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-800480AYTZQW-TA0H
APPROVED BY	
DATE	

☐**Approved For Specifications**
☐**Approved For Specifications & Sample**

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RECORD   OF   REVISION

Revision Date	Page	Contents	Editor
2016/10/26	--	New Release	Kokai

1.0 General Descriptions

1.1 Features

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 8" TFT-LCD panel and backlight unit.

(1) Construction: 7" a-Si TFT active matrix, Projective Capacitive Touch and White LED Backlight .

(2) Resolution (pixel): 800(R.G.B) X 480

(3) Number of the Colors : 16.7M colors (R , G , B, 8bit digital each)

(4) LCD type : IPS, Transmissive , normally Black

(5) 24 Bit LVDS interface

(6) Power Supply Voltage: 3.3V single power input. Built-in power supply circuit.

(7) Projective Capacitive Touch

    a. Interface : I2C

    b. Touch Controller: EXC3132

    c. Cover Lens :

      - Tempered Soda Lime Glass : T=1.0mm

      - Printing: Black border (Pantone :Black)

1.2 Product Summary

NO	Item	Specification	Remark
1	LCD Size	7.0 inch (Diagonal)	
3	Resolution	800 x 3 (RGB) x 480	
4	Display Mode	Normally Black.	
5	Pixel pitch	0.1926 (W) x 0.179(H) mm	
6	Active area	154.08(W) x 85.92(H) mm	
7	Module Size	184.0(W) x 128.0(H) x 12.1(T) mm	Note 1
8	LCD Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Luminance	470	Cd/m^2
11	Viewing Direction	All direction	

(Note1) Refer to the mechanical drawing.

1.3 Functional Block Diagram

Shows the functional block diagram of the LCD module.

Figure 1 Block Diagram
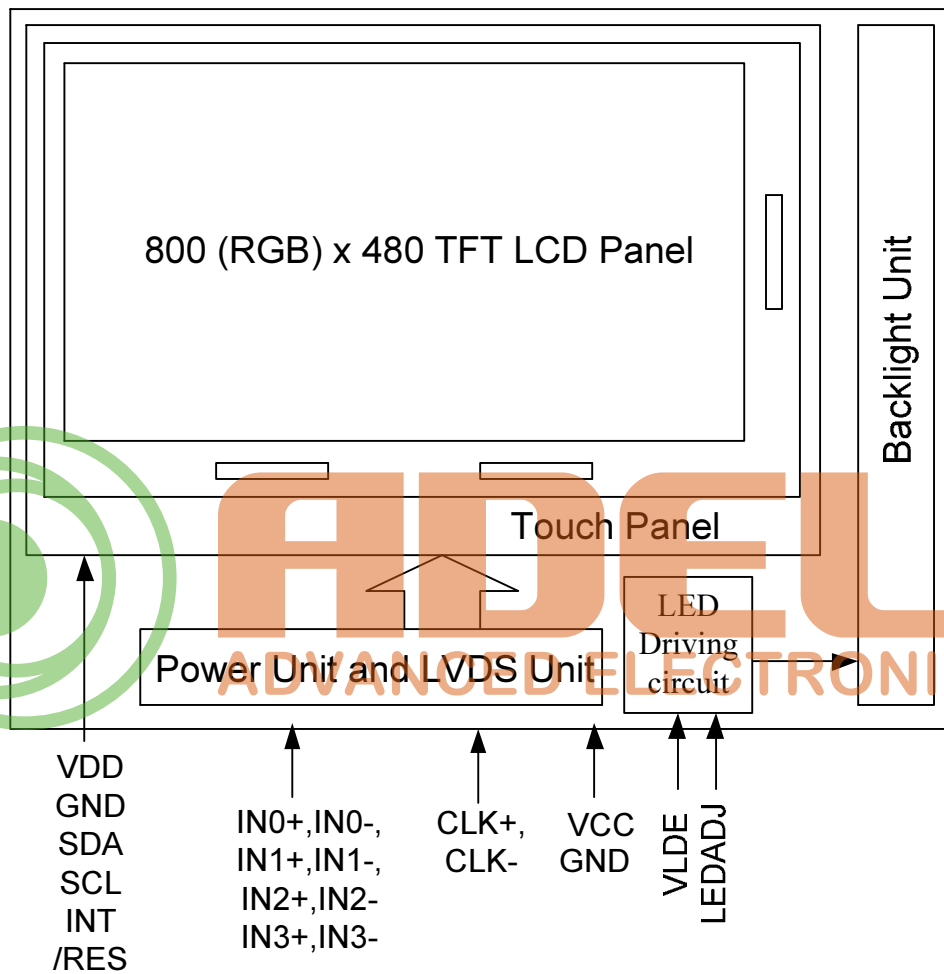
2.0 Absolute Maximum Ratings

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VDD	-0.5	3.96	V	GND=0V
Power voltage of LED Driver IC	VLED	-0.3	6	V	GND=0V
Voltage range at any terminal		-0.5	VCC+0.3	V	

2.1 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	70	℃	
Storage Temperature	Tstg	-30	80	℃	

3.0 Optical Specifications

| Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θ L	(80)	(88)	-	degree	(1),(2),(3)
		θ R	(80)	(88)	-		
	Vertical	θ U	(80)	(88)	-		
		θ D	(80)	(88)	-		
Contrast Ratio	Center		(700)	(900)	-	-	(1),(2),(4) θx=θy=0°
Response Time	Rising + Falling		-	(30)	(40)	ms	(1),(2),(5) θx=θy=0°
Color Chromaticity (CIE1931)	Red x		Typ (+0.05)	(0.633)	Typ (+0.05)	-	(1),(2),(3) θx=θy=0°
	Red y			(0.329)		-	
	Green x			(0.320)		-	
	Green y			(0.613)		-	
	Blue x			(0.150)		-	
	Blue y			(0.053)		-	
	White x		Typ. (-0.05)	(0.308)	Typ. (+0.05)	-	
	White y			(0.332)		-	
NTSC	-		-	(70)		%	(1),(2),(3) θx=θy=0°
White Luminance	Center Point		(375)	(470)	-	cd/m^2	(1),(2),(6) θx=θy=0°

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) for 15
minutes to avoid abrupt temperature change during measuring. In order to
stabilize the luminance, the measurement should be executed after lighting
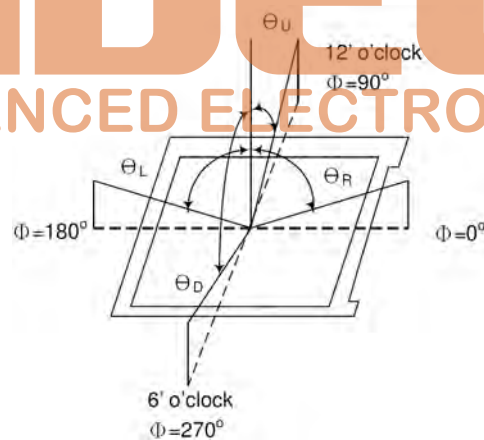backlight for 15 minutes in a windless room.

