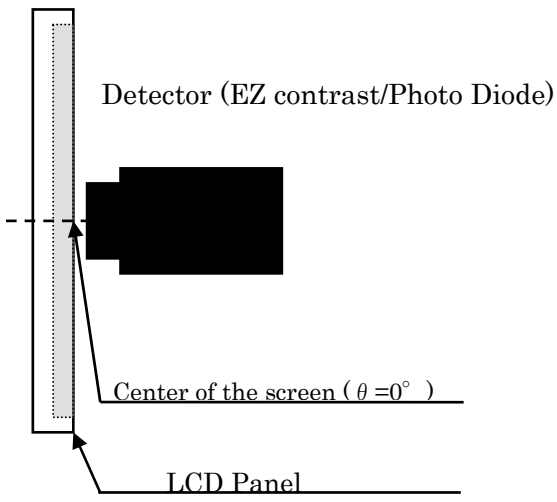
Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing angle range	Horizontal	θ21,θ22	CR>10	80	89	—	deg.	[Note 10-1, 10-3, 10-4, 10-6]
	Vertical	θ11		80	89	—	deg.	
		θ12		80	89	—	deg	
Contrast ratio		CR	θ=0°	800	1500	—		[Note 10-1, 10-4, 10-6]
Response time		τr+τd	θ=0°	—	30	—	ms	[Note 10-2, 10-5, 10-6]
Chromaticity of white		x		0.283	0.313	0.343		[Note 10-2, 10-6] Normal operation (PWM Duty=100%)
		y		0.299	0.329	0.359		
Chromaticity of red		x		—	0.640	—		
		y		—	0.330	—		
Chromaticity of green		x		—	0.210	—		
		y		—	0.710	—		
Chromaticity of blue		x		—	0.150	—		
		y		—	0.060	—		
Adobe ratio				95	100	—	%	
Luminance of white		Y_{LI}		320	400	—	cd/m^2	
White Uniformity 13 Points		δ_W	θ=0°	—	1.4	1.6		[Note 10-2, 10-7]

※ The measurement shall be taken 30 minutes after lighting the module at the following rating:

Condition: PWM Duty = 100%

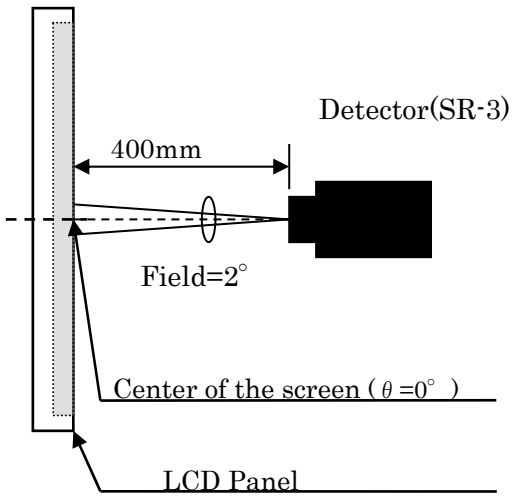
The optical characteristics shall be measured in a dark room or equivalent.

[Note 10-1] Measurement of viewing angle range and Response time.



Viewing angle range:EZ-CONTRAST / Response time: Photo diode)

[Note 10-2] Measurement of luminance and Chromaticity and Contrast.



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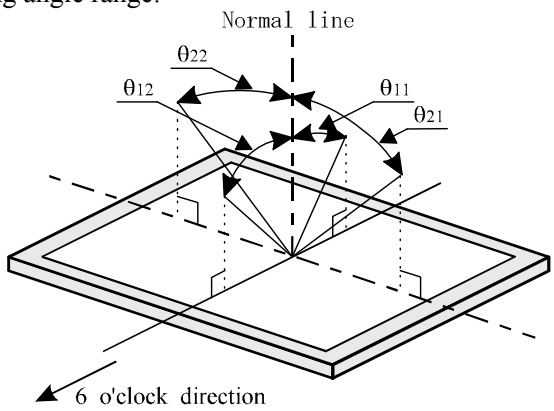
[Note 10-3] Definitions of viewing angle range:



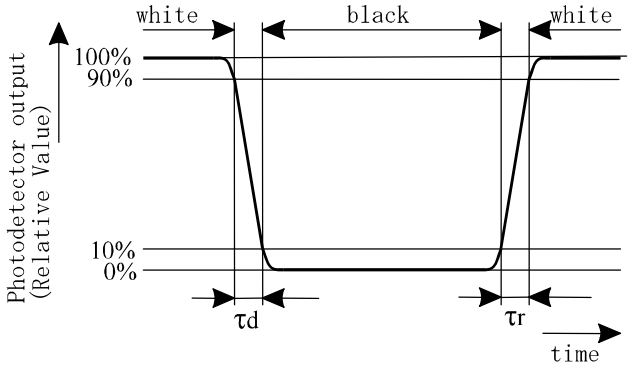
[Note 10-4] Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance (brightness) with all pixels white}}{\text{Luminance (brightness) with all pixels black}}$$

[Note 10-5] 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" .



