



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-1024600KBTMQW-T11H
APPROVED BY	
DATE	

Preliminary Specification

Formal Specification

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Patrick	Lawlite	Kokai

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2023/2/16	--	New Release	Kokai

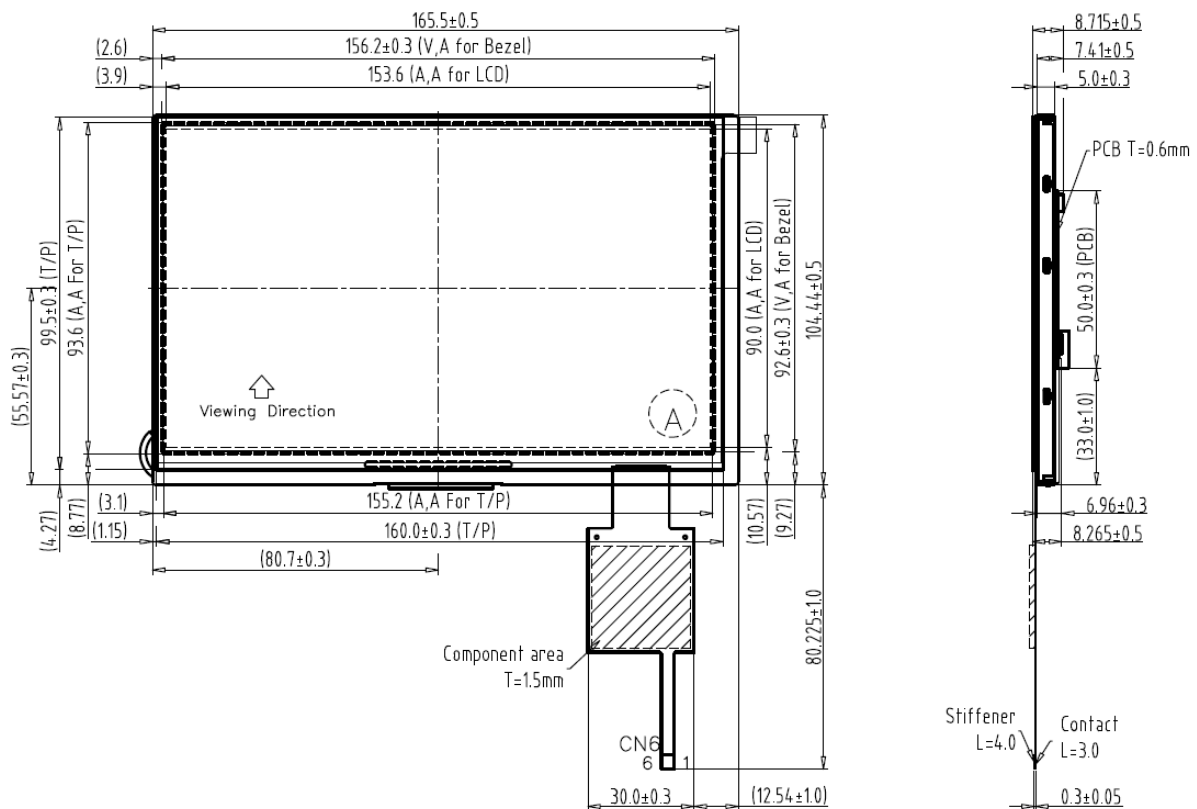
1. Features

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 7" TFT-LCD panel, LED backlight, LED driver unit, touch panel and power circuit unit.

- (1) Construction: 7" a-Si TFT active matrix, White LED Backlight and power & LED driver, touch panel.
- (2) Resolution (pixel): 1024(R.G.B) X600
- (3) Number of the Colors : 16M colors (R , G , B 6 bit digital each)
- (4) LCD type: Transmissive, normally White.
- (5) Interface: LVDS interface 8bit.
- (6) Power Supply Voltage: 3.3V for logic voltage, 12V for LED driver power voltage.
- (7) Projected Capacitive touch panel:
 - a. Interface : USB
 - b. Touch Controller : EXC80W32
- (8) Viewing Direction: 6 O'clock (Gray Inversion)

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	7 inch (Diagonal)	
Resolution	1024 x 3(RGB) x 600	dot
Dot pitch	0.05(W) x 0.15(H)	mm
Active area	153.6(W) x 90.0(H)	mm
Color arrangement	RGB-stripe	
interface	LVDS	
Brightness	850	cd/m ²