Figure 3 Measurement Setup
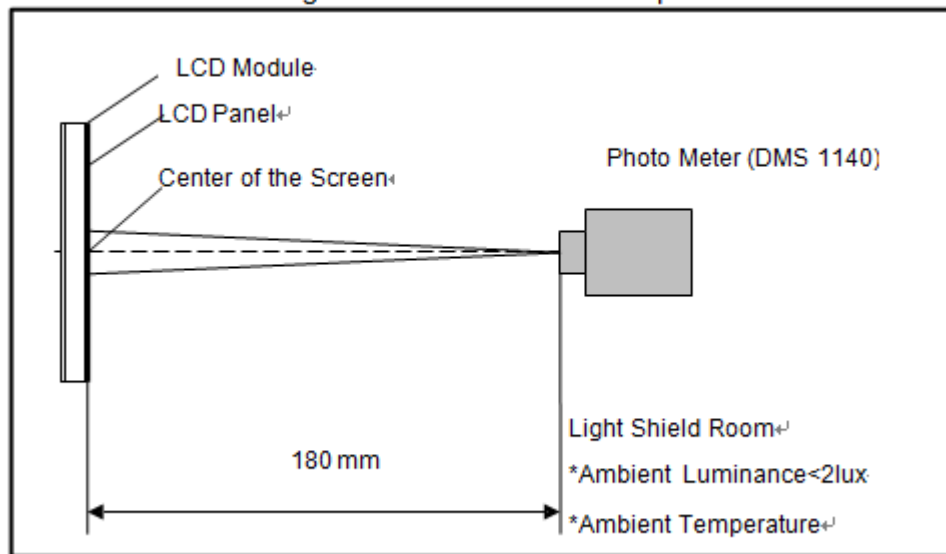
Note (2) The LED input parameter setting as:

I_LED: 180mA

Note (3) Definition of Viewing Angle

Note (4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following

expression: Contrast Ratio (CR) = L255 / L0
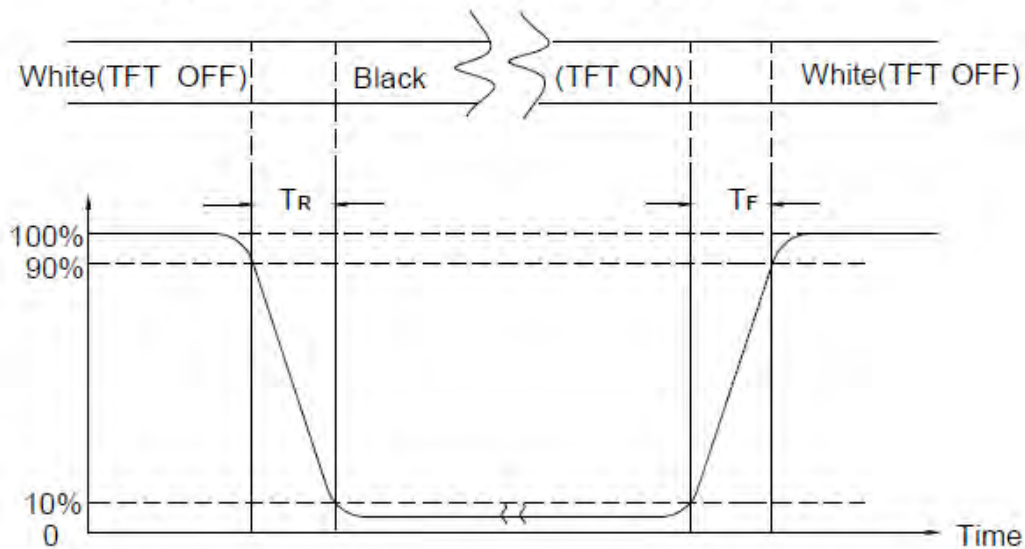
L255: Luminance of gray level 255, L0: Luminance of gray level 0

Note (5) Definition Of Response Time (T_R, T_F)

Figure 5 Definition of Response Time
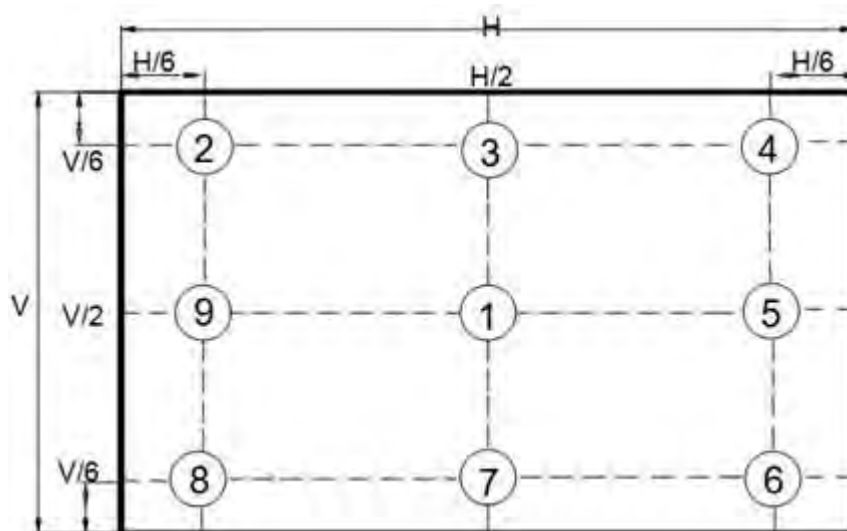

Note (6) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of gray level 255 at 9 points.