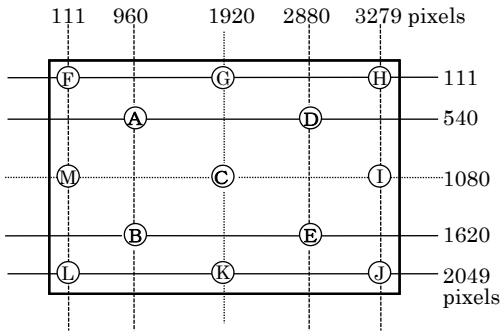
[Note 10-6]This shall be measured at center of the screen.

[Note 10-7] Definition of white uniformity:

White uniformity is defined as the following with 13 measurements.

(A～M)

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



12. Display Quality

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

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13. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable.
Please insert for too much stress not to join a connector in the case of insertion of a connector.

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. Observe all other precautionary requirements in handling components.

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

i) Protect sheet(Laminate film) is attached to the module surface to prevent it from being scratched. Peel the sheet 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. Working under the following environments is desirable.

- All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.
- Use Ionized blower for electrostatic removal, and peel of the protect sheet with a constant speed. (Peeling of it at over 2 seconds)

j) The polarizer surface on the panel is treated with Anti Glare . 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 module to a direct sunlight, for a long period of time to protect the module from the ultra violet ray.

l) 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.

m) 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.

n) Disassembling the module can cause permanent damage and should be strictly avoided.
Please don't remove the fixed tape, insulating tape etc that was pasted on the original module.
(Except for protection film of the panel.)

o) Be careful when using it for long time with fixed pattern display as it may cause afterimage.
(Please use a screen saver etc., in order to avoid an afterimage.)

p) 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.

q) Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series),
tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film.
Be sure to confirm the component of them.

r) Do not use polychloroprene. If you use it, there is some possibility of generating Cl_2 gas that influences the reliability of the connection between LCD panel and driver IC.

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s) Do not put a laminate film on LCD module, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.

t) Ground module bezel to stabilize against EMI and external noise.

u) When you peel off the protection film,

-Be sure to peel off slowly (recommended more than 5sec) and constant speed.

-Peeling direction shows the following Figure.

-Be sure to ground person with adequate methods such as the anti-static wrist band.

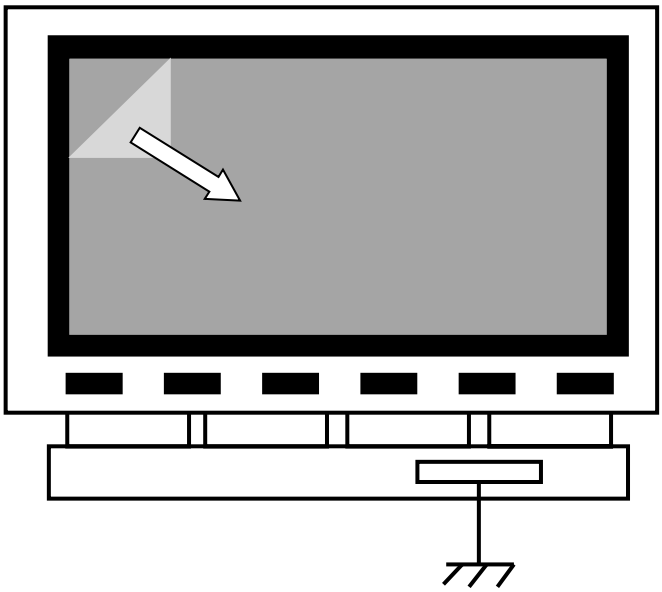
-Be sure to ground all terminals of the PWB connector while peeling of the protection film.

-Ionized air should be blown over during peeling action.

-The protection film must not touch driver-ICs, PWB and all components on PWB.