3. ABSOLUTE MAX. RATINGS

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VCC	-0.3	4.2	V	
	VLED	-0.3	14		
Operation temperature	TOP	-20	70	°C	
Storage temperature	TST	-30	80	°C	

4. ELECTRICAL CHARACTERISTICS

4-1 Typical Operation Conditions

Item	Symbol	Values			Unit	Remark	
		MIN	TYP	MAX			
Power Voltage	V _{CC}	3.0	3.3	3.6	V	Note 1,2	
Power Consumption	I _{CC}	--	150	--	mA	Note 1,2 V _{CC} =3.3V	
Logic Input Voltage	Input Voltage	V _{IN}	0	-	V _{CC}	V	
	Logic input high voltage	V _{TH}	0.7V _{CC}	-	V _{CC}	V	Note 3
	Logic input low voltage	V _{TL}	GND	-	0.3V _{CC}	V	Note 3

Note 1: Value for Power Board combined panel.

Note 2: VCC setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: LVDS.

4-2 LED Driving Conditions

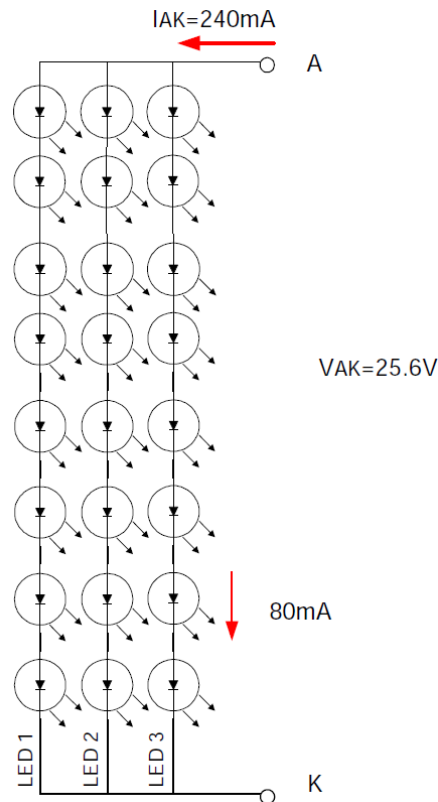
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver Power Voltage	V_{LED}	9	12	14	V	
LED Driver Current Consumption	I_{LED}	--	730	--	mA	$V_{LED}=12V$ $ADJ=3.3V$ (duty100%)
ADJ Input Voltage	V_{ADJ-IH}	1.2	--	V_{LED}	V	duty=100% Note(3)
	V_{ADJ-IL}	0	--	0.5	V	
LED Voltage	V_{AK}	24.8	25.6	26.4	V	Note(1)
LED Forward Current	I_{AK}	--	240	--	mA	$T_a=25^{\circ}C$
LED Life Time	--	--	50,000	--	Hr	Note(2)

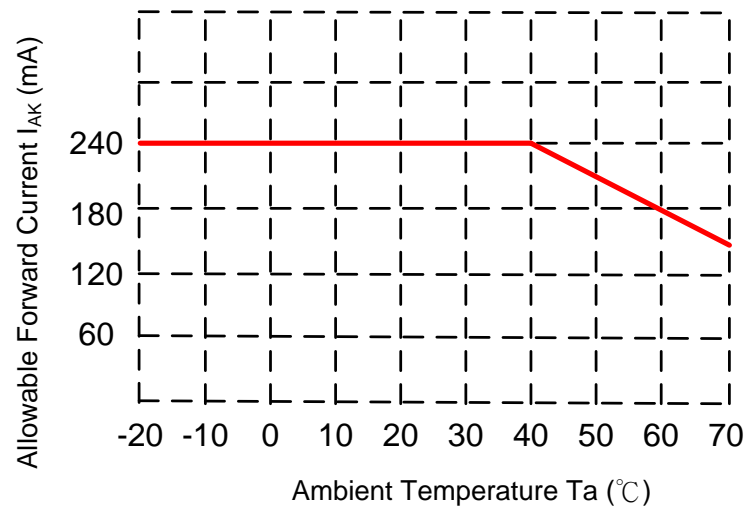
Note (1) The constant current source is needed for white LED back-light driving.

