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-1024768Y1TZQW-TA3H**
APPROVED BY	
DATE	

☐ **Approved For Specifications**

☐ **Approved For Specifications & Sample**

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2019/01/31	-	New Release	Mark
2019/02/13		Remove LED Driver	Mark

1. General specification

AM-1024768YTZQW-A0H is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.4 inch diagonally measured active display area with HD (1024 horizontal by 768 vertical pixels) resolution.

(1) Construction: 10.4” a-Si TFT active matrix, White LED Backlight.
(2) Resolution (pixel): 1024(R.G.B) X 768
(3) Number of the Colors : 262K (R , G , B 6 bit digital each)
(4) LCD type : Normally black
(5) Interface : 18 Bit LVDS interface
(6) Projective Capacitive Touch
   a. Interface : I2C
   b. Touch Controller : EETI EXC3000

1.1 Display Characteristics

Item	Specification	Unit
Outline Dimension	236 (H) x 175 (V) x10.31 (D) (Typ)	mm
Display area	211.2(H) x 158.4(V) (10.4” diagonal)	mm
Number of Pixel	1024(H) x 768(V)	pixels
Pixel pitch	0.20625(H) x 0.20625(V)	mm
Pixel arrangement	RGB Vertical Stripe	
Display mode	Normally Black	
NTSC	70(Typ.)	%
Surface treatment	Antiglare, Hard-Coating (3H)	
Weight	TBD	g
Back-light	Single LED (Side-Light type)	

2. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle	600	900	–		(1)(2)
Response time	Rising	TR+TF		–	30	40	msec	(1)(3)
	Falling							
White luminance (Center)		Y_L		425	510	–	cd/m^2	(1)(4) (I_L=480mA)
Color chromaticity (CIE1931)	White	W_x		0.273	0.313	0.353		(1)(4)
		W_y		0.289	0.329	0.369		
	Red	R_x			TBD			
		R_y			TBD			
	Green	G_x			TBD			
		G_y			TBD			
	Blue	B_x			TBD			
		B_y			TBD			
Viewing angle	Hor.	$Θ_L$	CR>10	80	85	–		
		$Θ_R$		80	85	–		
	Ver.	$Θ_U$		80	85	–		
		$Θ_D$		80	85	–		
Brightness uniformity		B_{UNI}	Θ=0	70	80	–	%	(5)
Optima View Direction		Free						(6)

Measuring Condition

- Measuring surrounding: dark room
- LED current I_L: 480mA
- Ambient temperature:

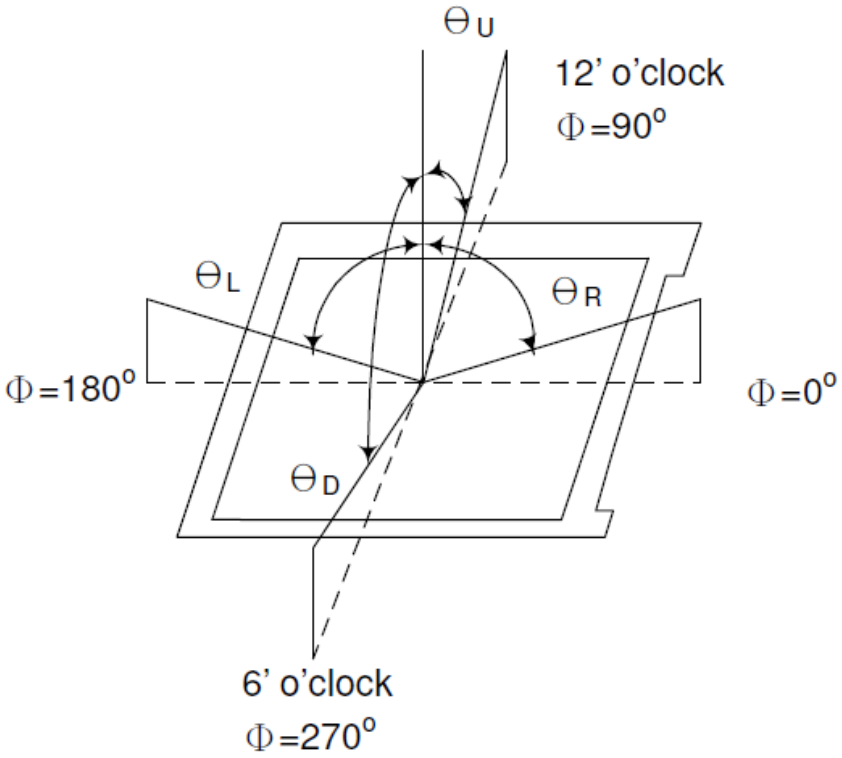
25±2°C

- 15min. warm-up time.

Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size : 20 ~ 21 mm

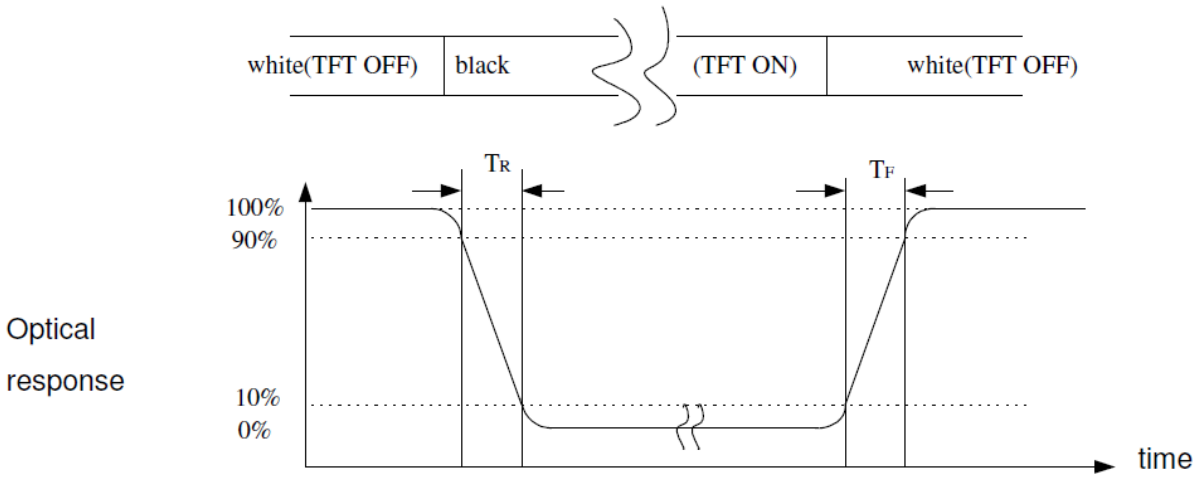
Note (1) Definition of Viewing Angle:



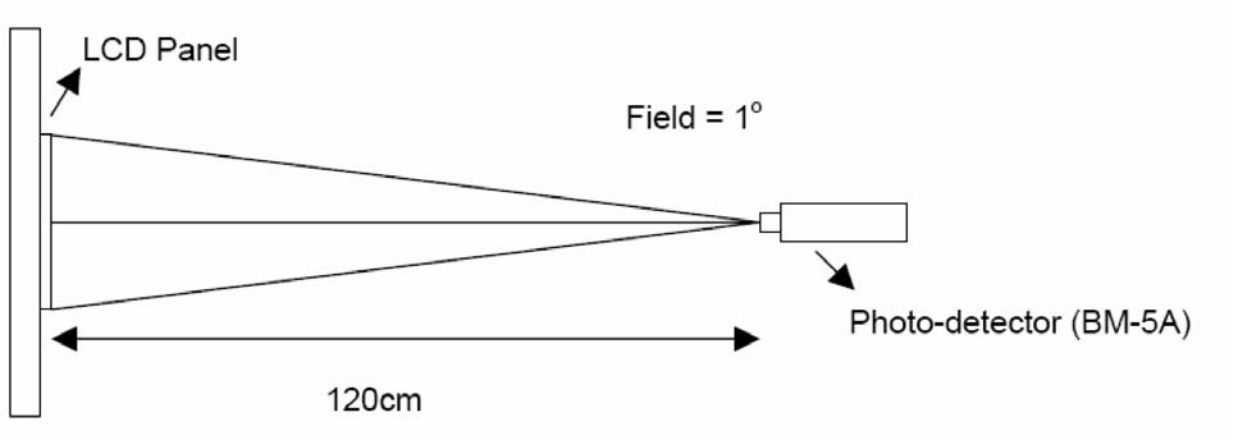
Note (2) Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

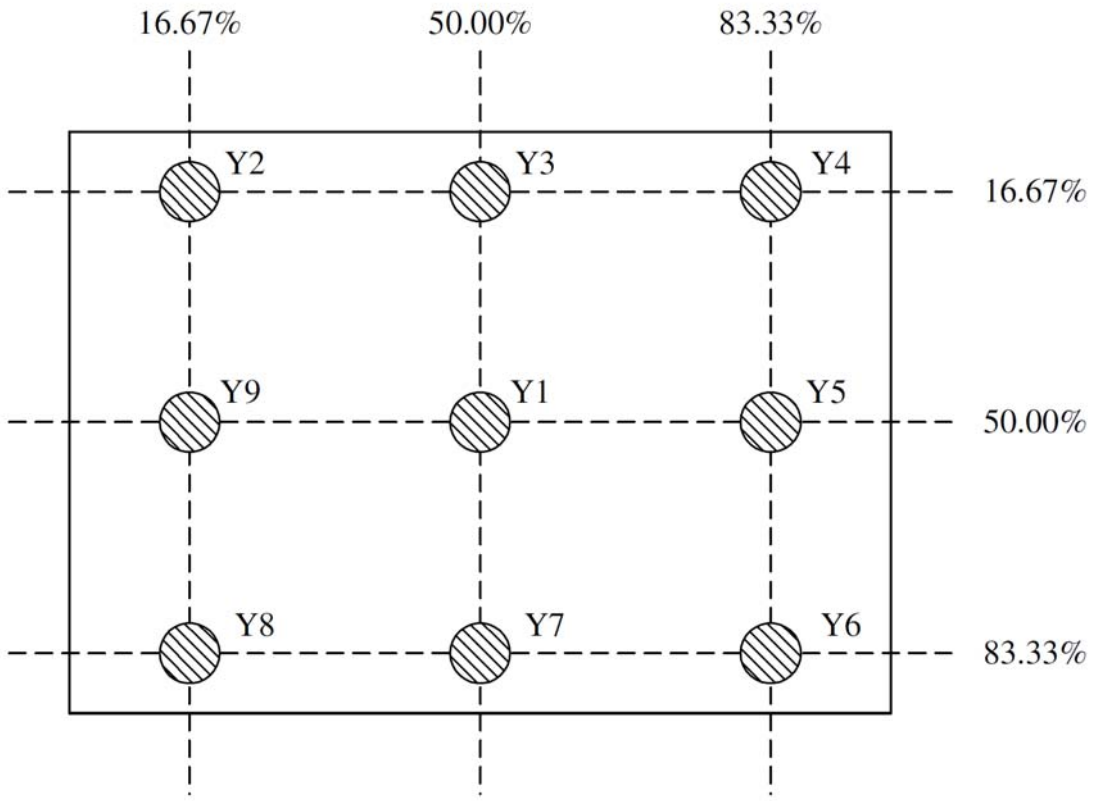
Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



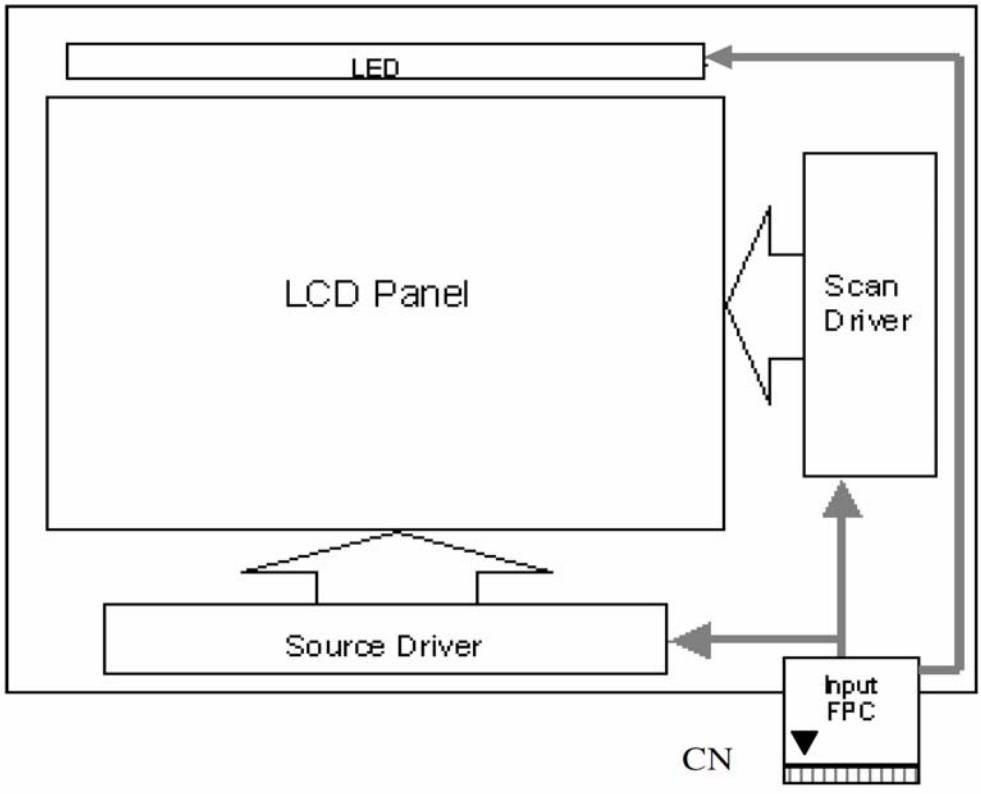
Note (5) Definition of brightness uniformity