-If adhesive may remain on the polarizer after the protection film peeling off, please remove with isopropyl-alcohol.

Front view



v.)The glass of display is bigger than Back-light, so please be careful of below points(especially about 4 corners.)

-Don't hit LCD module with hard solid to prevent glass cracking.

-Please wear the gloves etc. to protect hands when handling LCD module.

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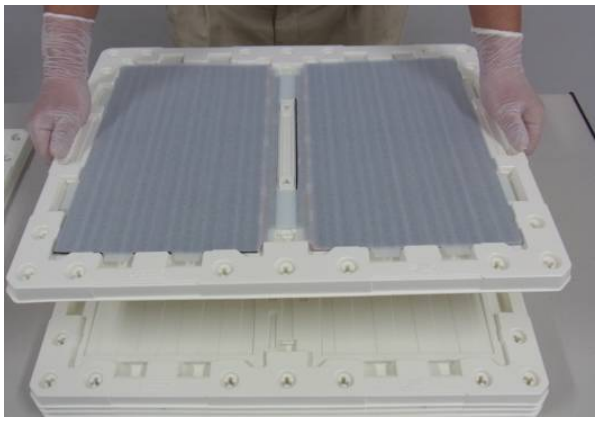
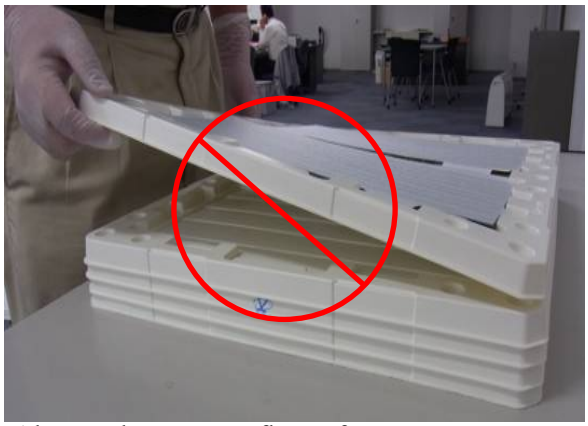
14. Precautions for Handling Tray

a.) Hold center of short side of tray with both hands when handling one or more trays.



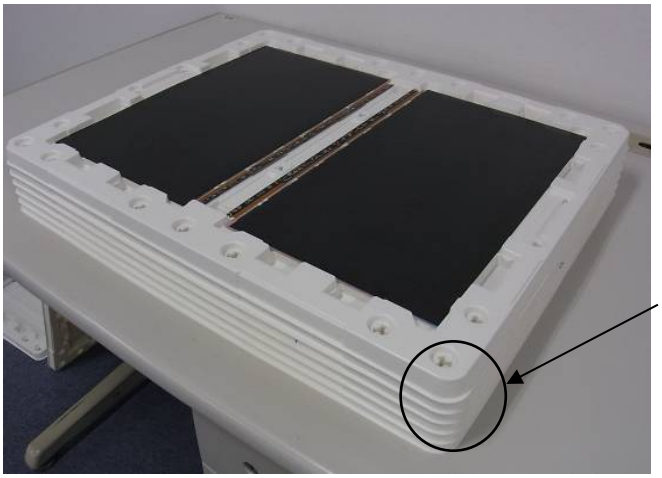
Caution：Do not handle with only one hand .



b.) Always place tray on flat surface.

c.) When stacking trays, please align same shape corner of each tray.
One corner is R corner. (Ref. Pic. 1)

d.) Maximum stacking quantity is the number of trays inside one box.
Ex.：In case of 20pcs LCD module per box (2pcs LCD module per tray), maximum stacking is 10 trays.