Note (2) Brightness to be decreased to 50% of the initial value. $T_a=25^{\circ}C$

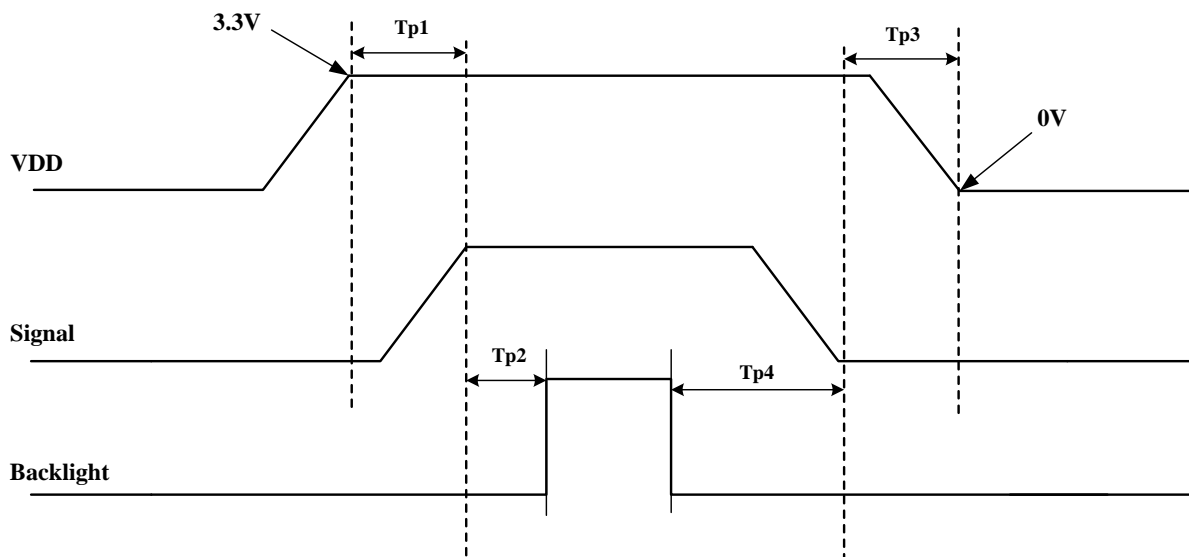
Note (3) V_{LEDADJ} is PWM signal input. It is for brightness control.

There are 5 Groups LED shown as below , $V_{AK}=25.6V$, $I_{AK}=240mA$.





4-3 Power Sequence



Item	Symbol	Value			Units	Remark
		Min.	Typ.	Max.		
VDD on to signal starting	Tp1	5	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD off	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	