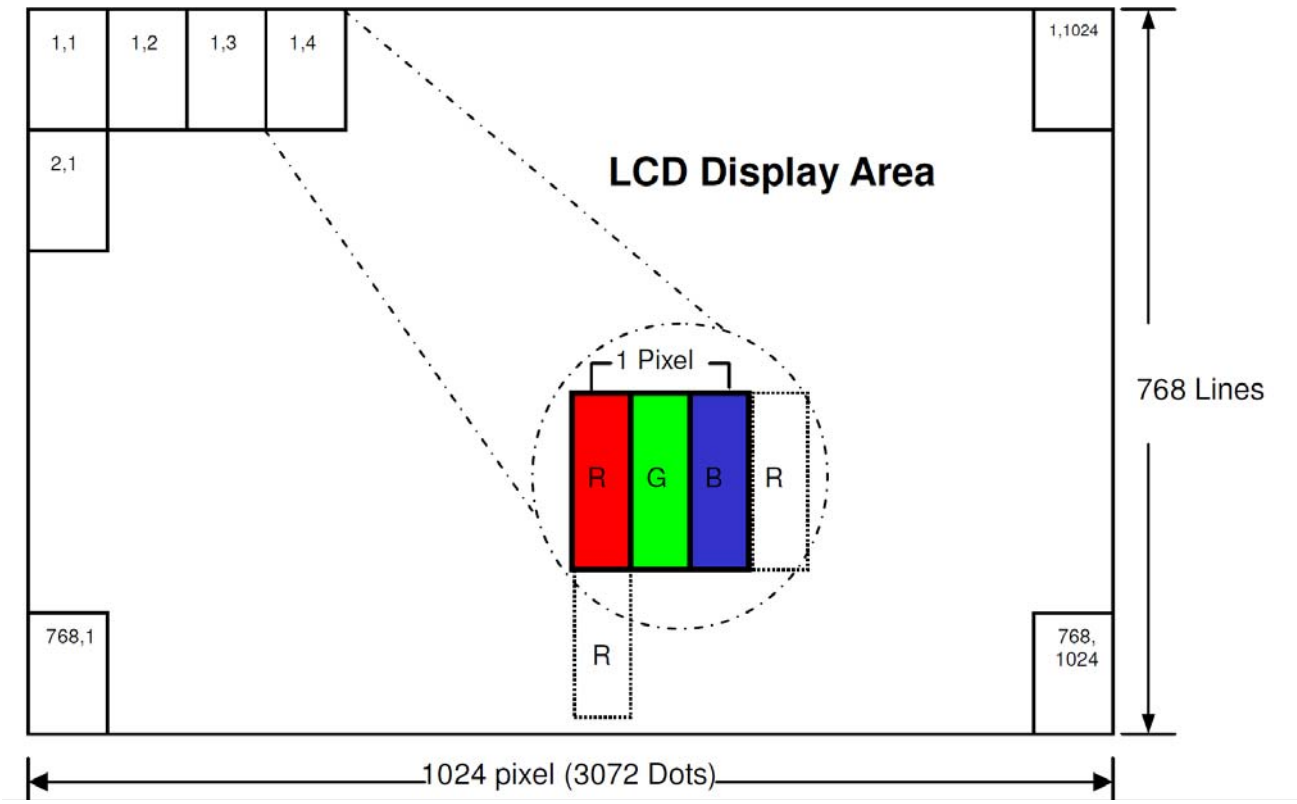
$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

Note (6)：Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

3. Functional Block Diagram



Pixel Format



3.1 Relationship between Displayed Color and Input

	Display	MSB R7	R6	R5	R4	R3	R2	R1	LSB R0	MSB G7	G6	G5	G4	G3	G2	G1	LSB G0	MSB B7	B6	B5	B4	B3	B2	B1	LSB B0	Gray scale Level
Basic color	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	Light Blue	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	-
	Yellow	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	-
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	-
Gray scale of Red	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L1
	↑	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
	↓	:								:								:								L3···L251
	Light	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L252
		H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L254
	Red	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Red L255
Gray scale of Green	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L1
	↑	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	L	L	L2
	↓	:								:								:								L3···L251
	Light	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L	L252
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L	L	L	L	L	L	L	L	L253
		L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	L	L254
	Green	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	L	L	L	L	L	L	L	L	Green L255
Gray scale of Blue	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L1
	↑	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	L	L2
	↓	:								:								:								L3···L251
	Light	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	L	L252
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	L	H	L253
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	L	L254
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	H	H	H	H	H	H	H	H	Blue L255
Gray scale of White & Black	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
	Dark	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L1
	↑	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L2
	↓	:								:								:								L3···L251
	Light	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	H	H	H	H	H	H	L	L	L252
		H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	L253
		H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	H	H	H	H	H	H	H	L	L254
	White	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	White L255

4. ABSOLUTE MAXIMUM RATINGS

4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
Power supply voltage	VDD	-0.3	5	V	
Logic Signal Input Level	V_{DVDD} V_{DVDD_LVDS}	-0.3	5	V	

4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T_{opa}	-20	70	℃	
Storage Temperature	T_{stg}	-30	80	℃	

5. ELECTRICAL CHARACTERISTICS

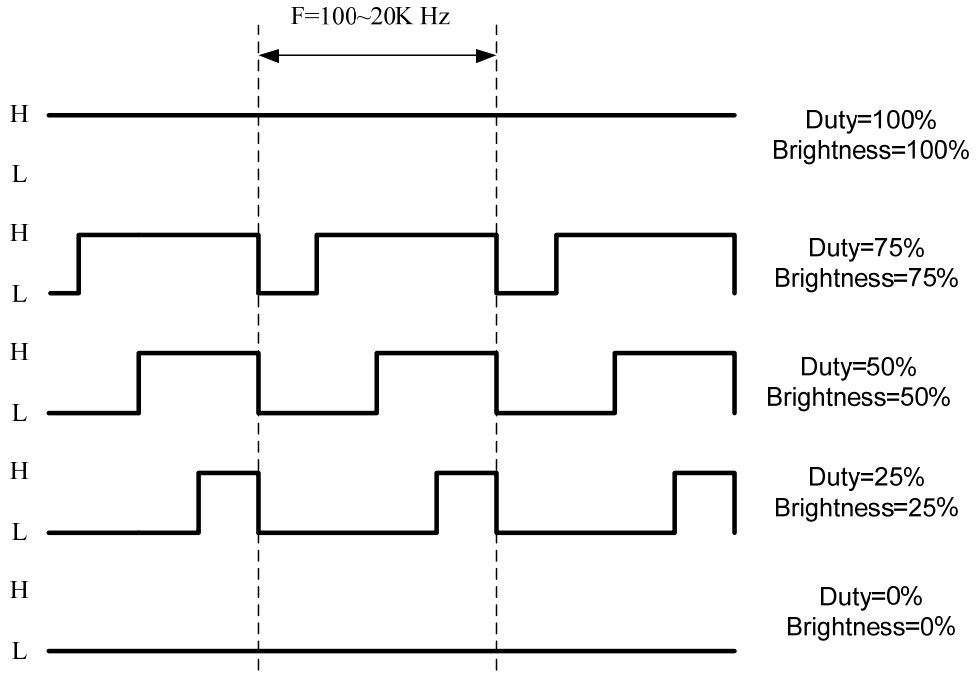
5.1 TFT LCD Module

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VDD	3	3.3	3.6	V	
	VAK		12.9		V	
Input signal voltage	ViH	0.8 VDD		3.6	V	
	ViL	0		0.2VDD	V	