Luminance Uniformity= Min.(L1, L2, ... L9) / Max.(L1, L2, ... L9)

H—Active Area Width, V—Active Area Height, L—Luminance

Figure 6 Measurement Locations of 9 Points

4.0 Interface Connections

Pin No.	Symbol	Function
1	VDD	POWER SUPPLY:3.3V
2	VDD	POWER SUPPLY:3.3V
3	GND	Power Ground
4	GND	Power Ground
5	IN0-	Transmission Data of Pixels
6	IN0+	Transmission Data of Pixels
7	GND	Power Ground
8	IN1-	Transmission Data of Pixels 1
9	IN1+	Transmission Data of Pixels 1
10	GND	Power Ground
11	IN2-	Transmission Data of Pixels 2
12	IN2+	Transmission Data of Pixels 2
13	GND	Power Ground
14	CLK-	Sampling Clock
15	CLK+	Sampling Clock
16	GND	Power Ground
17	LED ADJ	LED Dimming pin. Dimming by PWM 100Hz~200kHz.
18	VLED	Power supply of LED driving IC.
19	IN3-	Transmission Data of Pixels 3
20	IN3+	Transmission Data of Pixels 3

5. Backlight Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Driver Voltage	VLED	4.5	5.0	5.5	V	
Power Supply Current For LED Driver	ILED	-	380	-	mA	VLED=5V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V_{LEDADJ}	-	3.3	-	V	duty=100% Note(1)
LED voltage	V_{BL}	9.0	9.3	9.6	V	IBL=180mA
LED current	IBL	--	180	--	mA	Ta=25℃
LED Life Time	-	--	20K	--	Hour	

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

When LCM is operated over 60 deg.C ambient temperature, the I_{LED} of the LED back-light should be adjusted to 135mA max

Note (2) Brightness to be decreased to 50% of the initial value(Ta=25℃).
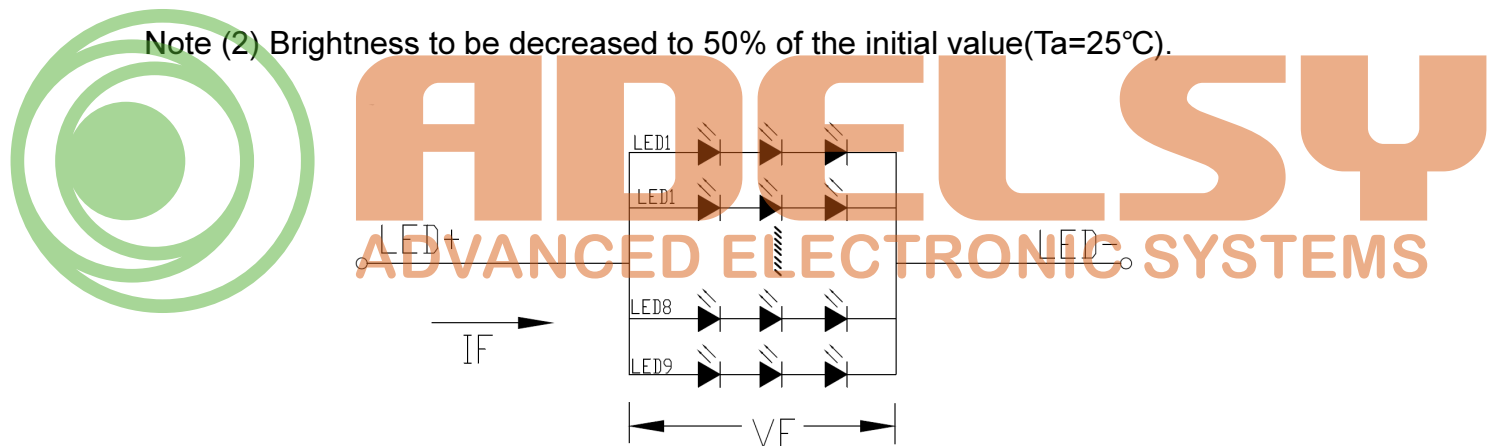
Note (3) VLEDADJ is PWM signal input. It is for brightness control.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ signal frequency	fPWM	100	--	50K	Hz
ADJ signal logic level High	VIH	2V	--	VLED (5.0V)	V
ADJ signal logic level Low	VIL	0	--	0.5	V

6. Touch Panel Unit

Basic Characteristic

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	4096 x 4096
Interface	I2C
Control IC	EXC3132

Specify the normal operating condition

(DGND=0V)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Low Level Input Voltage	VIL	0	--	0.8	V	1
High Level Input Voltage	VIH	0.8*VIN	--	VIN	V	1
Power Consumption	IVDD		T.B.D		mA	

Note 1: SDA , SCL ,/RES

Interface

Pin No.	Symbol	Function
1	GND	POWER GND
2	SDA	I2C DATA
3	SCL	I2C CLOCK
4	VDD	3.3V
5	INT	Interrupt Request pin. Active Low
6	/RES	Reset pin to Master Chip

