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-1024600DTZQW-TB9H**
Approved by	
Date	

■ **Preliminary Specification**
☐ **Approved Specification**

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This specification is subject to change without notice

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2021/05/18	-	New release	Mark

1. Features

It's a 7 inches Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 7" TFT-LCD panel, LED backlight, and Projective capacitive-type touch panel.

(1) Construction: 7" a-Si TFT active matrix, White LED Backlight.
(2) Resolution (pixel): 1024 RGB (H) x 600 (V)
(3) Number of the Colors : 16.7M colors (R , G , B 8 bit digital each)
(4) LCD type : Normally Black
(5) Interface: LVDS
(6) Touch panel
- Controller: EETI EXC80W32
- Interface: I2C

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	7 inch (Diagonal)	
Resolution	1024 x (RGB) x 600	dot
Pixel pitch	0.1506(W) x 0.1432(H)	mm
Active area	154.2144(W) x 85.92(H)	mm
Color arrangement	RGB-stripe	

3. ABSOLUTE MAX. RATINGS

Item	Symbol	Values			Unit	Remark
		MIN	TYP	MAX		
Power Voltage	VDD	-0.3	--	4	V	
LED Driver Power Voltage	VLED	-0.3	--	19	V	
Operation Temperature	TOP	-20	-	70	℃	
Storage Temperature	TST	-30	-	80	℃	

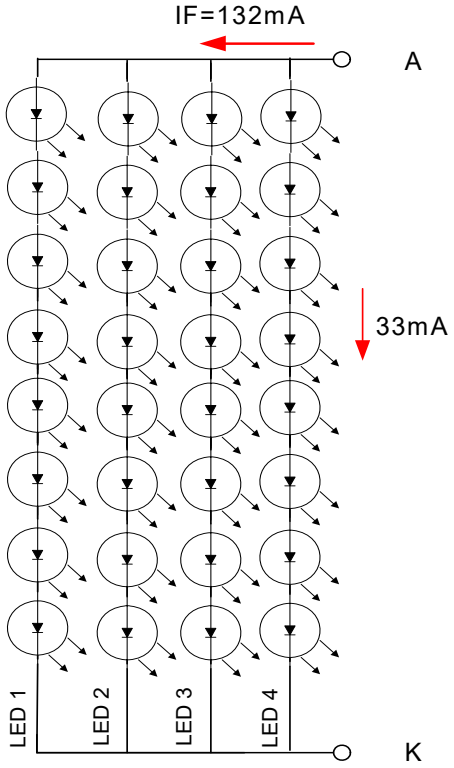
Note (1) The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

4. Backlight Driving Conditions

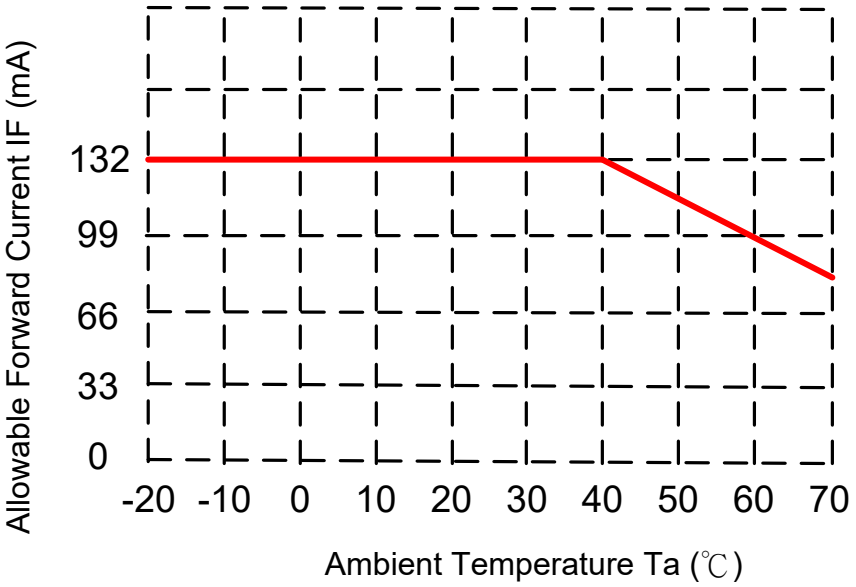
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Driver Power Voltage	VLED	--	12	19	V	
LED Driver Power Current	ILED(VLED=12V)	--	363	--	mA	Ta=25℃
PWM Dimming DC active level	VDIMH	1.5	--	6	V	
	VDIML	--	--	0.6	V	
PWM Dimming Freq.	FDIM	0.2		20	kHz	
BLEN Pin High Voltage	VBLENH	1.4		--	V	
BLEN Pin Low Voltage	VBLENL	--		0.8	V	
LED voltage	VAK	--	26.4	--	V	Note 1
LED current	IF	--	132	--	mA	Note 1
LED life time	--	--	50	--	kHrs	Note 2