5.2 Switching Characteristics for LVDS Receiver

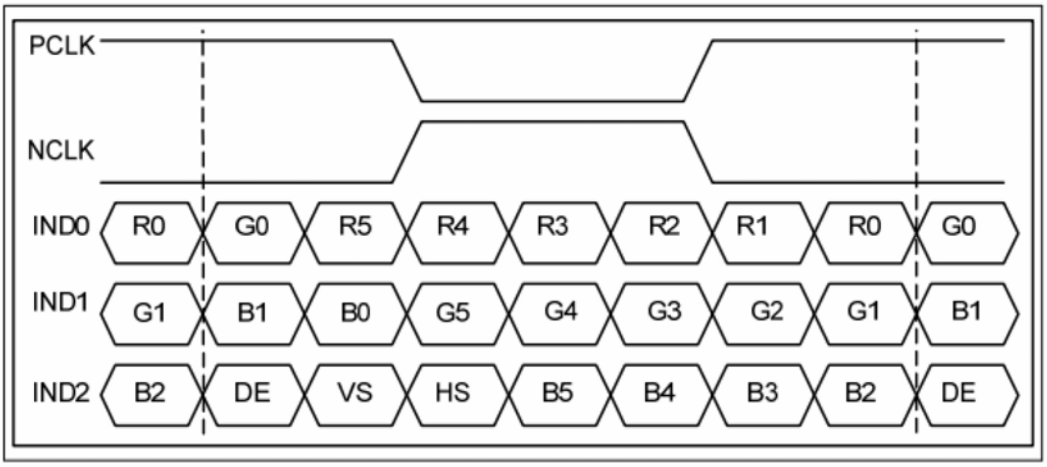
Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth			100	mV	V_{CM}=1.2V
Differential Input Low Threshold	Vtl	-100			mV	
Input Current	I_{IN}	-10		10	uA	
Differential input Voltage	$\|V_{ID}\|$	0.1		0.6	V	
Common Mode Voltage Offset	V_{CM}	0.7	1.2	1.6	V	

PWM

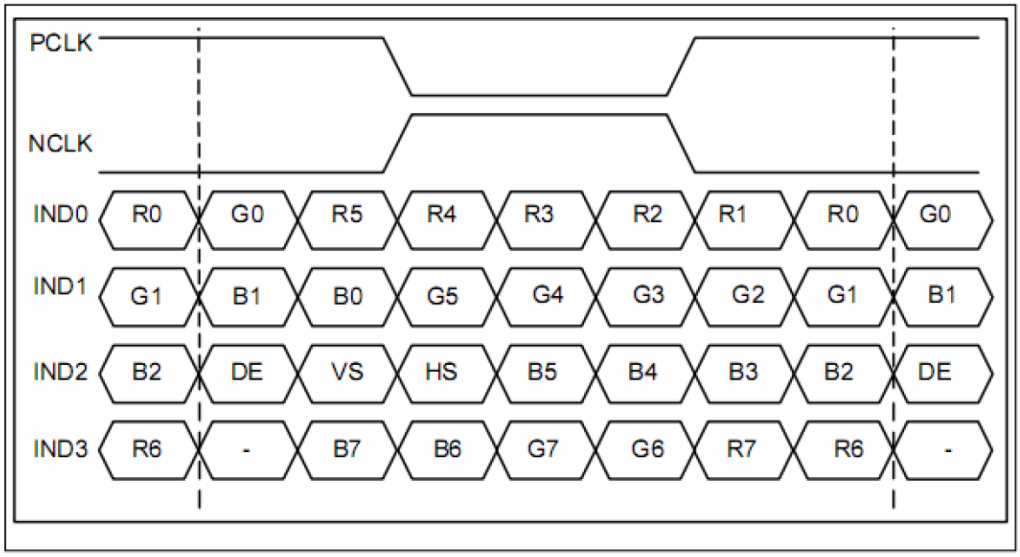


5.3 Bit LVDS input

5.3.1 6Bit LVDS input



5.3.2 8Bit LVDS input

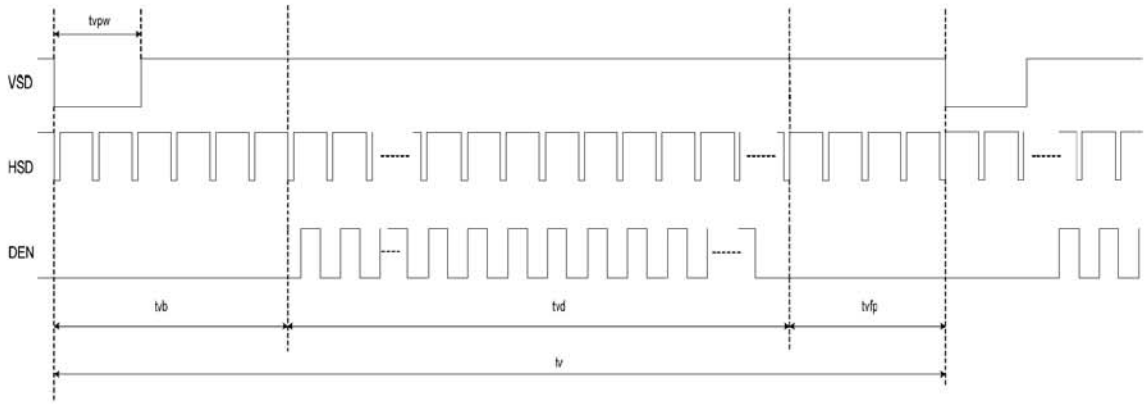


5.4 Interface Timing (DE mode)

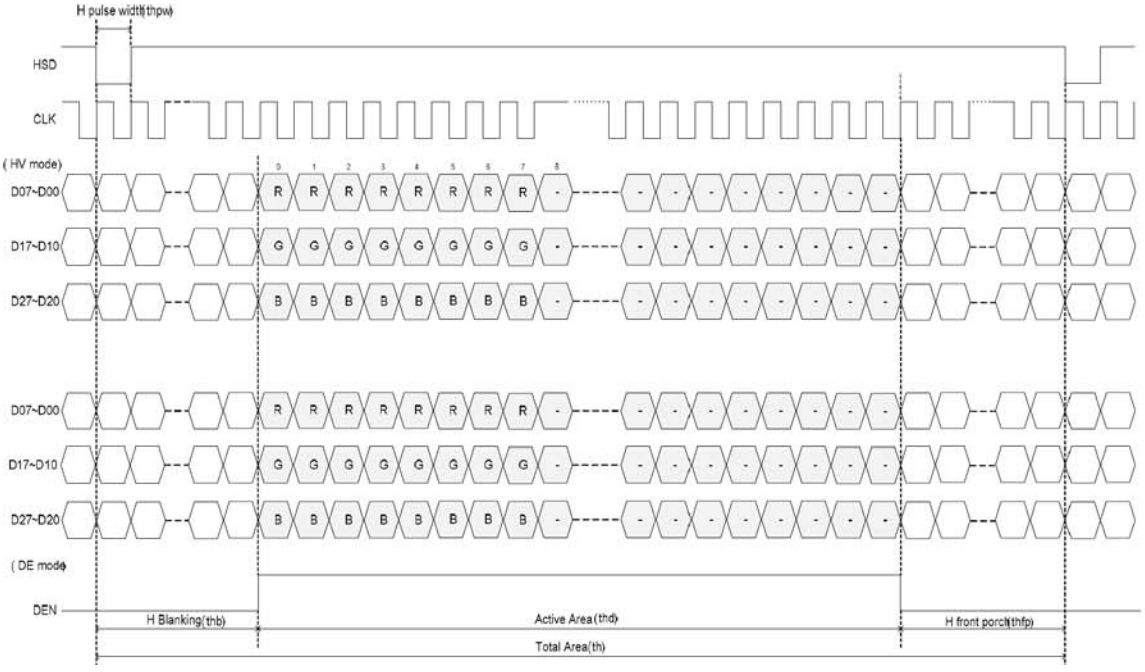
DE mode					
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	52	65	71	Mhz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		768		H
VSYNC period time	tv	778	806	845	H
VSYNC blanking	tvb+tvfp	10	38	77	H

