

INDUSTRIAL STRENGTH... Start Your Application From YOURITECH

Integration support
Obsolescence Management
Embedded Systems
Human Machine Interface
Touch Solutions
Software
Quality Management
Open Frame Monitors
Research & Development
EMC tests
on-site service
In-house Manufacturing
Cover glass
OEM Solutions
Custom Display

PCAP

Mechanical design

Production
Custom designs
Installation

System solutions



☒ Preliminary Specifications

☐ Final Specifications

Title	11.6-inch LCM Product Specifications
Model Name	ET116FH01-R
Version	2

Customer

Approved by

Date

Notice: This Specification is subject to change without notice.

Approved By	Prepared By
Jim 2022-3-21	Herman 2022-3-21



REVISION HISTORY

Version	Description of Changes	Date	Prepared
0	Preliminary Edition	2020-10-26	Shimei
1	Modify HPD High level output voltage	2020-11-12	Shimei
2	Modify Color chromaticity	2022-3-21	Herman



Contents

1. General Description	4
2. Pin Assignment.....	5
3. Operation Specifications	7
3.1. Absolute Maximum Ratings.....	7
3.2. Electrical Specifications	8
3.2.1 TFT-LCD panel driving	8
3.2.2 Backlight Driving.....	9
3.3. Power Sequence	10
3.4. Timing Characteristics.....	11
3.4.1. eDP Interface	11
3.4.2. eDP Input Signal	12
3.4.3. Input Data Signals and Display position on the screen.....	13
3.4.4. Input signal, basic display colors & gray scale of colors.....	14
3.4.5. eDP Rx Interface Timing parameter.....	15
3.4.6. Timing Condition.....	15
4. Optical Specifications.....	16
5. Reliability Test Items	18
6. General Precautions.....	19
6.1. Safety	19
6.2. Handling	19
6.3. Static Electricity.....	19
6.4. Storage.....	19
6.5. Cleaning	19
7. Appendix	20
7.1. Mechanical Drawing.....	20



1. General Description

No.	Item	Specification	Remark
1	LCD size	11.6 inch (Diagonal)	
2	Driver element	a-Si TFT active matrix	
3	Resolution	1920 x 3 (RGB) x1080 pixel	
4	Display mode	Normally Black	
5	Pixel pitch	0.1335(H) x0.1335(V)	
6	Active area	256.32(W) x 144.18(H) mm	
7	Module size	268(W) x 158(H) x 3.0(D) mm (Typ.) (outline)	Note 1
8	Surface treatment	Haze 25%, 3H	
9	Colors	16.7M (8bit)	
10	Interface	eDP	
11	Backlight Type	LED	
12	Operating Temperature	-20°C~70°C	
13	Storage Temperature	-30°C~80°C	
14	Weight	203g(Typ.)	

Note 1 : Refer to Mechanical Drawing



2. Pin Assignment

Pin No.	Symbol	Function	Remark
1	NC	No Connection	Note 1
2	H_GND	Ground	
3	LANE1_N	eDP RX Chanel 1 negative	
4	LANE1_P	eDP RX Chanel 1 positive	
5	H_GND	Ground	
6	LANE0_N	eDP RX Chanel 0 negative	
7	LANE0_P	eDP RX Chanel 0 positive	
8	H_GND	Ground	
9	AUX_CH_P	eDP AUX CH positive	
10	AUX_CH_N	eDP AUX CH negative	
11	H_GND	Ground	
12	VDD	Power Supply 3.3V (Typ.)	
13	VDD	Power Supply 3.3V (Typ.)	
14	NC	No Connection	Note 1
15	GND	Ground	
16	GND	Ground	
17	HPD	Hot plug detect output	Note 2
18	NC	No Connection	Note 1
19	NC	No Connection	Note 1
20	NC	No Connection	Note 1
21	NC	No Connection	Note 1
22	NC	No Connection	Note 1
23	NC	No Connection	Note 1
24	NC	No Connection	Note 1
25	NC	No Connection	Note 1
26	NC	No Connection	Note 1
27	NC	No Connection	Note 1
28	NC	No Connection	Note 1
29	NC	No Connection	Note 1