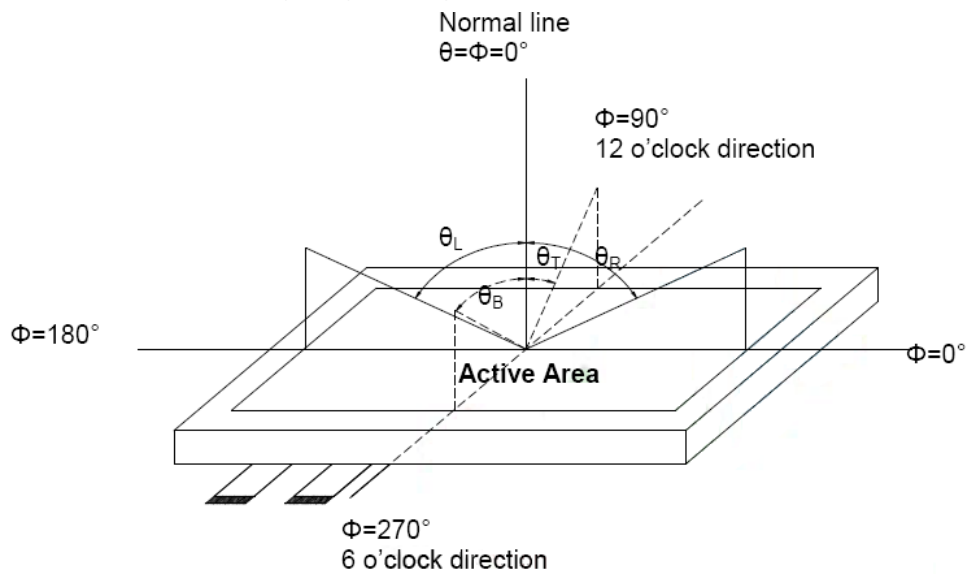
5. Optical Specifications

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θ L	$\Phi = 180^\circ$ (9 o'clock)	65	75	--	degree	Note1
	θ R	$\Phi = 0^\circ$ (3 o'clock)	65	75	--		
	θ T	$\Phi = 90^\circ$ (12 o'clock)	65	70	--		
	θ B	$\Phi = 270^\circ$ (6 o'clock)	65	75	--		
Response time	TON	Normal $\theta = \Phi = 0^\circ$	--	20	20	msec	Note3
	TOFF		--	20	30	msec	
Contrast ratio	CR		500	700	--	--	Note4
Color chromaticity	WX		0.249	0.299	0.349	--	Note5
	WY		0.273	0.323	0.373	--	Note6
Luminance	L		680	850	--	cd/m ²	Note6

Test Conditions:

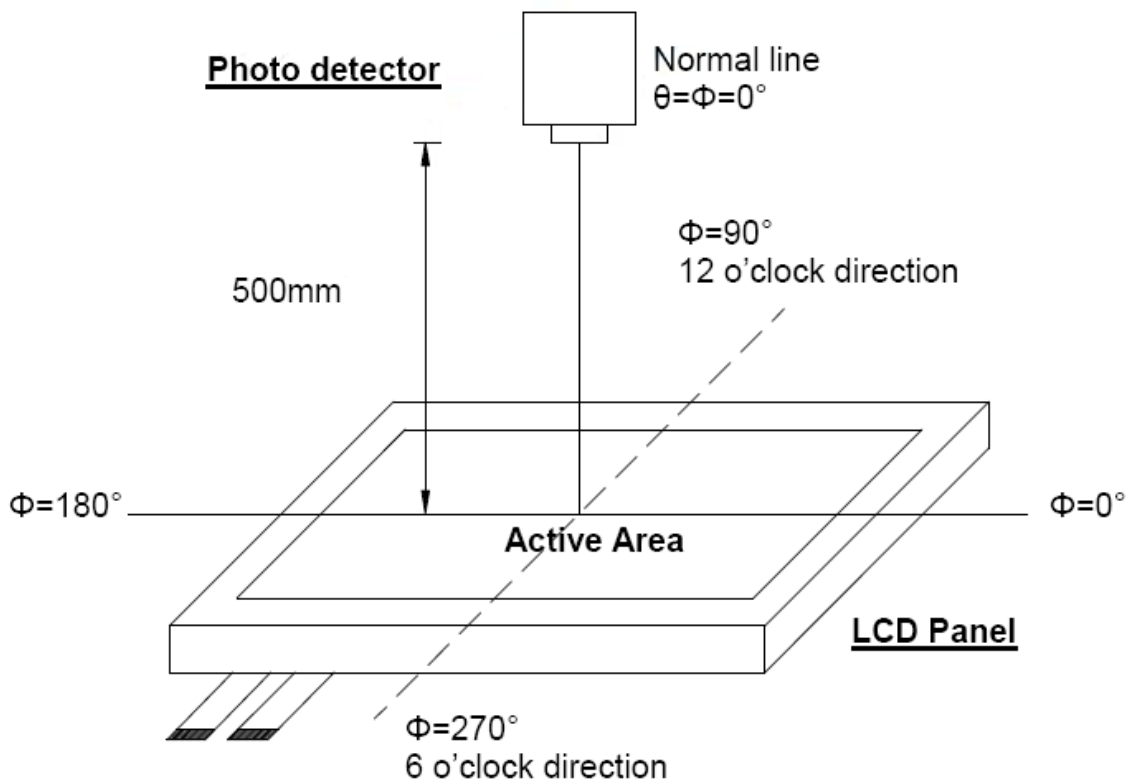
1. $V_{LED} = 12V$, $I_{AK} = 240mA$ (Backlight current), the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 2.