Note (1) The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IF=132 mA.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IF=132mA. The LED lifetime could be decreased if operating IF is larger than 132mA.



Note (3) When LCM is operated over 40℃ ambient temperature, the IF should be follow :



5. Optical Specifications

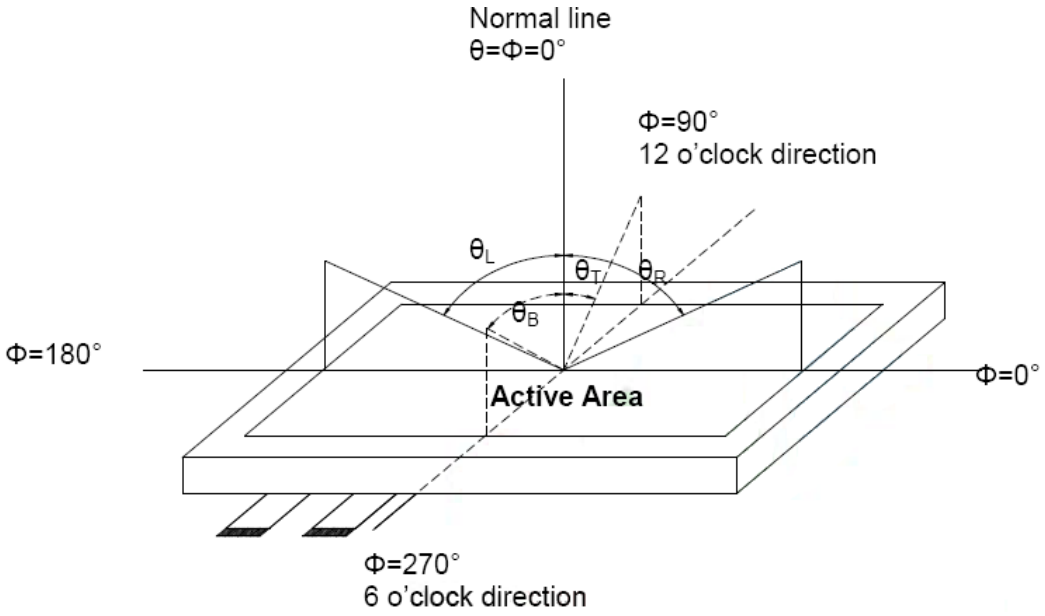
Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle (CR≧10)	θ L	Φ = 180° (9 o'clock)	80	85	--	degree	Note1
	θ R	Φ = 0° (3 o'clock)	80	85	--		
	θ T	Φ = 90° (12 o'clock)	80	85	--		
	θ B	Φ = 270° (6 o'clock)	80	85	--		
Response time	TON	Normal θ =Φ=0°	--	13	20	msec	Note3
	TOFF		--	15	25	msec	
Contrast ratio	CR		600	800	--	--	Note4
Color chromaticity	WX		0.26	0.31	0.36	--	Note5 Note6
	WY		0.31	0.36	0.41	--	
	RX		0.56	0.61	0.66		
	RY		0.29	0.34	0.39		
	GX		0.31	0.36	0.41		
	GY		0.52	0.57	0.62		
	BX		0.05	0.10	0.15		
	BY		0.03	0.08	0.13		
Luminance (central point)	L		**680**	**850**	--	cd/m^2	Note6
Luminance uniformity	YU		70	75	--	%	Note6

Test Conditions:

VDD = 3.3V, IF = 132 mA (Backlight current), the ambient temperature is 25℃.