30	NC	No Connection	Note 1
----	----	---------------	--------

The shielding case is connected with signal GND

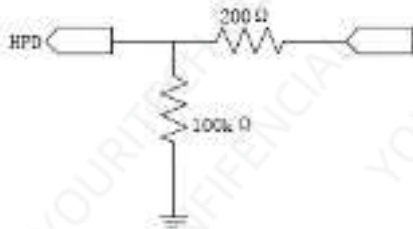
Connector used: IS050-L30B-C10(30P)

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

All terminals except NC terminal must be connected to input signal described as above or supply voltage or GND each.

Note 1: Do not input any signals or any powers into a NC pin. Keep the NC pin open.

Note 2: Output circuit is as below.



3. Operation Specifications

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in below table.

3.1. Absolute Maximum Ratings

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
LCD Power Supply Voltage	VDD	-0.3	3.6	V	Ta=25°C
Back-light Power supply Voltage	HV _{DDOUT}	2.7	24	V	Ta=25°C
Back-light Power Supply Current	I _{ledout}	6	25	mA	typ10.7
Operation Temperature	Top	-20	70	°C	Note 1
Storage Temperature	Tst	-30	80	°C	

Note 1: Humidity: 90%RH Max.at Ta≤+40°C.

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

No condensation.



3.2. Electrical Specifications

3.2.1 TFT-LCD panel driving

DC Electrical Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
+3.3V Supply voltage	V_{DD}	+3.0	+3.3	+3.6	V	
Current Consumption	I_{DD}	-	350	420	mA	
Inrush Current	I_{rush}	-	-	2.0	A	
Power Consumption	P_{VCC}	-	1.15	1.38	W	
Permissible input ripple voltage	V_{RP}	-	-	100	mVp-p	$V_{DD}=+3.3V$
eDP HPD Signal Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
HPD High level output voltage	VOH_{HPD}	2.25	2.5	-	V	
HPD Low level output voltage	VOL_{HPD}	-	0	-	V	
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	
Peak-to-peak voltage at TP1	$V_{AUX-DIFF-pp}$	0.32	-	1.36	V	
AUX DC Common mode voltage	$V_{AUX-DC-CM}$	-	-	2.0	V	
AUX Short current limit	I_{AUX_SHORT}	-	-	90	mA	
AUX CH termination Resistor	R_{AUX_TERM}	-	100	-	Ω	
AUX AC coupling capacitor	C_{AUX}	75	-	200	nF	
Number of pre-charge pulses	Pre-chargepulses	10	-	16	-	
eDP Main Link Receiver Characteristics						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Link clock down spreading	Down_Spread_Amplitude	0	-	0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	120	-	1200	mV	
Differential Return Loss at 1.35GHz at Rx package pins	$RL_{RX-DIFF}$	9	-	-	dB	
Differential termination resistance	$R_{RX-TERM}$	-	100	-	Ω	
RX short circuit Current Limit	$I_{RX-SHORT}$	-	-	50	mA	

TFT peak current will smaller than Inrush current.