Timing Diagram of Interface Signal (DE mode)

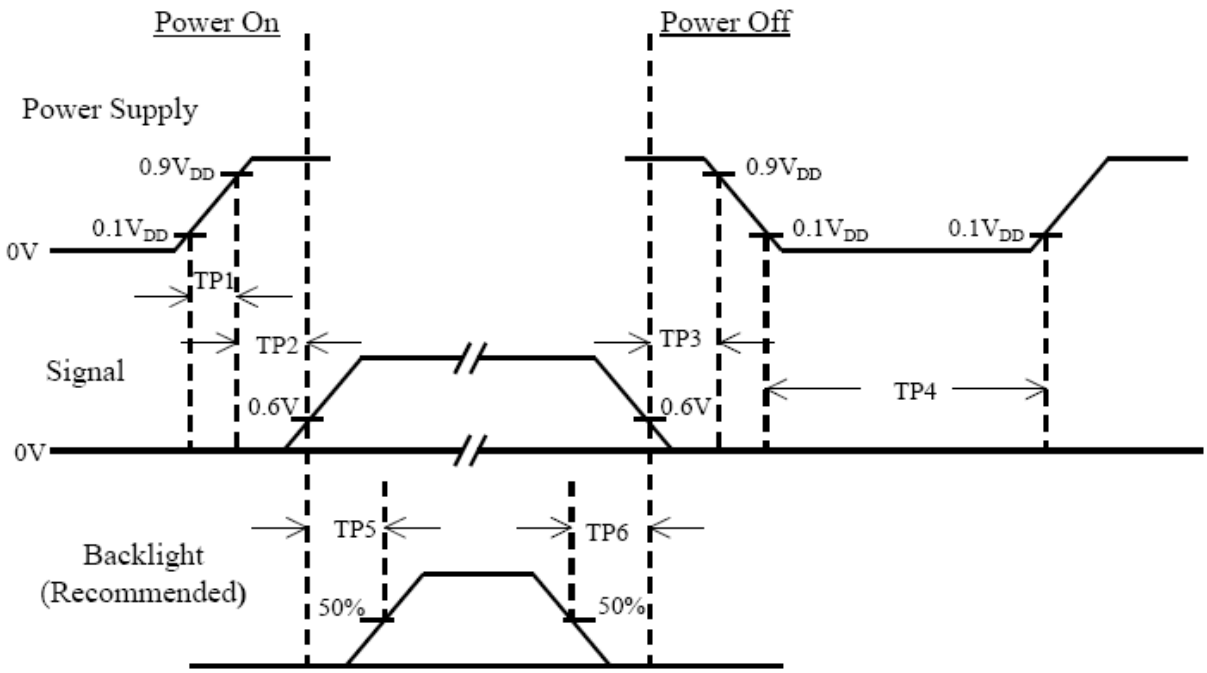
(1). Vertical input timing



(2). Horizontal input timing



5.5 Power On / Off Sequence



Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

Note：

(1) The supply voltage of the external system for the module input should be the same as the definition of VDD.

(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

(3) In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.

(4) TP4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

5.6 Backlight Unit

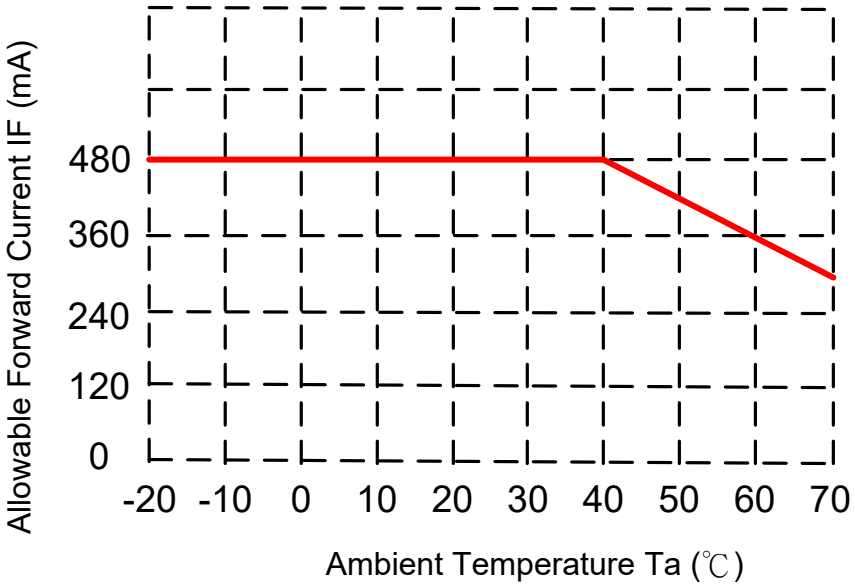
Parameter	Symbol	Min	Typ	Max	Units	Condition
LED Current	I_L	--	480	--	mA	Ta=25℃
LED Voltage	V_L	--	12.9	13.6	Volt	Ta=25℃
LED Life-Time	N/A	30,000	--	--	Hour	Ta=25℃ I_F=60mA Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=480mA. The LED lifetime could be decreased if operating IL is larger than 480mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit

When LCM is operated over 40℃ ambient temperature, the IL should be follow :



6. INTERFACE PIN CONNECTION

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 data input	
15	CLK+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	IN3-/NC	I	- LVDS differential data input If you use 6bit LVDS, please keep it NC	
18	IN3+/NC	I	+ LVDS differential data input If you use 6bit LVDS, please keep it NC	
19	NC	P	No connection	
20	NC	P	No connection	

7. TOUCH PANEL ELECTRICAL SPECIFICATION

Basic Characteristic

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Cover Lens	None
Activation	2-fingers
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 100 points/sec
Control IC	**EETI EXC3000**