Timing

/RES Keep Low 4mS at least. After /RES goes to high, do not accessing the I2C bus 40mS at least. Because the controller need to do the internal initiation.
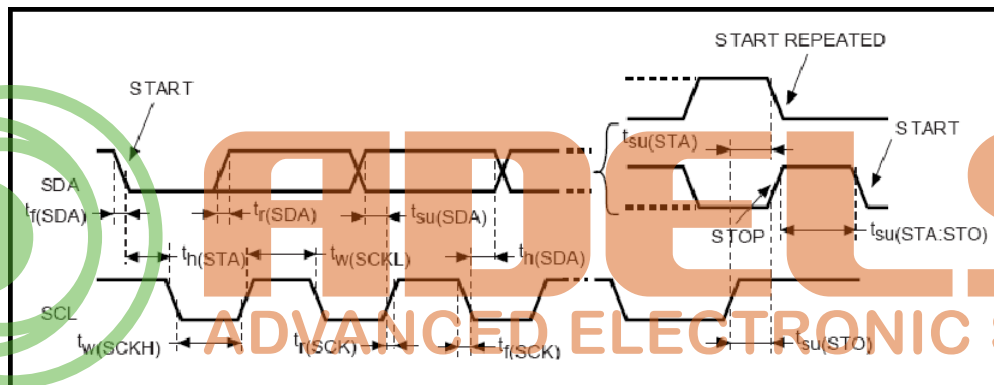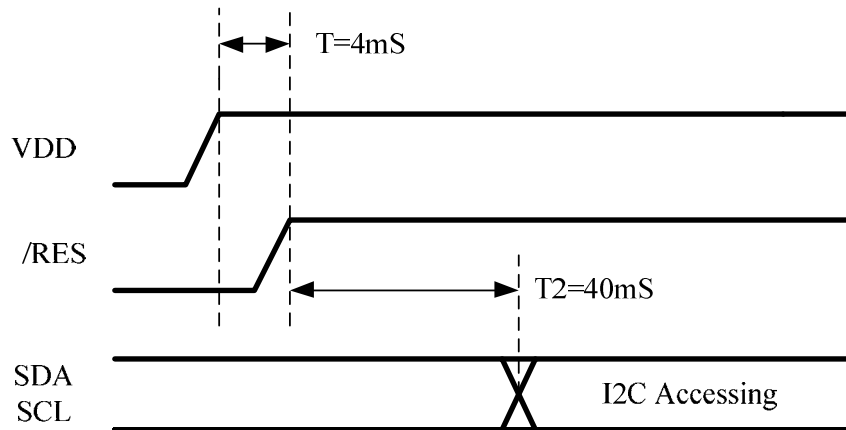
Symbol	Parameter	SCL = 100KHz		SCL = 400KHz		Unit
		Min	Max	Min	Max	
$t_{w(SCLL)}$	SCL clock low time	4.7		1.3		μs
$t_{w(SCLH)}$	SCL clock high time	4.0		0.6		
$t_{su(SDA)}$	SDA setup time	250		100		ns
$t_{h(SDA)}$	SDA data hold time	0		0	900	
$t_{r(SDA)}$ $t_{r(SCL)}$	SDA and SCL rise time		1000		300	
$t_{f(SDA)}$ $t_{f(SCL)}$	SDA and SCL fall time		300		300	
$t_{h(STA)}$	Start condition hold time	4.0		0.6		μs
$t_{su(STA)}$	Repeated Start condition setup time	4.7		0.6		
$t_{su(STO)}$	Stop condition setup time	4.0		0.6		μs
$t_{w(STO:STA)}$	Stop to Start condition time (bus free)	4.7		1.3		μs

Touch Controller software protocol

The EXC3132 7-bit slave Address=0x2A

● **INT operating mode**

I^2C Transaction Frame: each I^2C transaction frame transfers one I^2C packet data. The INT pin is low level trigger. The controller will pulls IRQ pin low until no data in the controller buffer.
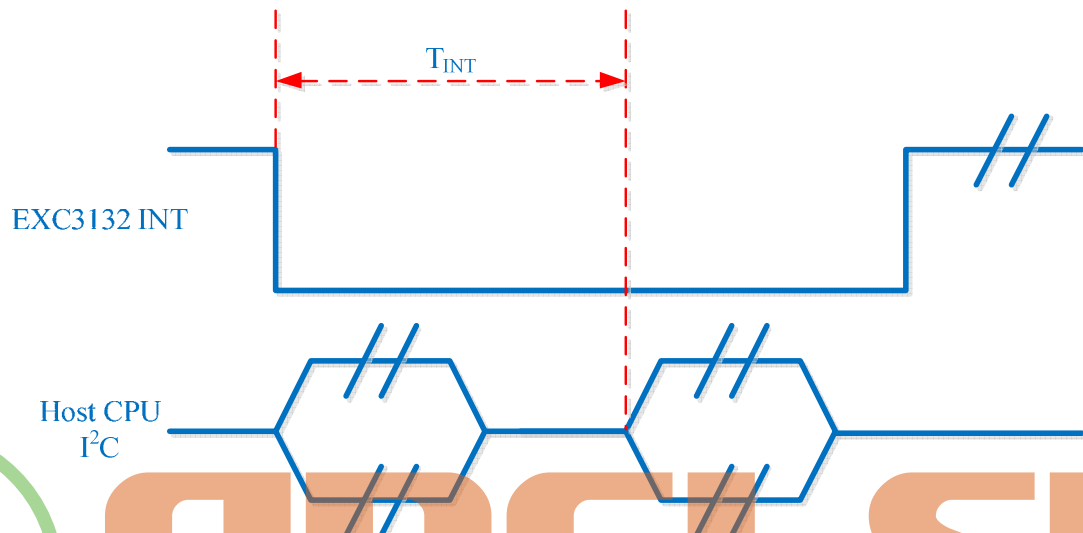
Report rate = $1/T_{INT}$. It depends on properties of touch panel such as resistive value, I^2C clock rate , channel number , thickness and ,material of cover lens , etc.

For better touch performance, we strongly recommend using the 400K clock rate.

● **The complete Read back data format:**

●	From Host to Device
	From Device to Host

S = START condition

Sr = Repeat START condition

P = STOP condition

R = Data direction READ (SDA HIGH)

W = Data direction WRITE (SDA LOW)

Ack = Acknowledge (SDA LOW)

Nak = Not acknowledge (SDA HIGH)

Address = 7-bit (EXC3000 = 0x2A)

DATA = 8bit

Read Mode : Host-receiver , Device-transmitter.

S	Address	R	Ack	Len-LSB	Ack	Len-MSB	Ack	DATA0	Ack

DATA	Ack			DATA65	Nack	P

Host need to read 66 Bytes for input report retrieval.

The 1st Byet0 and 2nd Byte1 (Len-LSB and Len-MSB): The value of "Len" is calculated

by 2 Bytes for "Len: field and n Bytes for valid "Input Data in the payload.

The 3rd DATA0 ~ 66th DATA65 are defined as :