Note 1 : Definition of viewing angle range



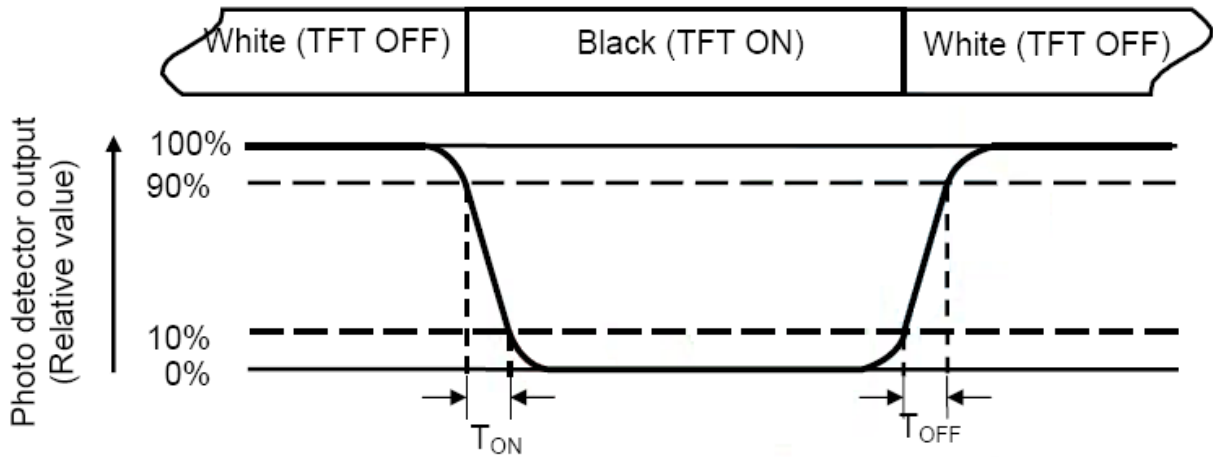
Note 2 : Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view : 1° / Height : 500mm.)



Note 3 : Definition of Response time

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



Note 4 : Definition of contrast ratio

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

Note 5 : Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

Note 6 : All input terminals LCD panel must be ground when measuring the center area of the panel.

6. INTERFACE

CN2 LVDS connector: P1.0 20pin/CP100-S20G-H16

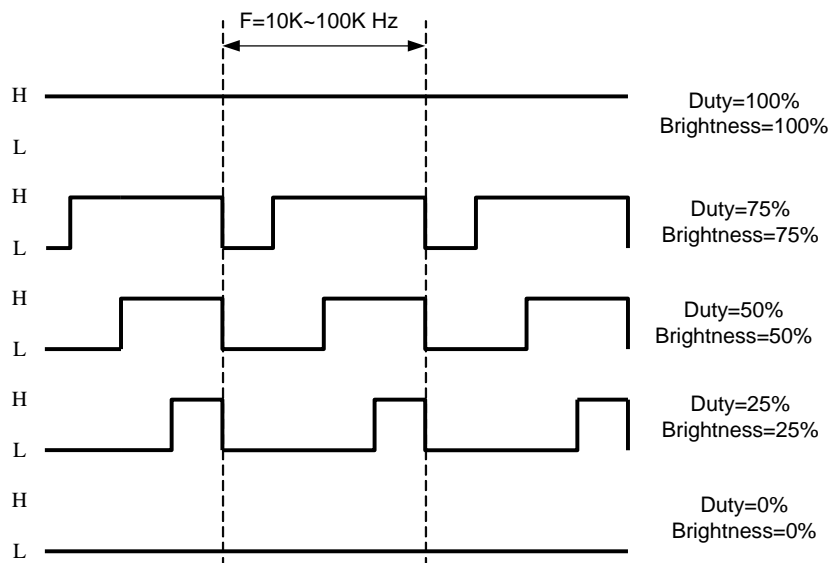
Pin No.	Symbol	I/O	Description	Note
1	VDD	P	Power Voltage for Logic: 3.3V	
2	VDD	P	Power Voltage for Logic: 3.3V	
3	GND	P	Ground	
4	GND	P	Ground	
5	IN0-	I	- LVDS differential data input	
6	IN0+	I	+ LVDS differential data input	
7	GND	P	Ground	
8	IN1-	I	- LVDS differential data input	
9	IN1+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	IN2-	I	- LVDS differential data input	
12	IN2+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	CLK-	I	- LVDS differential clock input	
15	CLK+	I	+ LVDS differential clock input	
16	GND	P	Ground	
17	IN3-	I	- LVDS differential data input	
18	IN3+	I	+ LVDS differential data input	
19	VLED	P	Power supply for backlight: 12V	
20	ADJ	I	LED PWM Signal	

CN3 LED connector: ENTERY 3808K-F05N-03L

Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Power supply for backlight: 12V	
2	GND	P	Ground	
3	NC	-	No Connection	
4	ADJ	P	LED PWM Signal	
5	NC	-	No Connection	

NOTE (1): ADJ is PWM signal input. It is for brightness control.