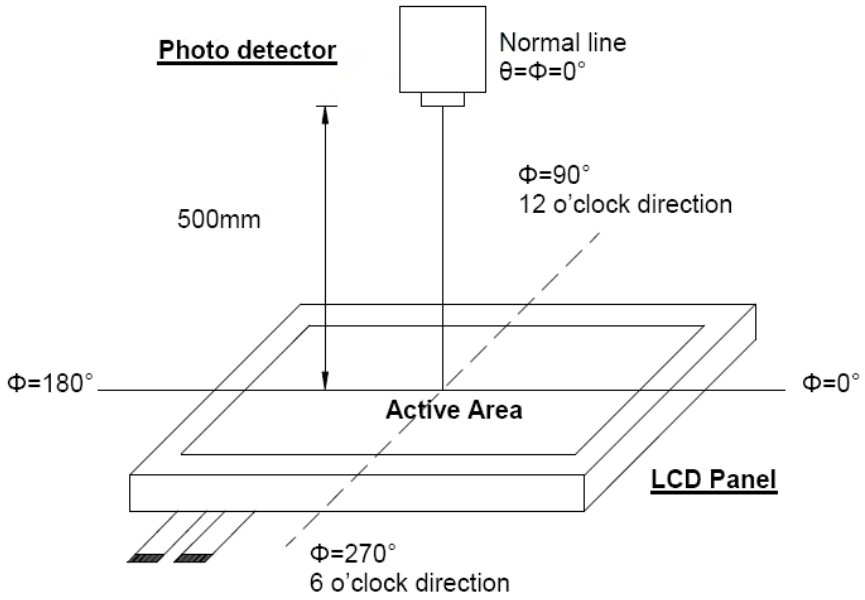
The test systems refer to Note 2.

Note (1) Definition of viewing angle range



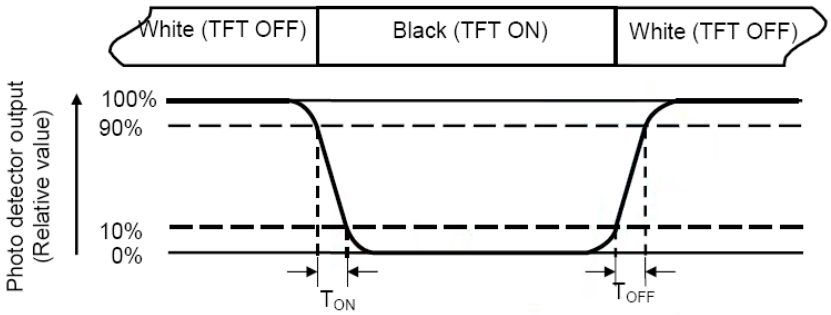
Note (2) Definition of optical measurement system

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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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.

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

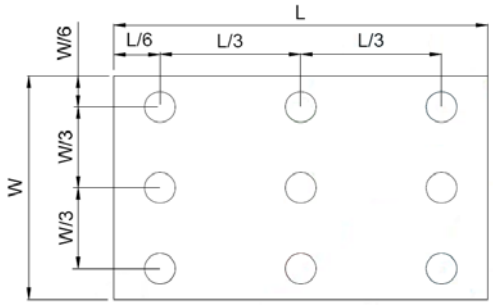
Note (6) Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure).

Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{\text{Bmin}}{\text{Bmax}}$$

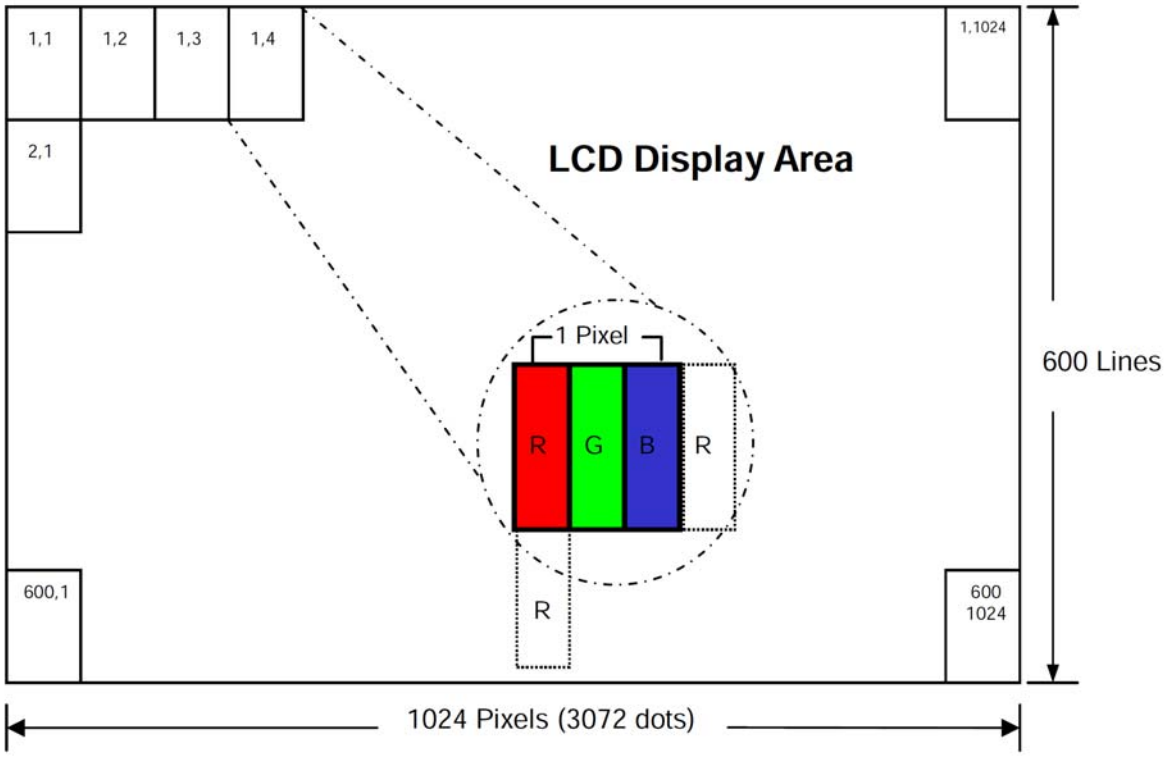
L ----- Active area length W ----- Active area width



Bmax : The measured maximum luminance of all measurement position.

Bmin : The measured minimum luminance of all measurement position.

Note (7) Pixel format



6. INTERFACE

CN2:P1.0 20Pin/CP100-S20G-H16 or Equivalent

Pin No.	Symbol	Function
1	VDD	POWER SUPPLY
2	VDD	POWER SUPPLY
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	IN3-	Transmission Data of Pixels 3
18	IN3+	Transmission Data of Pixels 3
19	GND	Power Ground
20	GND	Power Ground

I: input, O: output, P: power

CN3: ENTERY 3808K-F05N-03L or Equivalent, Mating Connector: ENTERY H208K-P05N-02B or Equivalent