Pic.1 Stacking tray

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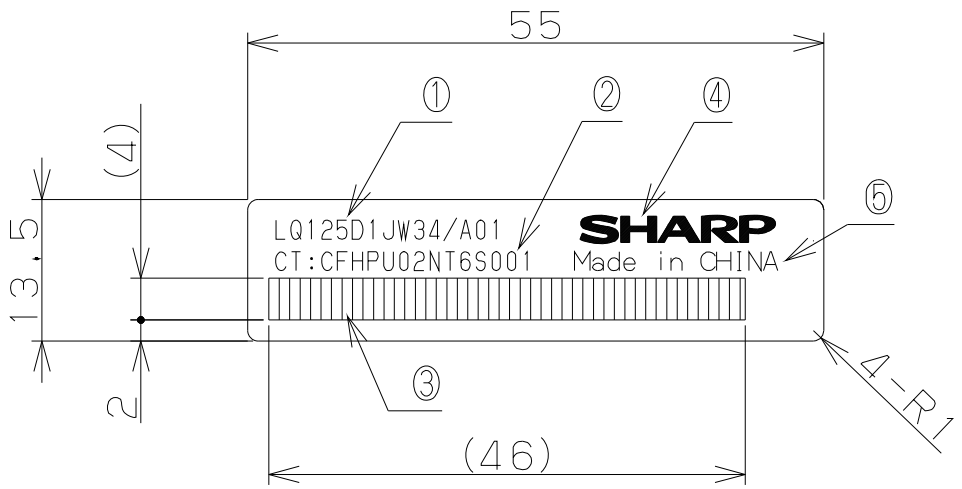
15. Packaging Condition

Piling number of cartons	6
Package quantity in one carton	30
Carton size	394(W)×534(H)×210(D)
Total mass of one carton filled with full modules	9.5kg
Packing form	Fig.1

16. Label

1) Module barcode label:

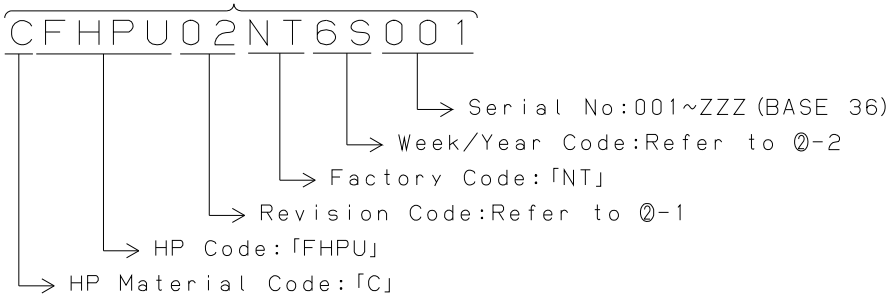


	font	notes
①:SHARP Model No	(8)	「LQ125D1JW34」
②:Serial Number	(8)	
③:Barcode (Sirial Number)	-	Barcode Symbology:Code93 Do not include the characters "CT:" within the barcode
④:SHARP Logo	-	data:sharplogo
⑤:Manufacturing Country	(8)	

②Serial Number

14digits

※There is no space between characters



②-1:Revision Code

Revision	notes
01	Start
02	Change LED vender
03	-
04	-

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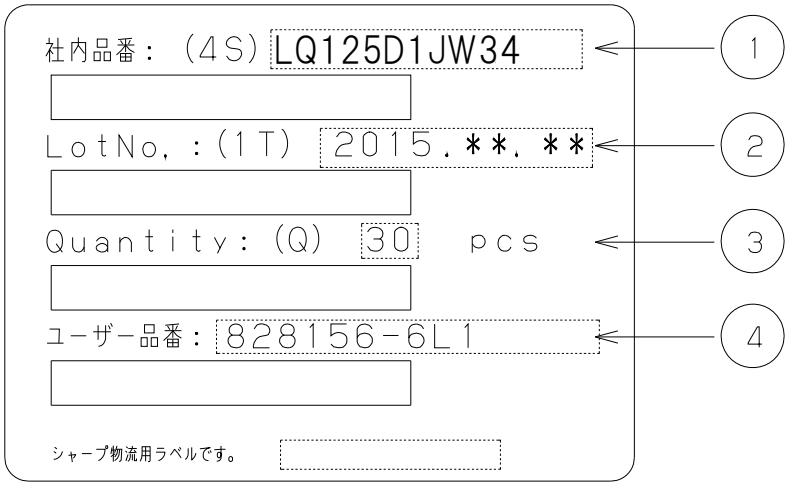
2) Packing bar code label

①SHARP Model No.

②Date

③Quantity (30 pcs / Carton)

④USER Model No.