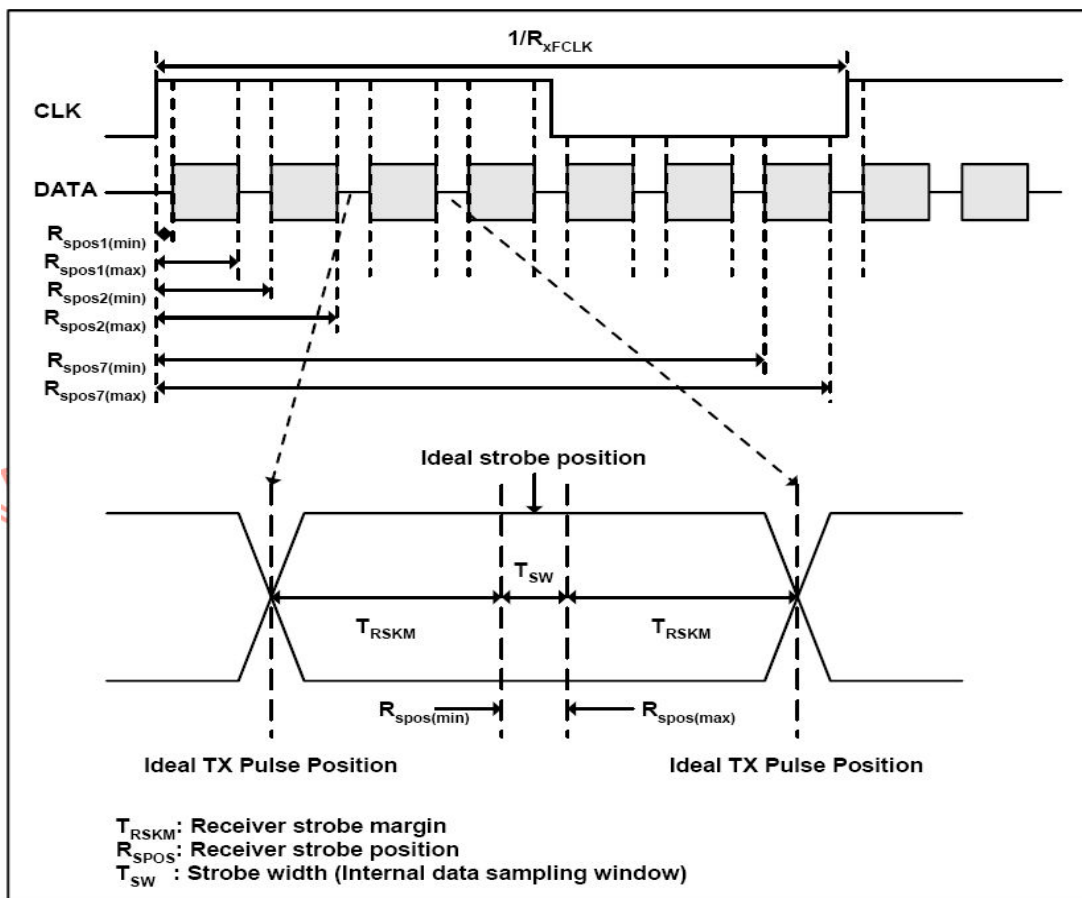
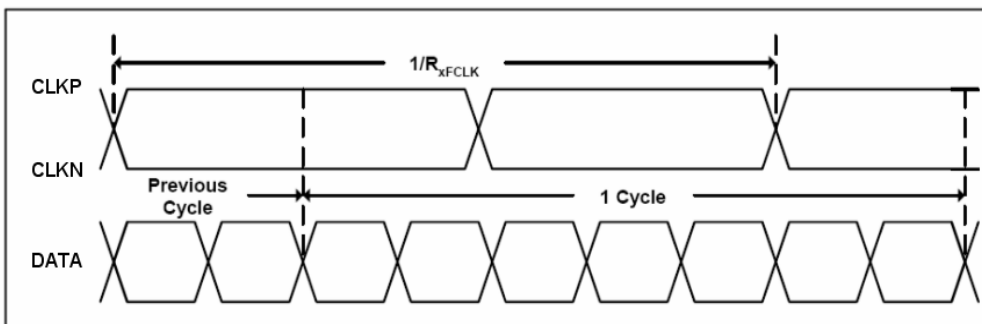
ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ signal frequency	f _{PWM}	10	--	100	KHz
ADJ signal logic level High	V _{IH}	1.2	--	5	V
ADJ signal logic level Low	V _{IL}	0	--	0.4	V