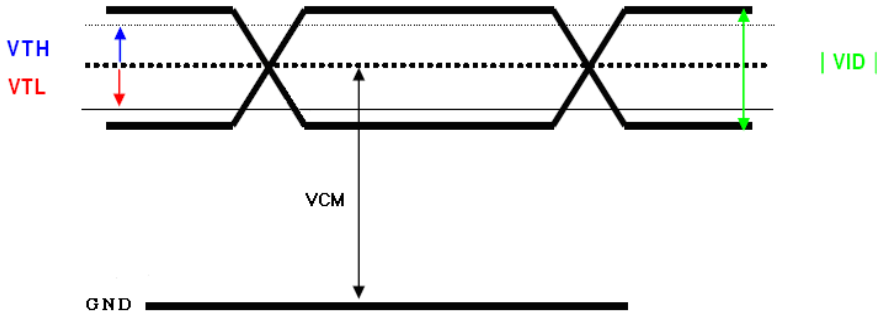
1	VLED	Power supply of LED driving circuit
2	GND	Power Ground
3	BLEN	LED BLU ON/OFF, High: enable, Low: disable
4	DIM	Adjust the LED brightness by PWM
5	NC	No connection

Note (1) BLU means Backlight Unit

7. ELECTRICAL CHARACTERISTICS

7.1. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Digital Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Digital Power Supply Current	IDD		55		mA	
Differential Input High Threshold	VTH	--	--	100	mV	VCM=1.2V
Differential Input Low Threshold	VTL	-100	--	--	mV	
Input current	IIN	-10	--	+10	uA	
Differential input Voltage	|VID|	0.2	--	0.6	V	
Common Mode Voltage Offset	VCM	$\frac{\|VID\|}{2}$	1.25	$2.4-\frac{\|VID\|}{2}$	V	