DATA0	DATA1 ~ DATA 65
Report ID	The definitions are differences depends on report ID
Report ID = 0x06 Multi Touch format	<table><tr><td>DATA1</td><td colspan="9">Num of Fingers : Actual contact in this report</td></tr></table> <table><tr><td>DATA2</td><td>DATA3</td><td>DATA4</td><td>DATA5</td><td>DATA6</td><td>DATA7</td><td>DATA8</td><td>DATA9</td><td>DATA10</td><td>DATA11</td></tr></table> Contact data 1 ● Contact data format : <table><tr><td>DATA2</td><td>DATA3</td><td>DATA4</td><td>DATA5</td><td>DATA6</td><td>DATA7</td><td>DATA8</td><td>DATA9</td><td>DATA10</td><td>DATA11</td></tr><tr><td>Byte0</td><td>Byte1</td><td>Byte2</td><td>Byte3</td><td>Byte4</td><td>Byte5</td><td>Byte6</td><td>Byte7</td><td>Byte8</td><td>Byte9</td></tr><tr><td>Status</td><td>Finger ID</td><td>X (LSB)</td><td>X (MSB)</td><td>Y (LSB)</td><td>Y (MSB)</td><td>Reserved</td><td>Reserved</td><td>Reserved</td><td>Reserved</td></tr></table> ● Status: Bit0=1 for touch Down , Bit0=0 for Lift Off. ● X/Y resolution : 4096 The following Contact data are with the same format. <table><tr><td>DATA12</td><td>DATA13</td><td>DATA14</td><td>DATA15</td><td>DATA16</td><td>DATA17</td><td>DATA18</td><td>DATA19</td><td>DATA20</td><td>DATA21</td></tr><tr><td colspan="10">Contact data 2</td></tr><tr><td>DATA22</td><td>DATA23</td><td>DATA24</td><td>DATA25</td><td>DATA26</td><td>DATA27</td><td>DATA28</td><td>DATA29</td><td>DATA30</td><td>DATA31</td></tr><tr><td colspan="10">Contact data 3</td></tr><tr><td>DATA32</td><td>DATA33</td><td>DATA34</td><td>DATA35</td><td>DATA36</td><td>DATA37</td><td>DATA38</td><td>DATA39</td><td>DATA40</td><td>DATA41</td></tr><tr><td colspan="10">Contact data 4</td></tr><tr><td>DATA42</td><td>DATA43</td><td>DATA44</td><td>DATA45</td><td>DATA46</td><td>DATA47</td><td>DATA48</td><td>DATA49</td><td>DATA50</td><td>DATA51</td></tr><tr><td colspan="10">Contact data 5</td></tr><tr><td>DATA52</td><td>DATA53</td><td>DATA54</td><td>DATA55</td><td>DATA56</td><td>DATA57</td><td>DATA58</td><td>DATA59</td><td>DATA60</td><td>DATA61</td></tr><tr><td colspan="4">Scan Time</td><td>Reserved</td><td>Reserved</td><td>Reserved</td><td>Reserved</td><td>Reserved</td><td>Reserved</td></tr><tr><td>DATA62</td><td>DATA63</td><td>DATA64</td><td>DATA65</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Reserved</td><td>Reserved</td><td>Reserved</td><td>Reserved</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> The device input report contains maximum 5 contacts in one I^2C frame. If it must report 10 contacts, device will break these down into 2 I^2C frames that report 5 contacts each. The "Num of Fingers" only show in the first frame. The "Num of Fingers" of the second frame is 0.

7 INPUT SIGNAL

7.1 LVDS Signal

switching characteristics over recommended operating conditions (unless otherwise noted)

	PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
t_{su}	Setup time, D0–D20 to CLKOUT↓	C_L = 8 pF, See Figure 5	5			ns
t_h	Data hold time, CLKOUT↓ to D0–D20		5			ns
$t_{(RSKM)}$	Receiver input skew margin§ (see Figure 7)	t_c = 15.38 ns (±0.2%), |Input clock jitter| < 50 ps¶,	550	700		ps
t_d	Delay time, CLKIN↑ to CLKOUT↓ (see Figure 7)	V_{CC} = 3.3 V, t_c = 15.38 ns (±0.2%), T_A = 25°C	3	5	7	ns
t_{en}	Enable time, $\overline{SHTDN}$ to phase lock	See Figure 7		1		ms
t_{dis}	Disable time, $\overline{SHTDN}$ to off state	See Figure 8		400		ns
t_t	Transition time, output (10% to 90% t_r or t_f) (data only)	C_L = 8 pF		3		ns
t_t	Transition time, output (10% to 90% t_r or t_f) (clock only)	C_L = 8 pF		1.5		ns
t_w	Pulse duration, output clock			0.50 t_c		ns

† All typical values are at V_{CC} = 3.3 V, T_A = 25°C.

§ The parameter $t_{(RSKM)}$ is the timing margin available to allocate to the transmitter and interconnection skews and clock jitter. The value of this parameter at clock periods other than 15.38 ns can be calculated from t_{RSKM} = tc/14 − 550 ps.

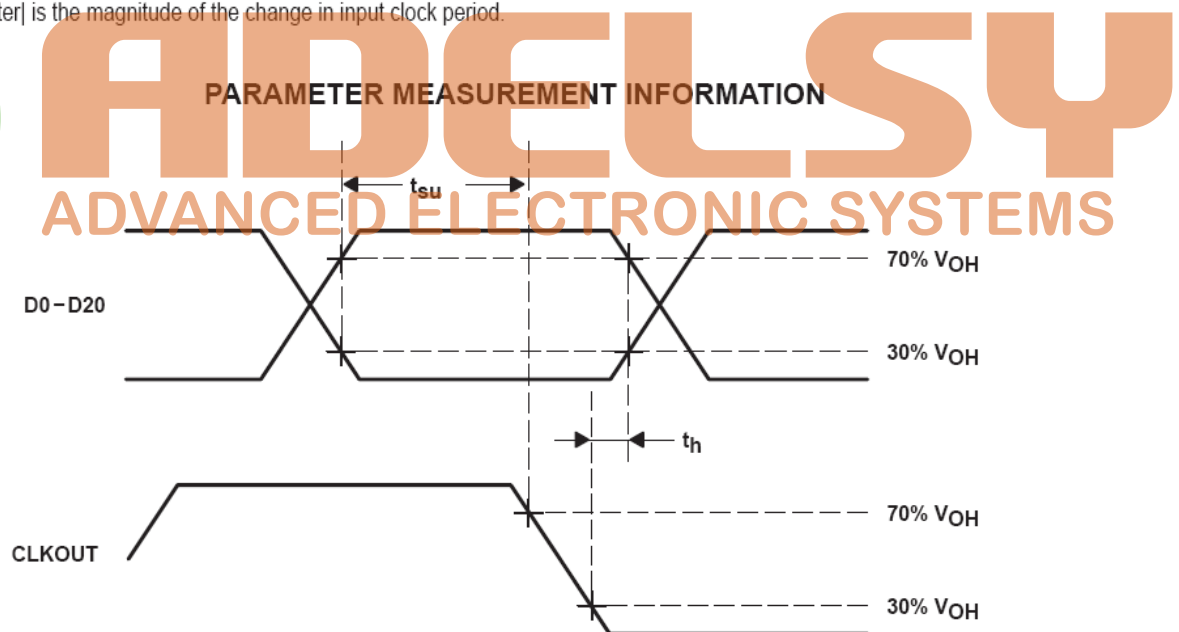¶ \|Input clock jitter\| is the magnitude of the change in input clock period.