17. RoHS Directive

This LCD module is compliant with RoHS Directive.

inReliability Test Items

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18. Reliability Test Items

No.	Test item	Conditions
1	High temperature storage test	Ta = 60℃ 240h
2	Low temperature storage test	Ta = -20℃ 240h
3	High temperature & high humidity operation test	Ta = 40℃ ; 90%RH 240h (No condensation)
4	High temperature operation test	Ta = 50℃ 240h
5	Low temperature operation test	Ta = 0℃ 240h
6	Vibration test (non- operating)	Frequency:10~57Hz/Vibration width (one side):0.076mm :57~500Hz/Acceleration:9.8m/s^2 Sweep time: 11minutes Test period: 1 hour for each direction of X,Y,Z
7	Shock test (non- operating)	Max. gravity : 490 m/s^2 Pulse width : 11 ms, half sine wave Direction : ±X,±Y,±Z once for each direction.
8	ESD	150pF [330Ω] , Panel center , Around the module : One time for each position <Contact : non-operation> ±10kV <Contact : operation>±8kV <Air : non-operation> ±20kV <Air : operation>±15kV ※If LCM can self-recover, temporary degradation of performance is allowed.

[Result Evaluation Criteria] Under the display quality test conditions with normal operation state. Do not change these conditions as such changes may affect practical display function.

[Normal operation state] Temperature : +15～+35℃, Humidity : 45～75%, Atmospheric pressure : 86～106kPa

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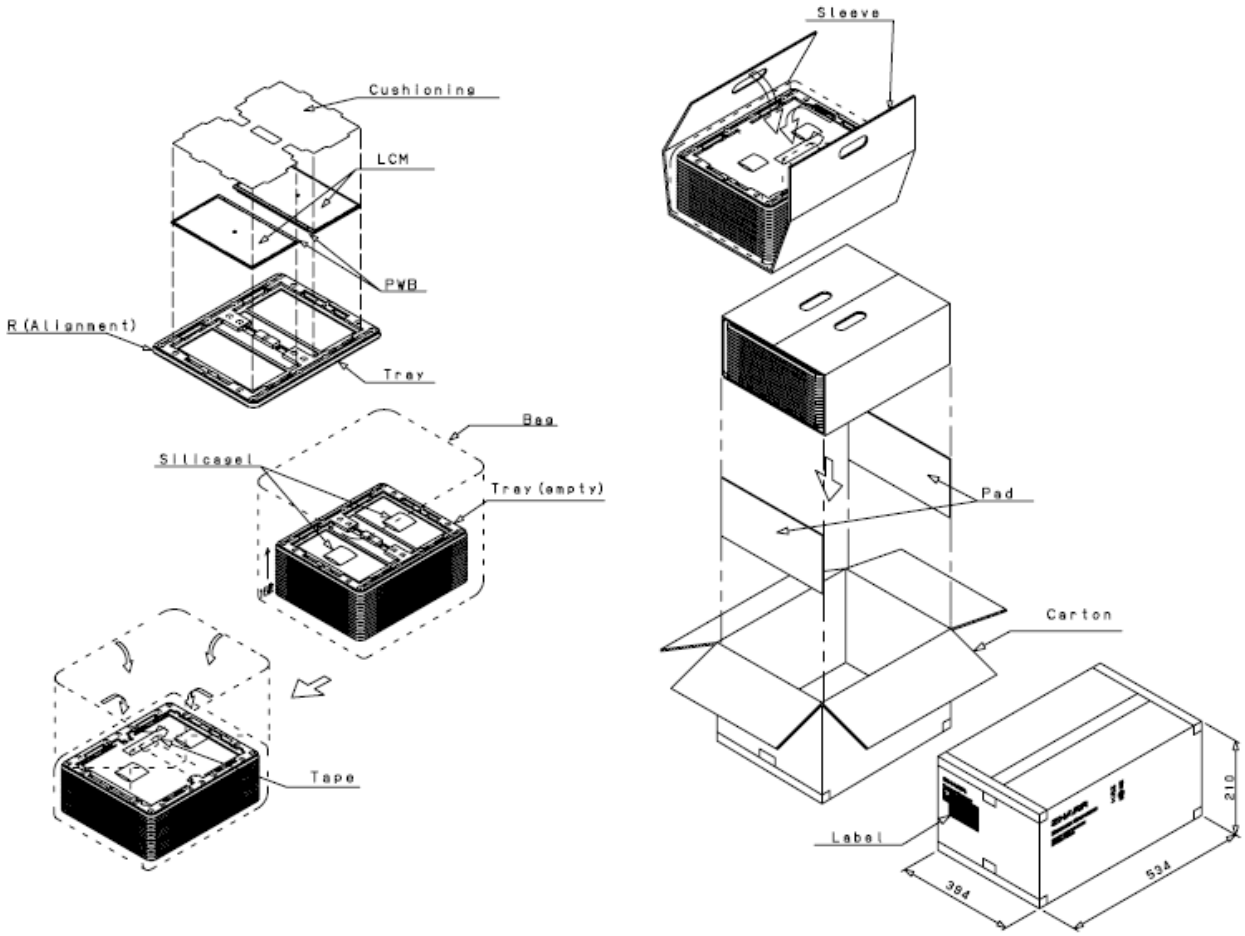