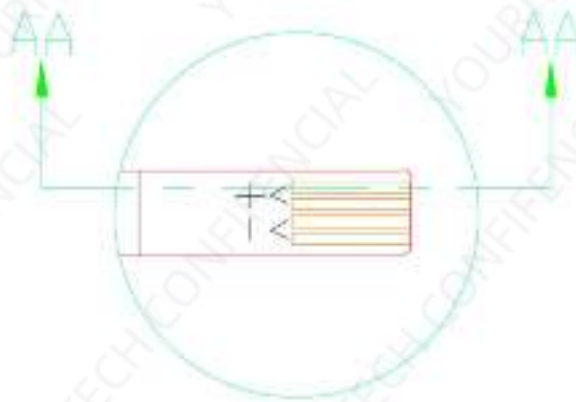


3.2.2 Backlight Driving

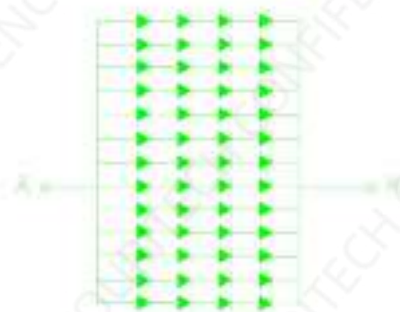
The backlight system is an edge-lighting type with white-LED.

(It is usually required to measure under the following condition: $T_a=25^{\circ}\text{C}\pm 2^{\circ}\text{C}$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply voltage	V_{BL}	-	24	24.8	V	BL_PWR
Current dissipation	I_{BL}	-	260	-	mA	
Power consumption	P_{BL}	-	6.24	6.45	W	
Inrush Current	$I_{rush_{BL}}$	-	-	2	A	
LED Life time	-	-	30000	-	hrs	



LED串並電路

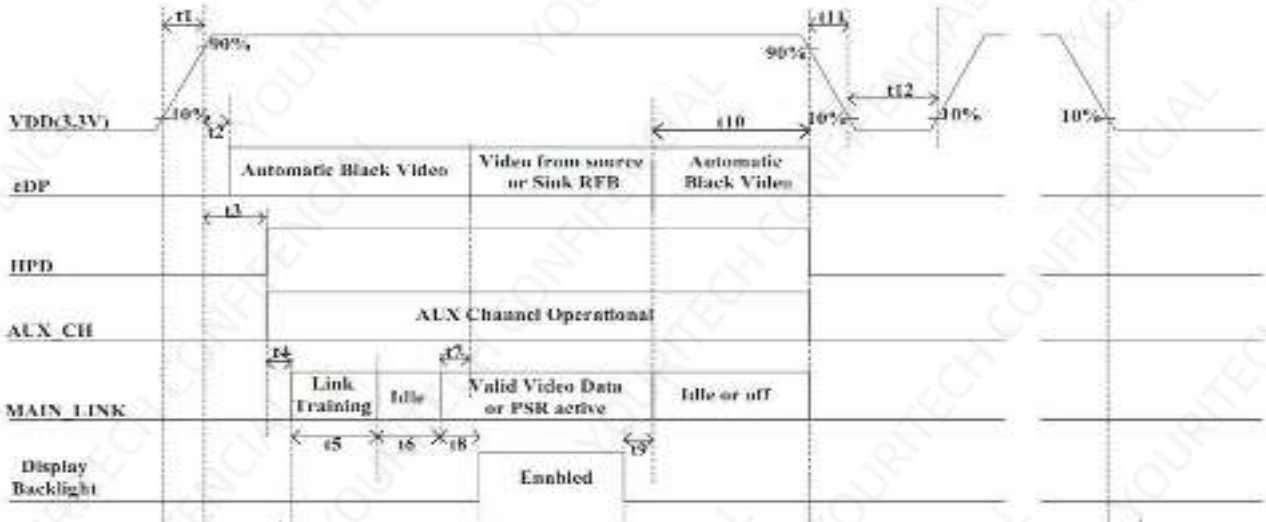


LED串並電路 4串13並



3.3. Power Sequence

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	Remark
t1	0.5	10	ms	
t2	0	200	ms	
t3	0	200	ms	
t4	-	-	ms	
t5	-	-	ms	
t6	-	-	ms	
t7	0	50	ms	
t8	-	-	ms	
t9	-	-	ms	
t10	0	500	ms	
t11	0.5	10	ms	Note 1
t12	500	-	ms	

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.