PARAMETER MEASUREMENT INFORMATION

Figure 5. Setup and Hold Time Waveforms
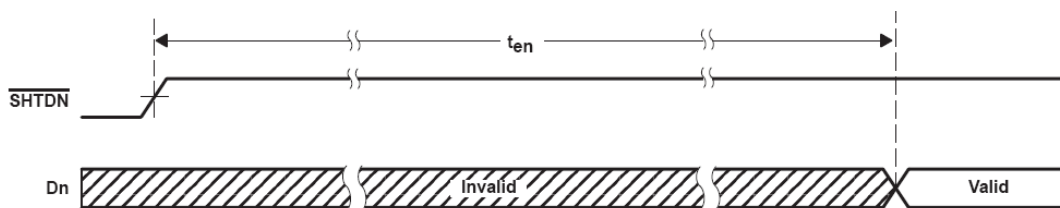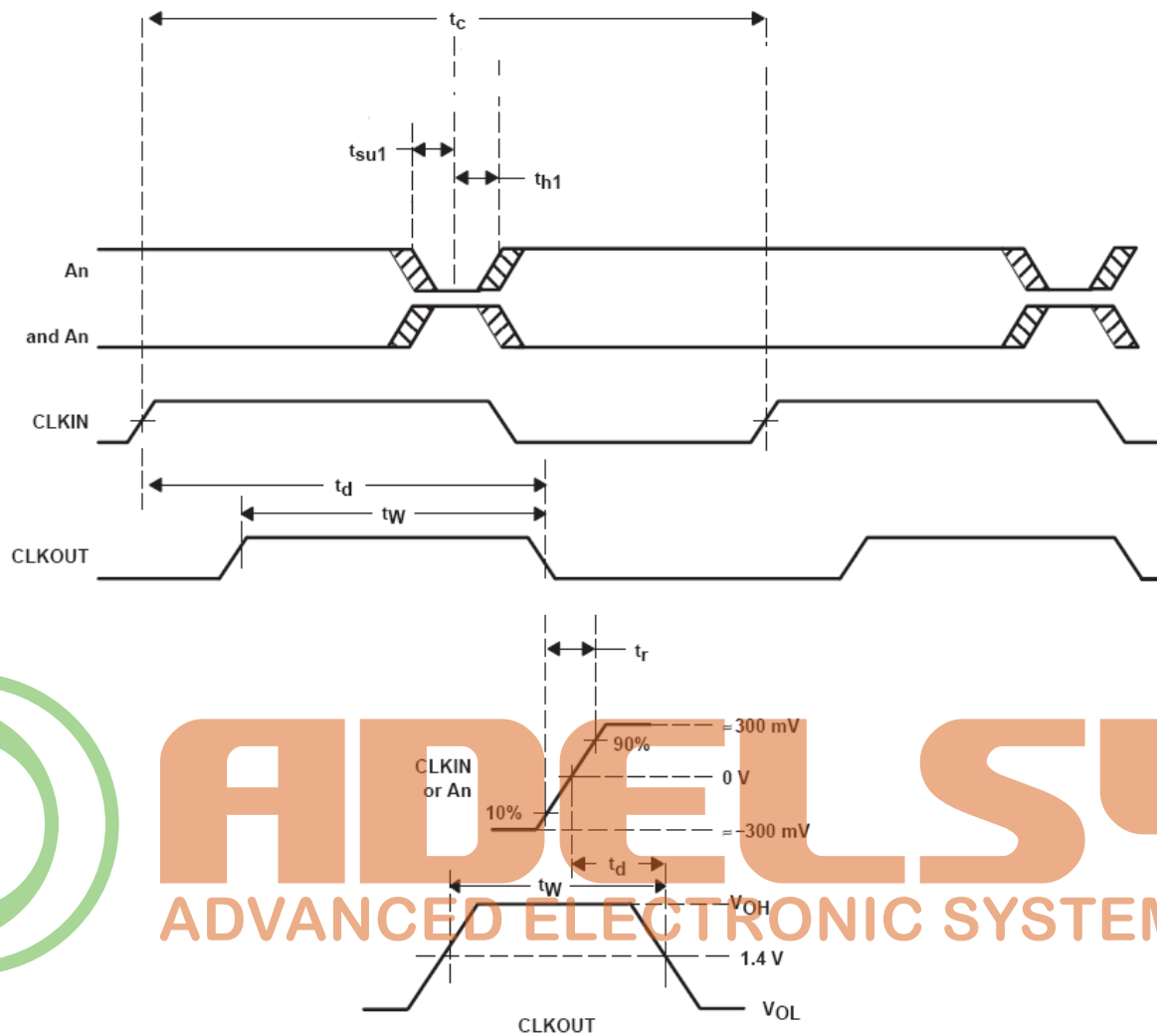
Figure 7. Enable Time Waveforms
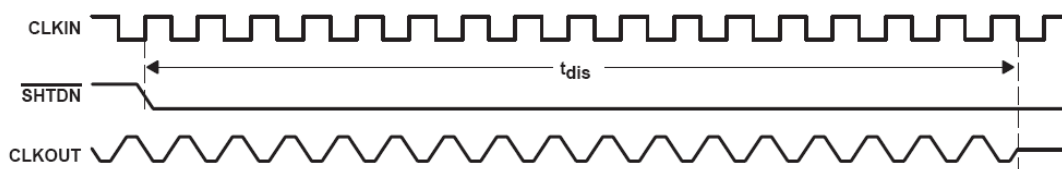
Figure 8. Disable Time Waveforms

7.2 Timing of LCD Timing controller

Parameter	Symbol	Min.	Typ.	Max.	Unit
Data setup time	Tdsu	6	-	-	ns
Data hold time	Tdhd	6	-	-	Tcph
DE setup time	Tesu	6	-	-	Tcph
CLK frequency	F$_{CPH}$		33.26		MHz
CLK period	T$_{CPH}$		30.06		ns
CLK pulse duty	T$_{CWH}$	40	50	60	%
DE period	T$_{DEH}$+T$_{DEL}$	1000	1056	1200	T$_{CPH}$
DE pulse width	T$_{DEH}$	-	800	-	T$_{CPH}$
DE frame blanking	T$_{DEB}$	10	45	110	T$_{DEH}$+T$_{DEL}$
DE frame width	T$_{DE}$	-	480	-	T$_{DEH}$+T$_{DEL}$