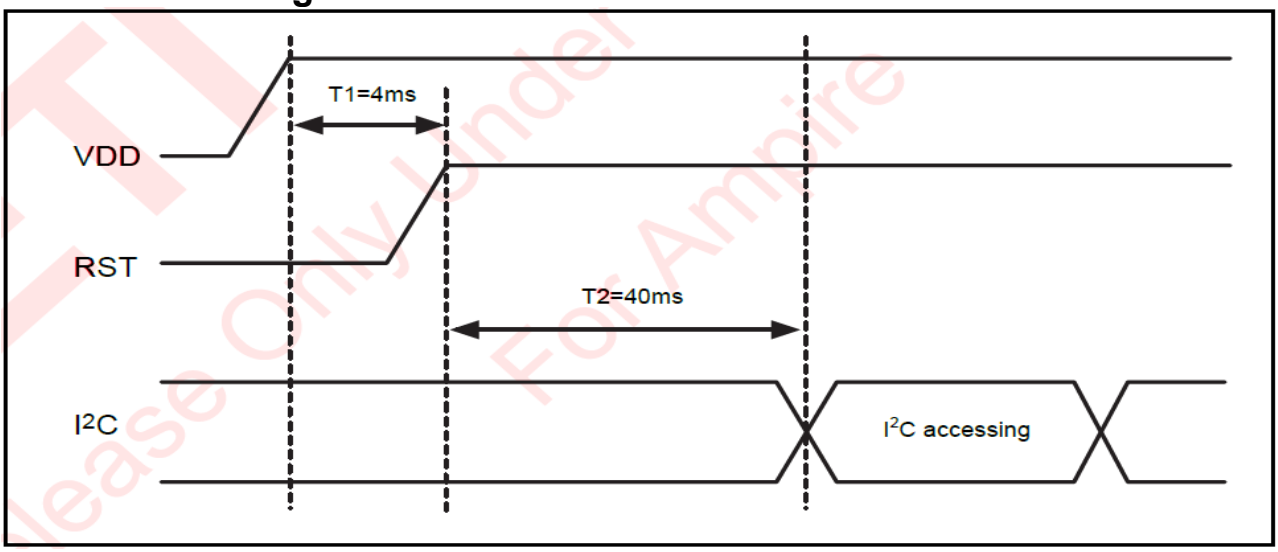
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Low Level Input Voltage	VIL	0	--	0.8	V	1
High Level Input Voltage	VIH	0.8*VIN	--	VIN	V	1
Power Consumption	I_{VDD}		T.B.D		mA	

Note 1: SDA , SCL ,/INT, RES

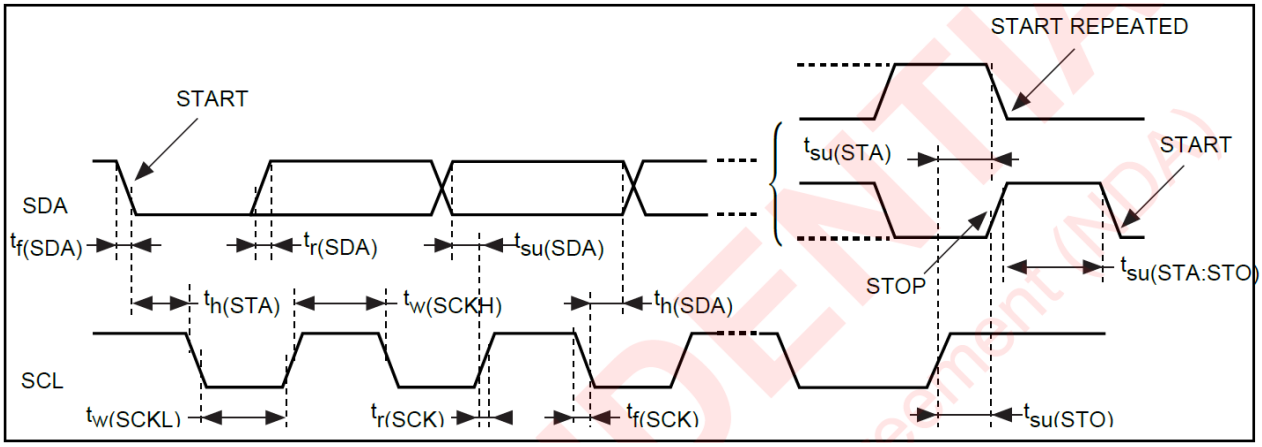
Interface

Pin	Name	Description
1	PGND	Power GND
2	SDA	I^2C Data
3	SCL	I^2C Clock
4	VIN	Power supply 3.3V
5	INT	Active “Low” Interrupt Output pin. Active “Low”
6	RST	Rest input pin to Master Chip.

Power- on Timing Chart



7.4 I2C AC Waveform



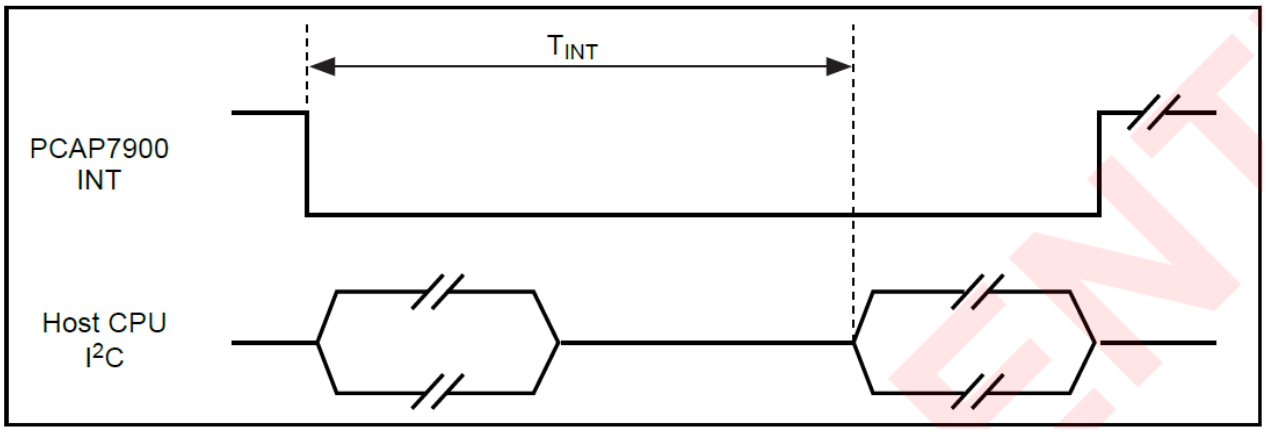
I2C Characteristics

Symbol	Parameter	SCL = 100KHz		SCL = 400KHz		Unit
		Min	Max	Min	Max	
$t_{w(SCLH)}$	SCL clock high time	4.7		1.3		μs
$t_{w(SCLL)}$	SCL clock low 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

Software Protocol

I2C Transaction Frame: each I2C transaction frame transfers one I2C packet data. The IRQ pin is low level trigger.

The controller will pulls IRQ pin low until no data in the controller buffer.



Report rate = 1 / TINT , it depends on properties of touch screen such as resistive value, I2C clock rate, channel number, thickness and material of cover lens, etc.

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

	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 (0x2A)
DATA = 8-bit

Read mode : Host-receiver, Device-transmitter.

S	Address	R	Ack	Len-LSB	Ack	Len-MSB	Ack	DATA	Ack
DATA	Ack				DATA	Nak	P		

Host need to read 66 Bytes for input report retrieval. The total 66 Bytes contains 2 Bytes "Length" and 64 Bytes data payload. The value of "Len" is calculated by 2 Bytes for "Len" field and n Bytes for valid "Input Data" in the payload.

The input data packet format inside the I2C payload is defined as

Report ID	Data

According to different report ID, there are different data format as below.
Report ID = 6, for parallel mode multi-touch data.