7. TIMING CHARACTERISTICS

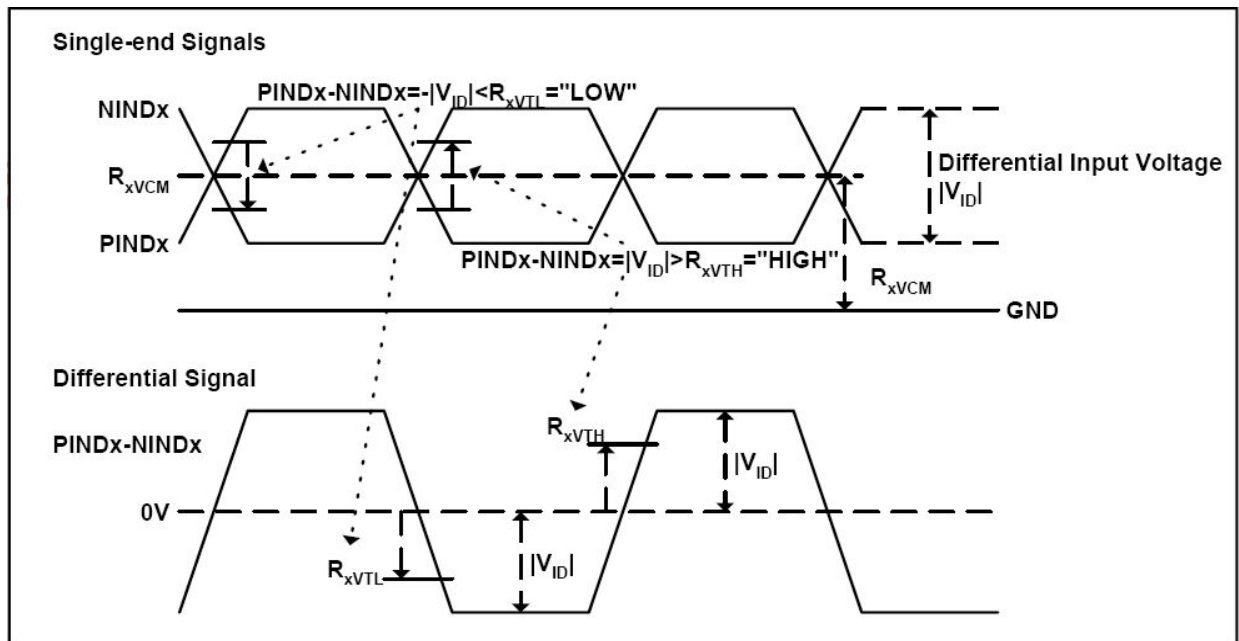
7-1 AC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		MIN	TYP	MAX		
Clock frequency	R_{xFCLK}	40.8	51.2	71		
Input data skew margin	T_{RSKM}	500	--	--		
Clock high time	T_{LVCH}	--	$4/(7 * R_{xFCLK})$	--		
Clock low time	T_{LVCL}	--	$3/(7 * R_{xFCLK})$	--		