Note：We suggest using the typical value, so it can have better performance.
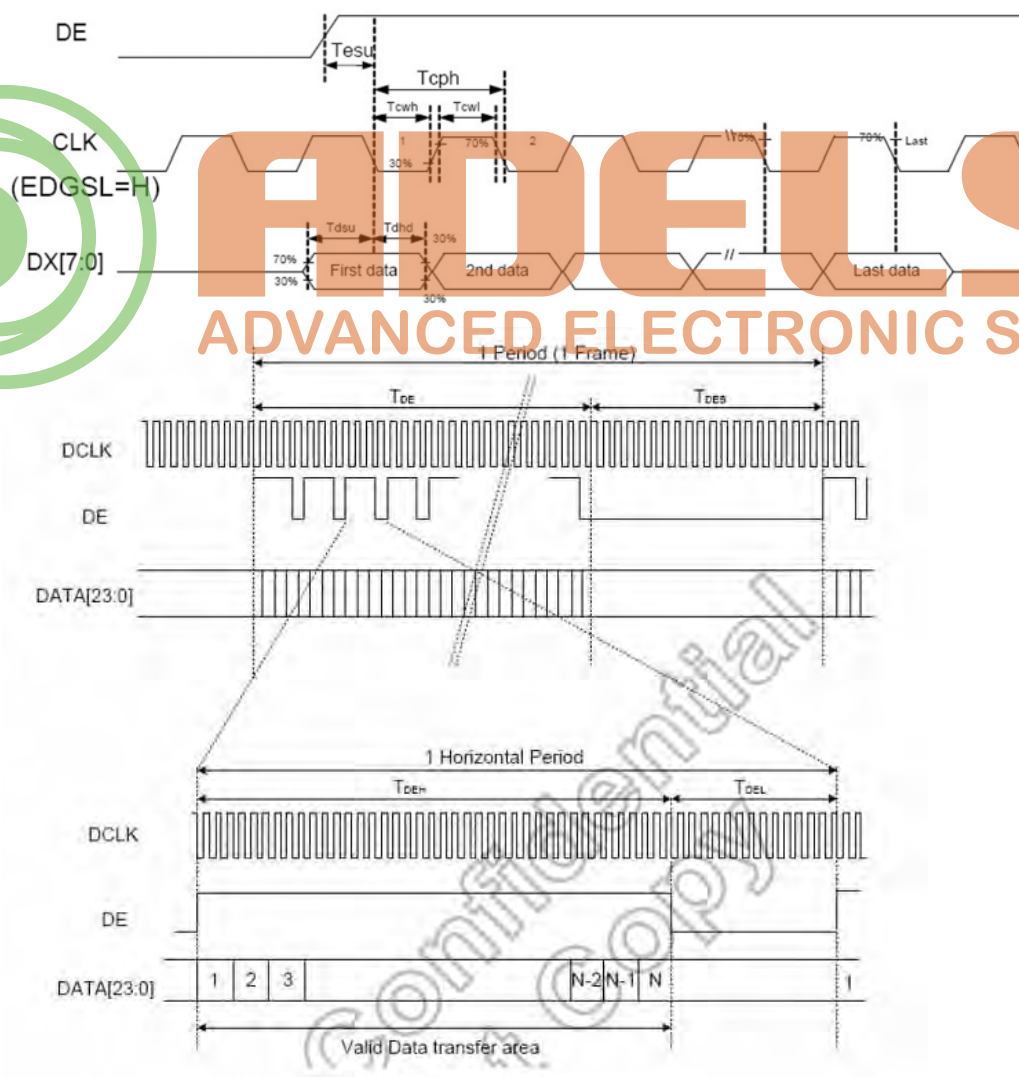
8 Power On / Off Sequence
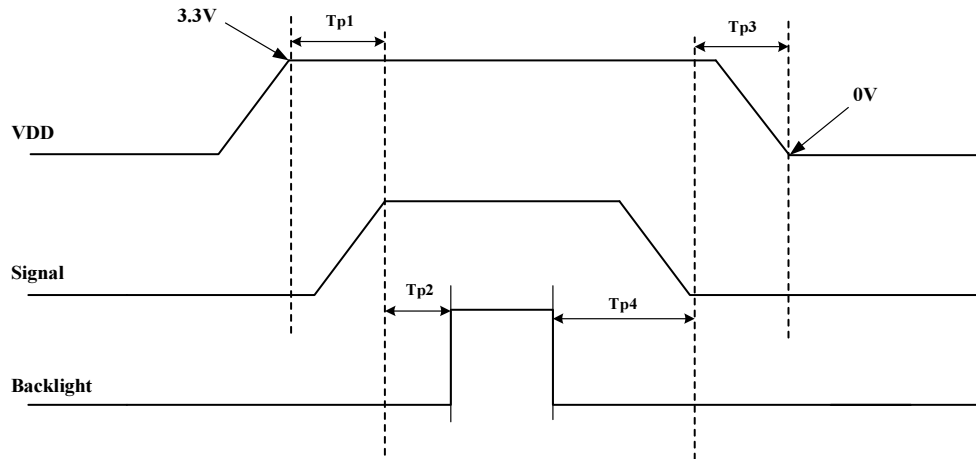
Item	Symbol	Value			Units	Remark
		Min.	Typ.	Max.		
VDD on to signal starting	Tp1	5	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD off	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	

9 .Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-30°C (30min) ~ 80°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).
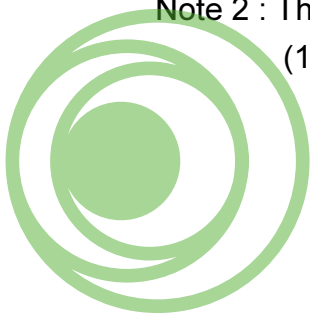
10 General Precautions

10-1 Safety

Liquid crystal is poisonous. Do not put it your month. 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±10℃ 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.

10-6 Mechanism

(1) Please mount LCD module by using mounting holes arranged in four corners tightly.