Multi-Touch format :

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11
Report ID = 0x06	Num Of Fingers*	Contact data 1									
Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19	Byte20	Byte21		
Contact data 2											
Byte22	Byte23	Byte24	Byte25	Byte26	Byte27	Byte28	Byte29	Byte30	Byte31		
Contact data 3											
Byte32	Byte33	Byte34	Byte35	Byte36	Byte37	Byte38	Byte39	Byte40	Byte41		
Contact data 4											
Byte42	Byte43	Byte44	Byte45	Byte46	Byte47	Byte48	Byte49	Byte50	Byte51		
Contact data 5											
Byte52	Byte53	Byte54	Byte55								
Scan Time											

The device input report contains maximum 5 contacts in one I2C frame. If it must report 10 contacts, device will break these down into 2 I2C frames that report 5 contacts each.
The “Nums of Fingers” indicates the actual contact in this report. The actual contact number is reported in the first frame. The other frames should have an actual count of 0. For 10 contacts example, the actual count in the first frame has a value of 10, and the second frame has an actual count of 0.

Contact data format :

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
State**	Finger ID	X *** (LSB)	X (MSB)	Y *** (LSB)	Y (MSB)	reserved		reserved	

** tate: Bit0=Down/Up bit, Bit0 = 1 for Touch Down, Bit0 = 0 for Lift off.

*** The X/Y resolution is 4096.

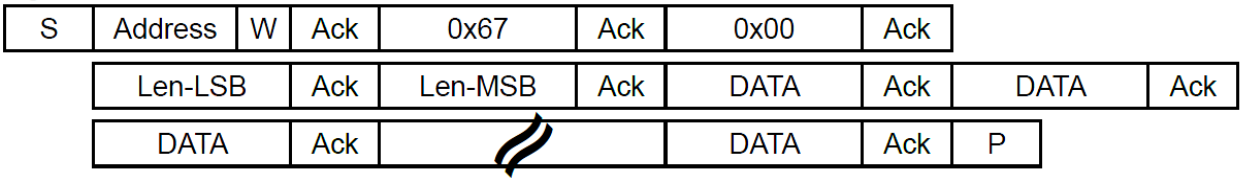
Report ID = 3, for vendor specific diagnostics data.

Diagnostics packet format

Byte0	Byte1	≈
Report ID = 0x03	Length	data stream

The “Length” indicates the length of the coming data stream. This data stream must follow EETI eGalax diagnostics format. The software integrator must be carefully handling this data stream.

Write mode : Host-transmitter, Device-receiver.



Host need to write 2 Bytes [0x67] [0x00] to device first, and follow 2 Bytes length field and data payload. Each I2C transaction always contains 64 Bytes data payload so the length field should be always as 66 Bytes (2 Bytes for “Len”+64 Bytes for “Data” payload).If the data to be sent to the controller is less than 64 Bytes, 0 padding is necessary.

The packet format in the payload is defined as diagnostics packet.

Diagnostics packet format :

Byte0	Byte1	
Report ID = 0x03	Length	data stream

The “Length” indicates the length of the coming data stream. This data stream must follow EETI eGalax diagnostics format. The software integrator must be carefully handling this data stream.

Command Example

Query firmware version

Host → Device

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x67	0x00	0x42	0x00	0x03	0x01	'D'	0x00	0x00	0x00
Byte10 → Byte67									
0x00									

<Device triggers INT pin low. Host call the read function to retrieve the device response data>

Device → Host

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x42	0x00	0x03	0x07	'D'	'0'	'.'	'0'	'0'	'2'
Byte10	Byte11 → Byte65								
0x00	0x00								

Host → Device

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x67	0x00	0x42	0x00	0x03	0x01	'E'	0x00	0x00	0x00
Byte10 → Byte67									
0x00									

<Device triggers INT pin low. Host call the read function to retrieve the device response data>

Device → Host

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x42	0x00	0x03	0x0C	'E'	'P'	'7'	'9'	'0'	'0'
Byte10	Byte11	Byte12	Byte13	Byte14	BYTE15	Byte16 → Byte65			
'-'	PID				0x00	0x00			

Note: Byte[11:14] = 001A stands for model PID 001A

Query controller model name

Power Saving Mechanism

EXC7900 - supports 3 working mode for power saving.

Fully working mode :

After reset, the controller module works at full power working state.

Idle mode:

After EXC7900 receives a software packet from host computer to request MCU entering idle state, this controller module will enter idle state. At idle state, IRQ pin will be released to high state. Host computer can wake up this controller module via generating a falling edge signal at IRQ pin. When controller transfers to fully working mode, it will reply a wakeup command to host.

Set idle command

Host → Device

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x67	0x00	0x42	0x00	0x03	0x04	0x36	0x3F	0x01	T
Byte10 → Byte67									
0x00									

Host computer send this command as above for idle state configuration setting. Where, T means the scanning interval when in idle state. The touch controller will wakeup every that period of time to scan touch screen to check if the touchscreen touched or not. Once it detects sensor touched, the controller will back to fully working state automatically.

⬇

The default value of T is 30, the interval = T x 0.25 = 7.5ms

Sleep mode:

Whenever the host computer wants to deep sleep, it issues a sleep command packet to controller. Once the controller firmware receives such sleep command, it enters deep sleep state and does not response until it wakes up from this sleep state. Only host computer can wake up this device via generating a falling edge signal at IRQ pin.
When controller transfers to fully working mode, it will reply a wakeup command to host.

Set sleep command

Host → Device

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x67	0x00	0x42	0x00	0x03	0x03	0x36	0x3F	0x02	0x00
Byte10 → Byte67									
0x00									

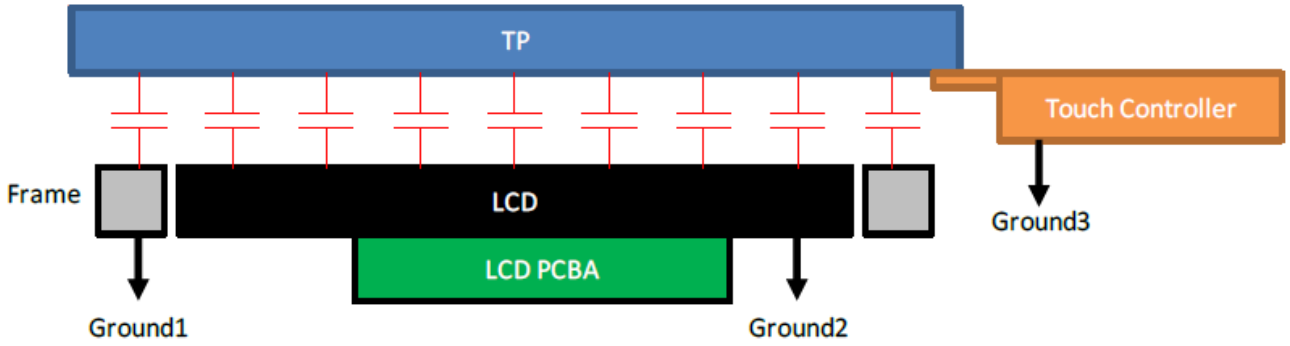
Host computer send above command packet to touch controller device to make the device enter sleep state for power saving.

Wakeup notification command

Once the controller transfers to working state from idle and sleep state, it will trigger INT pin low and reply below command to host.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x42	0x00	0x03	0x03	0x36	0x3F	0x01	0x00	0x00	0x00
Byte10 → Byte65									
0x00									

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

8. RELIABILITY TEST CRITERIA

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	-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 more than one condition, and all the test conditions are independent.

Note 4 : All the reliability tests should be done without protective film on the module.