Fig. 1 Packaging Condition

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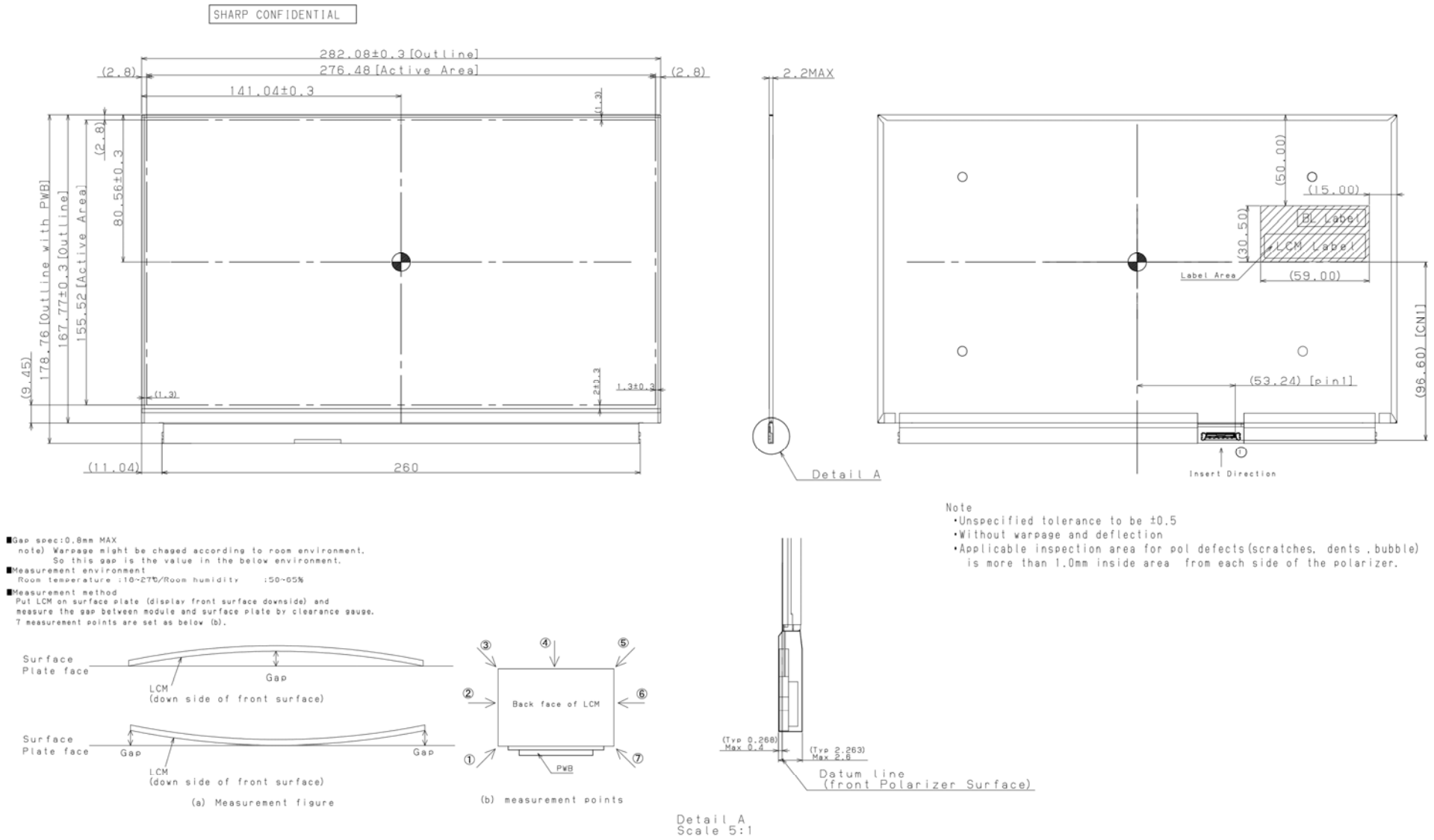

Fig. 2 Outline Dimension

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