(2) The square adhesive tape which is between the touch panel and display can't provide well supporting in the long term and high ambient temperature condition. Whether upright or horizontal position the support holder which is in the back side of

the display is needed. Do not let the display floating.
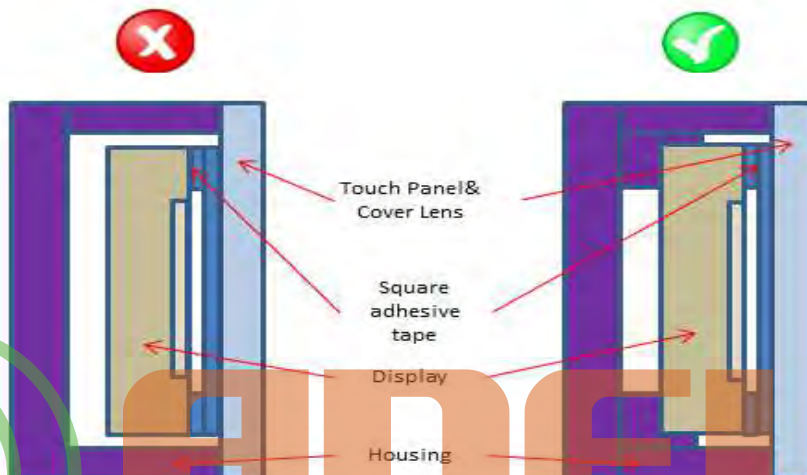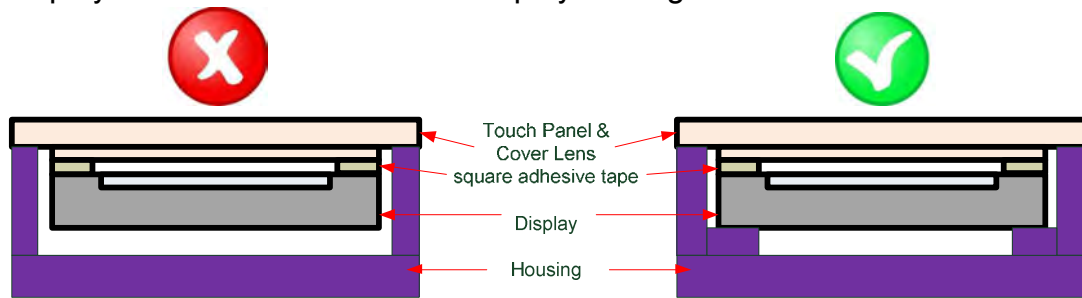
10-7 Others

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

11. Outline Dimension

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1 connector:P0.5 50PIN/FH12A-50S-0.5SH or Equivalent.
4. CN2 P1.0 20Pin CP100-S20G-H16 or Equivalent
5. T/P Controller board: ENTERY 3808K-F06N-03L or Equivalent

CN2

1	VDD	11	IN2-
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK-
5	IN0-	15	CLK+
6	IN0+	16	GND
7	GND	17	LEDADJ
8	IN1-	18	VLED
9	IN1+	19	IN3-
10	GND	20	IN3+

I2C interface:

1	GND	4	VDD
2	SDA	5	INT
3	SCL	6	/RES

A Block

R G B

0.179
0.0642
0.1926

	1	800480AY-A0+800480B CTP		7	
	2	I2C interface(3132)		8	
	3	T/P Controller Board		9	
	4			10	
	5			11	
	6			12	

| DIM. | A | B |
| TOLERANCE GRADE(±) | | |

IE NO.

PART'S NO. LCM
800480AY-TA0

DWN. Mingfu   DATE 07-05-16'
CHK.   DATE
APPD.   DATE

TITLE
800480AY-TA0
(7.0")+CTP

DWG. NO.
*160719MB

SHEET 1 OF 1

Dimensions shown:
128.0±0.5 (Cover Lens)
100.0±0.2 (LCM)
89.7±0.2 (T/P A,A)
89.39±0.2 (V,A for Bezel)
87.34±0.2 (Cover Lens V,A)
86.92±0.2 (V,A for LCD)
85.92 (A,A for LCD)
184.0±0.5 (Cover Lens)
164.9±0.2 (LCM)
157.08±0.2 (V,A for Bezel)
155.6±0.2 (T/P A,A)
155.08±0.2 (V,A for LCD)
154.3±0.2 (Cover Lens V,A)
154.08 (A,A for LCD)
92.0±0.5
64.2±0.5
75.0±0.2
47.18±0.2
4.0±0.2
18.0±0.2
2.0±0.2
70.0±0.2
37.0±0.2
4.0±0.2
12.0±0.5
8.15±0.5
8.45±0.5
5.7±0.3

M2 Screw holes

AMPIRE 晶采光電科技

A Block

RGB

0.179
0.0642
0.1926

CN2

1	VDD	11	IN2−
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK−
5	IN0−	15	CLK+
6	IN0+	16	GND
7	GND	17	LEDADJ
8	IN1−	18	VLED
9	IN1+	19	IN3−
10	GND	20	IN3+

I2C interface:

1	GND
2	SDA
3	SCL
4	VDD
5	INT
6	/RES

Note:
1. Unless indicated, Tolerance ±0.3"
2. UV Glue For OLB Protection.
3. CN1 connector:P0.5 50PIN/FH12A-50S-0.5SH or Equivalent.
4. CN2 P1.0 20Pin CP100-S20G-H16 or Equivalent
5. T/P Controller board: ENTERY 3808K-F06N-03L or Equivalent

Back View

1	800480AY-A0+800480B CTP	7
2	I2C interface(3132)	8
3	T/P Controller Board	9
4		10
5		11
6		12

| TOLERANCE GRADE(±) | A | | B | DIM. | MM | DWN. | DATE |
| | | | | | | Mingfu | 07-05-16 |

| PARTS NO. LCM-1 | | | | APPD. | | DATE |
| 800480AY-TA0 | IE NO. | MM | CHK. | | DATE |

TITLE
800480AY-TA0
(7.0")+CTP

DWG. NO.
*160720MB

SHEET 1 OF 1

AMPIRE 晶采光電科技

Kapton Tape (50.0x10.0mm)
22-Conductive Fabric 7.0x15.5mm
GND pad
Back View

(49.6)
51.15±0.3
50.0±0.3 (PCB)
184.4±0.5 (Cover Lens)
164.5±0.2 (LCM)
140.0±0.3 (PCB)
142.75±0.5
92.0±0.5
4.00±0.3(PCB)
(47.9±0.3)
50.0±0.3(PCB)
70.0±0.3
100.0±0.2 (LCM)
128.0±0.5 (Cover Lens)
64.0±0.5

M2 Screw holes
雙面膠貼合
M2 Screw holes
12.1±0.5
4.0±0.2
18.0±0.2
2.0±0.2
47.18±0.2
75.0±0.2
4.0±0.2

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	07-05-16	Mingfu
1	Modify interface & Note.	10-26-16	EMILY