9. USE PRECAUTIONS

9.1 Handling precautions

1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
4) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

9.2 Installing precautions

1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. 1MΩ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off.

9.3 Storage precautions

1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

9.4 Operating precautions

1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC dive voltage.
4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
5) Make certain that each signal noise level is within the standard (L level: 0.2Vdd or less and H level: 0.8Vdd or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

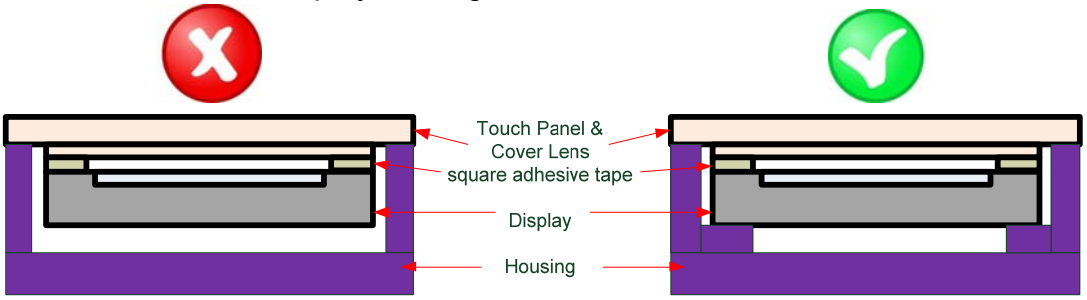
9.5 Other

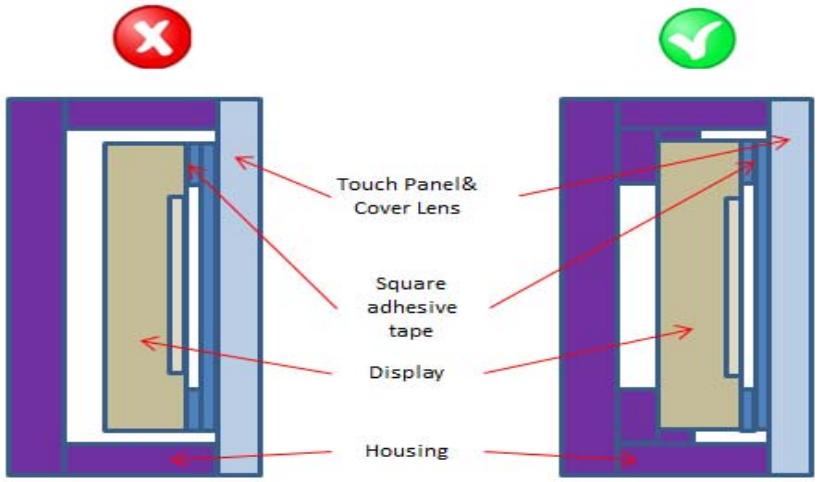
1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
2) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.
3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

9.6 Mechanism

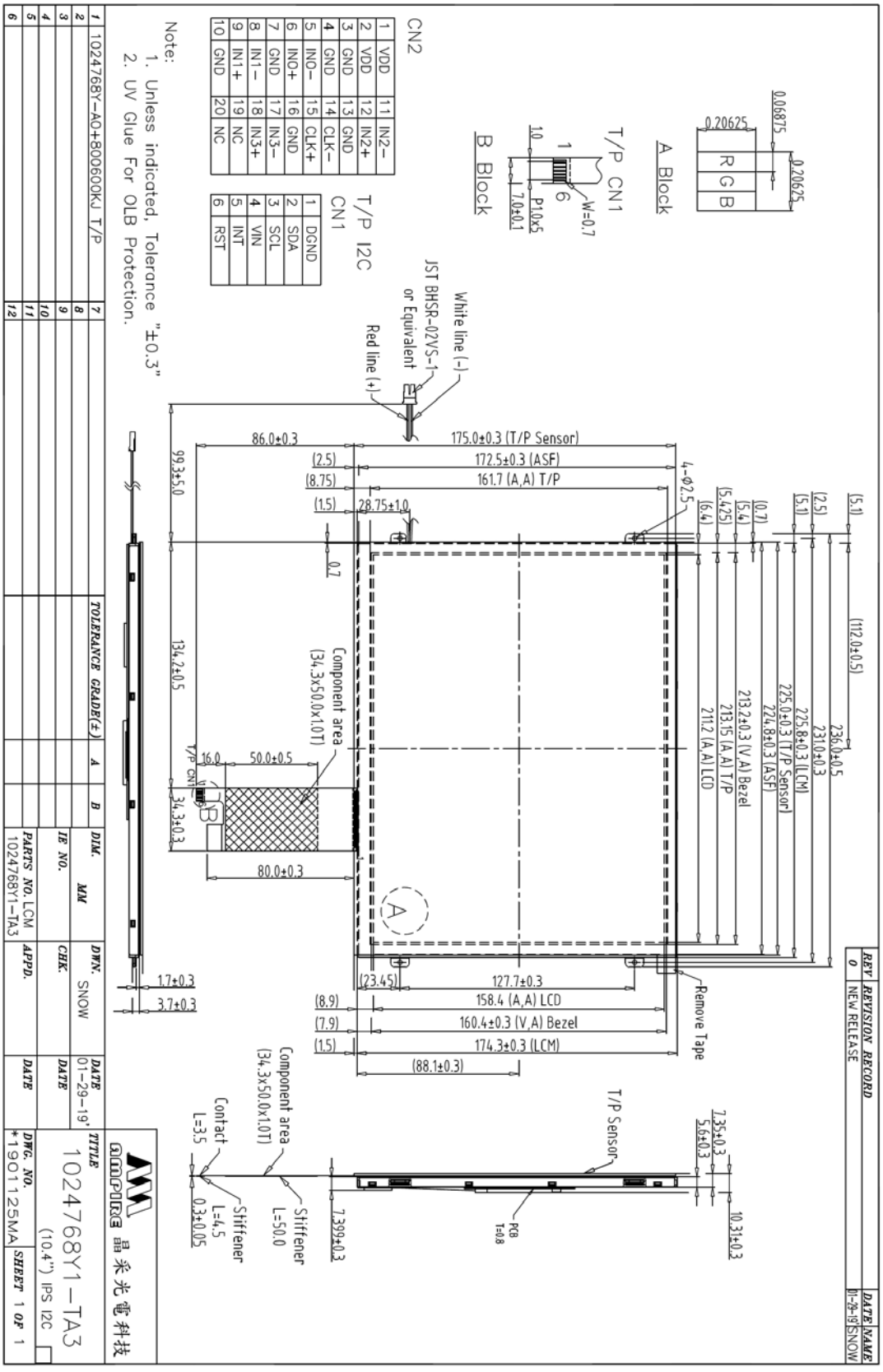
(1) Please mount LCD module by using mounting holes arranged in four corners tightly.

(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. OUTLINEDIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	01-29-19	SNOW

1024768Y-A0+800600KJ T/P	TOLERANCE GRADE(±)	A	B
DIM. MM	DWN. SNOW	DATE 01-29-19	
IE NO.	CHK.	DATE	
PARTS NO. LCM 1024768Y1-TA3	APPD.	DATE	

AMPIRE 晶采光電科技

TITLE 1024768Y1-TA3 (10.4") IPS I2C

DWG. NO. *190112SMA

SHEET 1 OF 1