7-2 DC Electrical Characteristics

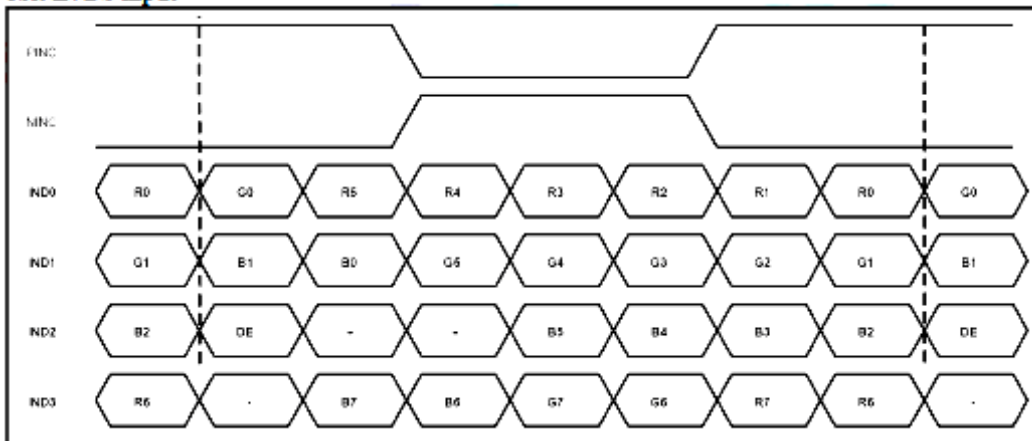
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	$R_{xVCM}=1.2V$
Differential input low Threshold voltage	R_{xVTL}	-0.1	-	-	V	
Input voltage range (singled-end)	R_{xVIN}	0	-	2.4	V	
Differential input common mode voltage	R_{xVCM}	$ V_{ID} /2$	-	$2.4- V_{ID} /2$	V	
Differential voltage	$ V_{ID} $	0.2	-	0.6	V	
Differential input leakage current	RV_{xIIZ}	-10	-	+10	μA	



7-3 Timing

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
Clock Frequency	fclk	40.8	51.2	67.2	MHz	Frame rate =60Hz
Horizontal display area	thd	1024			DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd	600			H	
VS period time	tv	610	635	800	H	
VS Blanking	thb	10	35	200	H	

8bit LVDS input



8. Touch Panel Electrical specification

8.1 Basic Characteristic

5 ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	10-fingers or Signal-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 100 points/sec
Resolution	16384 x 16384
Interface	USB
Control IC	EXC80W32

Specify the normal operating condition

(GND=0V)

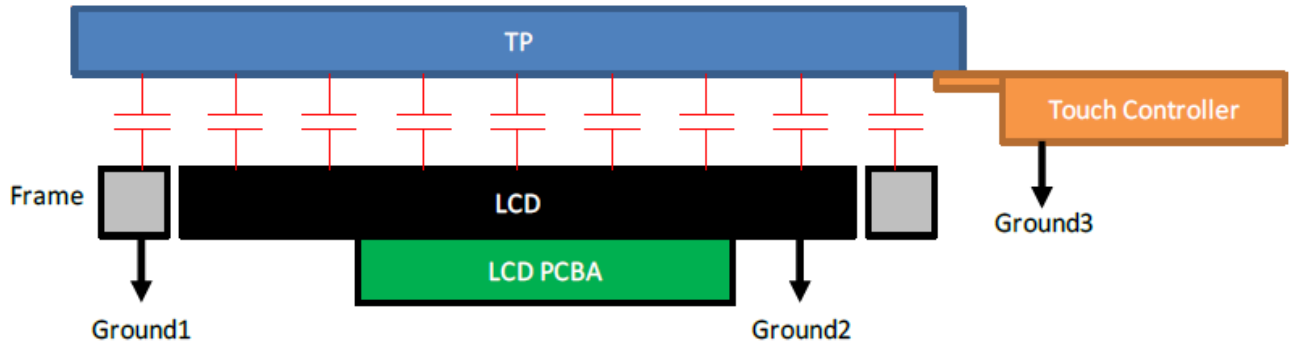
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VIN	4.75	5.0	5.25	V	
Power Consumption	I _{VDD}		T.B.D		mA	

8.2 Interface

CN6		
Pin No.	Symbol	Function
1	DGND	Power Ground
2	DA-	USB DATA-
3	DA+	USB DATA+
4	VIN	USB 5V power input.
5	NA	No connection
6	NA	No connection

Grounding

TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must not be floating. Intermittent floating any conductive part around the touch sensor may cause significant stray capacitance change and abnormal touch function. It is recommended to keep all conductive parts having same electrical potential as the GND of the touch controller module.



GND1, GND2 and GND3 should be connected together to have the same ground

9. RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , Dry t=240 hrs	
Low Temperature Operation	-20±3°C , Dry t=240 hrs	
High Temperature Storage	80±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C , Dry t=240 hrs	1,2
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 70°C (30min) 100 cycles	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note(1) Condensation of water is not permitted on the module.

Note(2) The module should be inspected after 1 hour storage in normal conditions (15-35°C, 45-65%RH).

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

Definitions of life end point:

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

10. General Precautions

10-1 Safety

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

10-2 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.

10-3 Static Electricity

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

10-4 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.

10-5 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.

10-5 Others

1. AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.
2. Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver