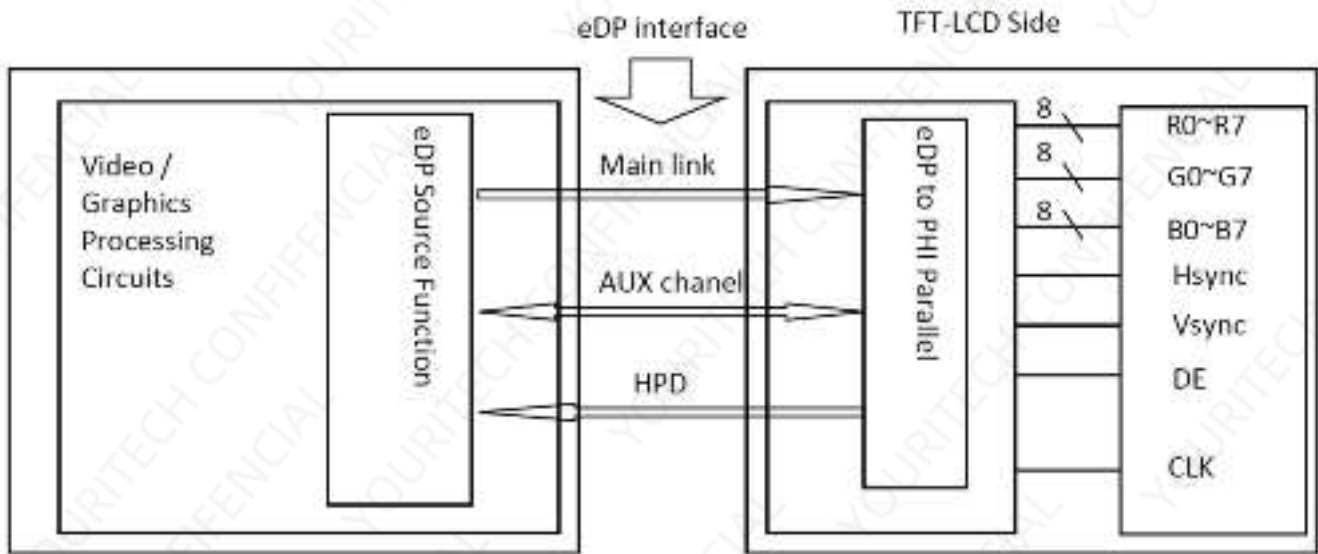
*1 : As for the power sequence for backlight, it is recommended to apply above mentioned input timing.

If the backlight is light on and off at a timing other than shown above, displaying image maybe get disturbed.



3.4. Timing Characteristics

3.4.1. eDP Interface



3.4.2. eDP Input Signal

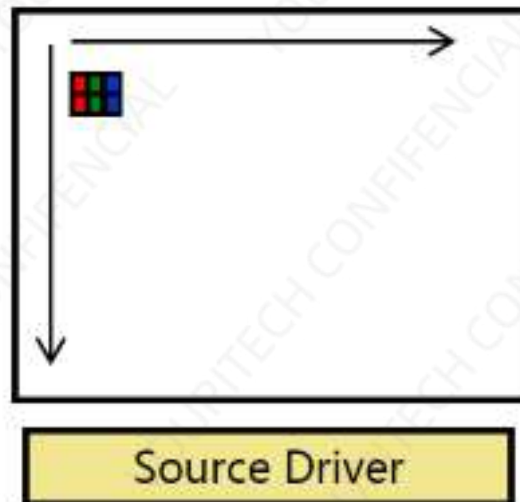
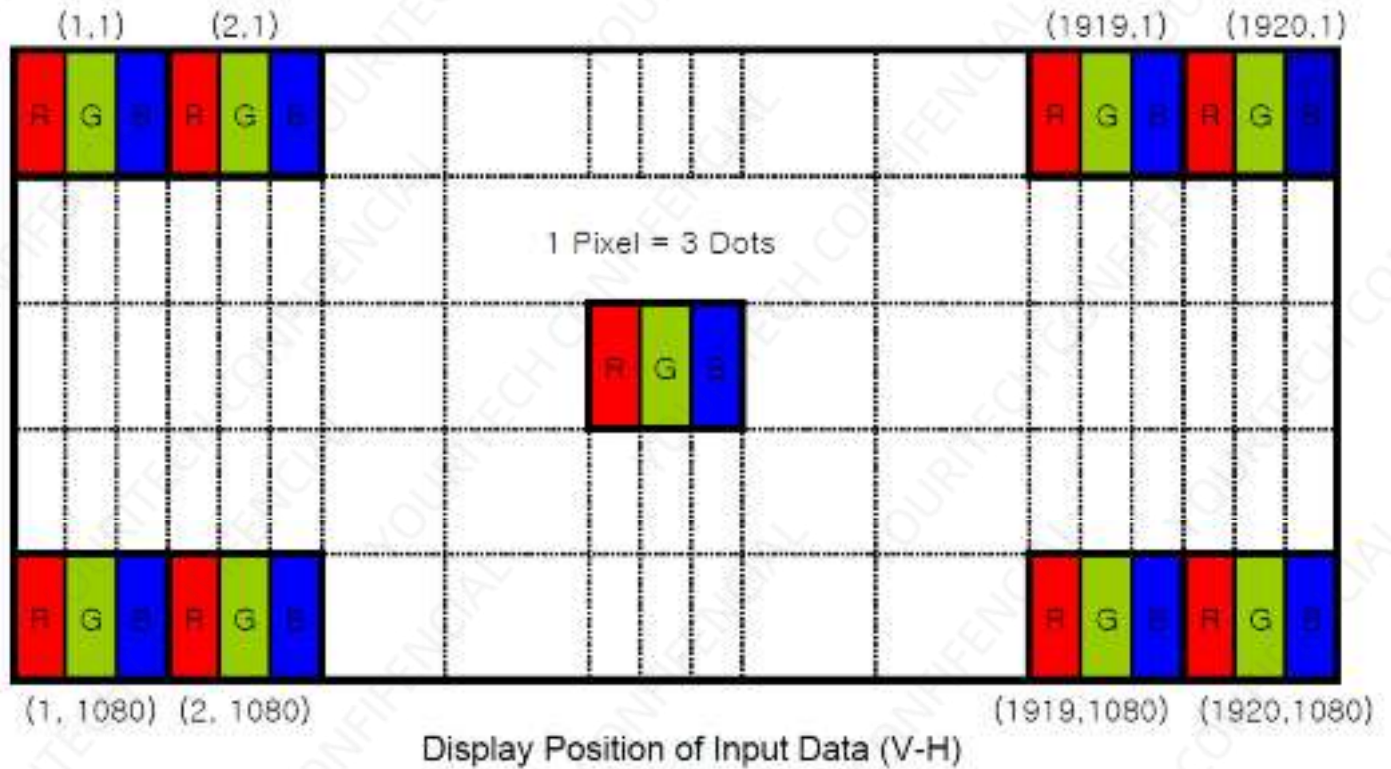
Lane 0	
R0-7:0	R1-7:0
G0-7:0	G1-7:0
B0-7:0	B1-7:0
R2-7:0	R3-7:0
G2-7:0	G3-7:0
B2-7:0	B3-7:0
R4-7:0	R5-7:0
G4-7:0	G5-7:0
B4-7:0	B5-7:0

eDP 2Lane 8bit input data mapping

Notification: eDP eye pattern must follow VESA standard.



3.4.3. Input Data Signals and Display position on the screen



Scan direction



3.4.4. Input signal, basic display colors & gray scale of colors

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△																								
	▽																								
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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
Gray Scale of Green	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△																								
	▽																								
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	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
Gray Scale of Blue	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
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△																								
	▽																								
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	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
Gray Scale of White	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
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△																								
	▽																								
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	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

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.



3.4.5. eDPRx Interface Timing parameter

The Specification of the eDP Rx interface timing parameter is shown as below table.

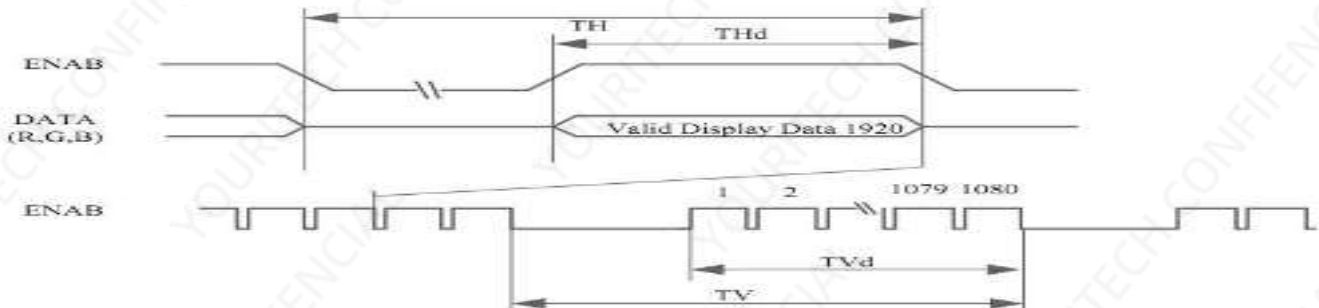
Item	Symbol	Min	Typ	Max	Unit	Remark
Differential peak-to-peak input voltage at package pins	VRX-DIFFp-p	120	-	1200	mV	
Rx input DC common mode voltage	VRX_DC_CM	-	GND	-	V	
Differential termination resistance	R _{RX-DIFF}	80	-	100	Ω	
Single-ended termination resistance	R _{RX-SE}	40	-	60	Ω	
Rx short circuit current limit	I _{RX_SHORT}	-	-	20	mA	
Intra-pair skew at Rx package pins (HBR) Rx intra-pair skew tolerance at HBR	L _{RX_SKEW_INTRA_PAIR}	-	-	150	ps	

3.4.6. Timing Condition

V_{DD}=+3.0V~+3.6V, T_a=10°C~+60°C

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	100	141.4	160	MHz
Horizontal display area	thd	1920			pixel
HSYNC period time	th	2080	2142	2400	pixel
HSYNC blanking	Thb+thfp		222		pixel
Vertical display area	T _{Vd}	1080			H
VSYNC period time	T _V	1090	1100	1238	H
VSYNC blanking	T _{vb} +T _{vfp}	-	20	-	H
Frequency	fV	40	60	66	Hz

Note 1: In case of using the long vertical period, the deterioration of display quality, flicker, etc. may occur.



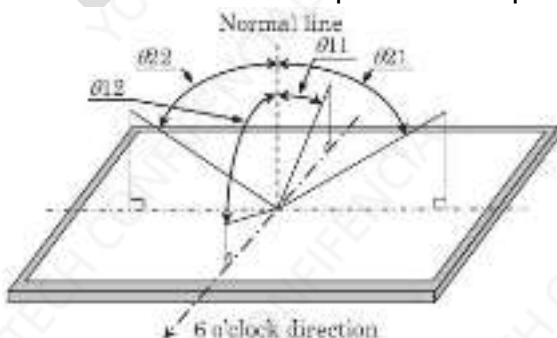
4. Optical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle	Horizontal	Θ_{21}	CR>10	-	85	-	Deg.	Note 1
		Θ_{22}		-	85	-	Deg.	
	Vertical	Θ_{11}		-	85	-	Deg.	
		Θ_{12}		-	85	-	Deg.	
Response time		T _{On} +T _{Off}	$\Theta=0^{\circ}$ (Center)	-	30	35	ms	Note 2 Note 3
Contrast ratio		CR		800	1000	-	-	Note 2 Note 4
Color chromaticity		W _x		0.253	0.313	0.373	-	Note 2 Note 5 Note 6
		W _y		0.269	0.329	0.389	-	
		R _x		0.574	0.634	0.694		
		R _y		0.283	0.343	0.403		
		G _x		0.242	0.302	0.362		
		G _y		0.559	0.619	0.679		
		B _x		0.09	0.150	0.21		
		B _y		0.002	0.062	0.122		
Luminance (AA center)		L		1150	1250	-	cd/m ²	
NTSC ratio		-		67	72		%	
Luminance uniformity 9 pt		ΔLV		72	-	-	%	
Cross Talk		CT		-	-	2.0	%	

Test Conditions: The ambient temperature is 25°C.

Note1: Definition of viewing angle range

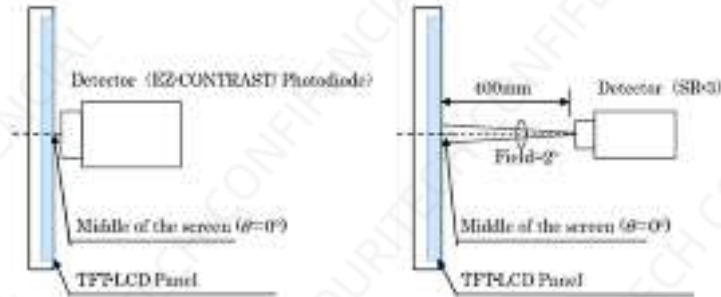
Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface.



Note2: Definition of optical measurement system

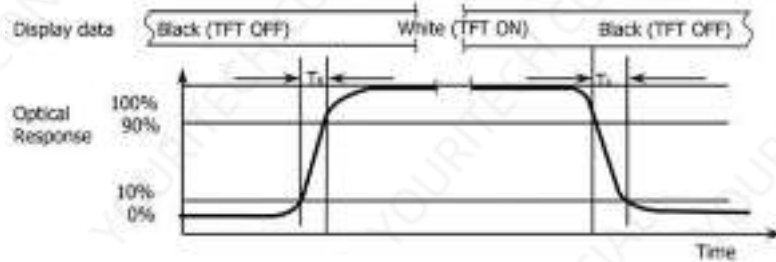


The optical characteristic should be measured in darkroom. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Viewing angle is measured by EZ-CONTRASE, Response time is measured by Photodiode. The other items are measured by SR-3Field of view: 2°/Height: 400mm.)



Note3: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (TR) is the time between photo detector output intensity changed from 10% to 90%. And fall time (TF) is the time between photo detector output intensity changed from 90% to 10%.



Note4: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

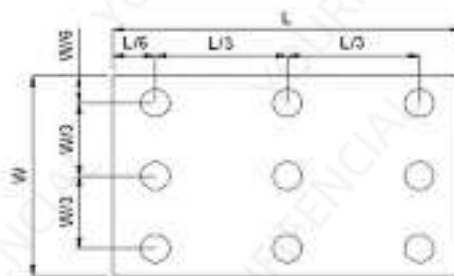
Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity (“White” state)

Active area is divided into 9 measuring areas.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$



Definition of measuring points

$B_{\max}$: The measured maximum luminance of all measurement position.

$B_{\min}$: The measured minimum luminance of all measurement position.



4. Reliability Test Items

No.	Item	Test Conditions
1	High Temperature Storage	80°C, 240hrs
2	Low Temperature Storage	-30°C, 240hrs
3	High Temperature Operation	70°C, 240hrs
4	Low Temperature Operation	-20°C, 240hrs
5	Operate at High Temperature and Humidity	60°C, 90%RH, 240hrs

Result Evaluation Criteria: Under the display quality test condition with normal operation state.

Do not change the condition as such changes may affect practical display function.

Normal operation state temperature: 15~35°C, Humidity: 45~75%, Atmospheric pressure: 86~106kPa



6. General Precautions

6.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

6.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

6.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

6.4. Storage

1. Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

6.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.



7. Appendix

7.1. Mechanical Drawing

Unit : mm