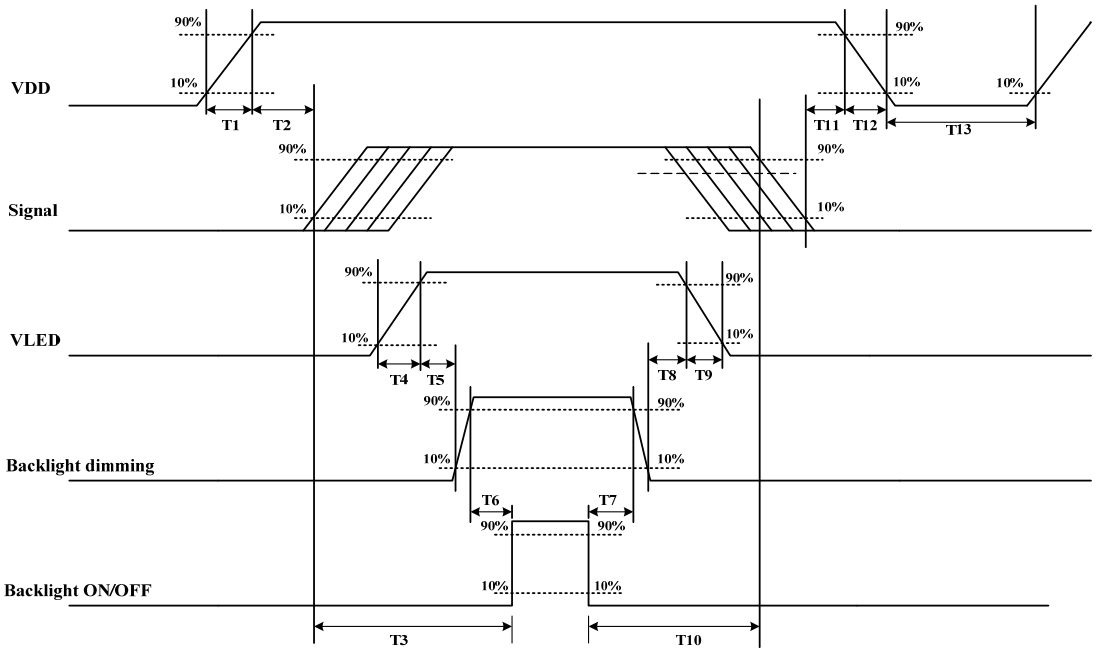
7.2. AC Characteristics

TTL

DE mode					
Parameter	Symbol	Spec.			
		Min.	Typ.	Max.	Unit
DCLK frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+ thfp	90	320	376	DCLK
Vertical display area	tvd		600		TH
VSD period	tvbp	610	635	800	TH
VSD blanking	tvbp+ tvfp	10	35	200	TH
HV mode					
DCLK frequency	fclk	44.9	51.2	63	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1200	1344	1400	DCLK
HSD pulse Width	thpw	1	-	140	DCLK
HSD back porch	thbp		160		DCLK
HSD front porch	thfp	16	160	216	DCLK
Vertical display area	tvd		600		TH
VSD period	tv	624	635	750	TH
VSD pulse Width	tvpw	1	-	20	TH
VSD back porch	tvbp		23		TH
VSD front porch	tvfp	1	12	127	TH

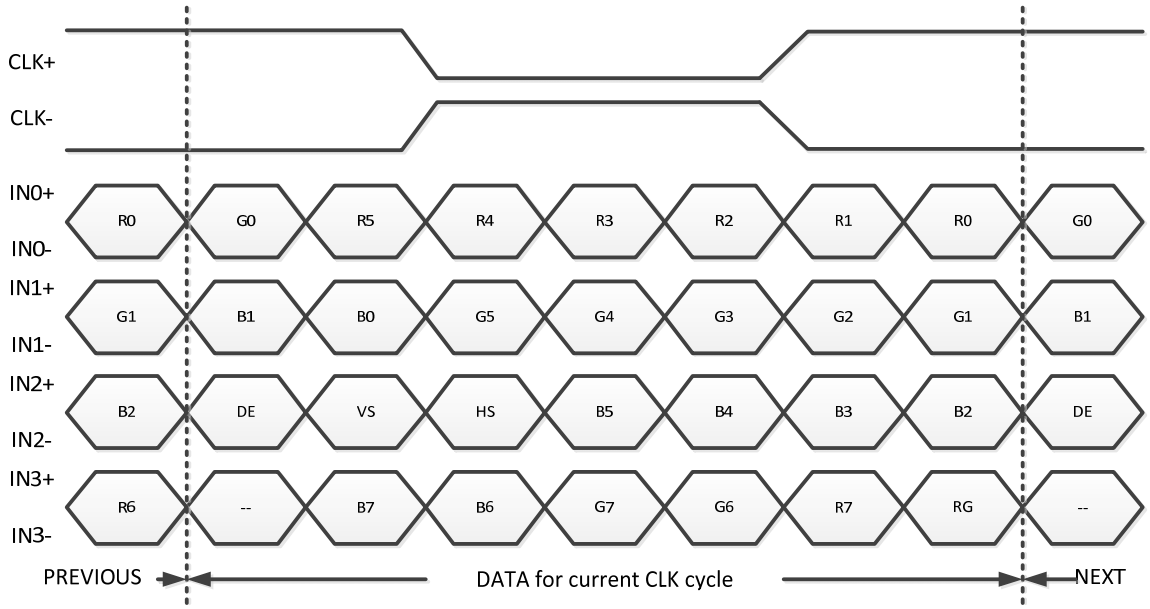
7.3. Power ON/OFF sequence

VDD power and LED on/off sequence are as follows. Interface signals are also shown in the chart. Signal shall be Hi-Z state or low level when VDD is off.



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0.5	16	50	[ms]
T12	-	-	100	[ms]
T13	1000	-	-	[ms]

7.4. 24-BIT LVDS Input Data Format



Note: R/G/B data 7: MSB, R/G/B data 0: LSB

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Date 7 (MSB) Green Date 6 Green Date 5 Green Date 4 Green Date 3 Green Date 2 Green Date 1 Green Date 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
CLK+ CLK-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync Signal	
HS	Horizontal Sync Signal	

8. Projected capacitive-type TOUCH PANEL ELECTRICAL SPECIFICATION

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Two-fingers or Single-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 100 points/sec
Interface	**I2C**
Control IC	**EETI EXC80W32**

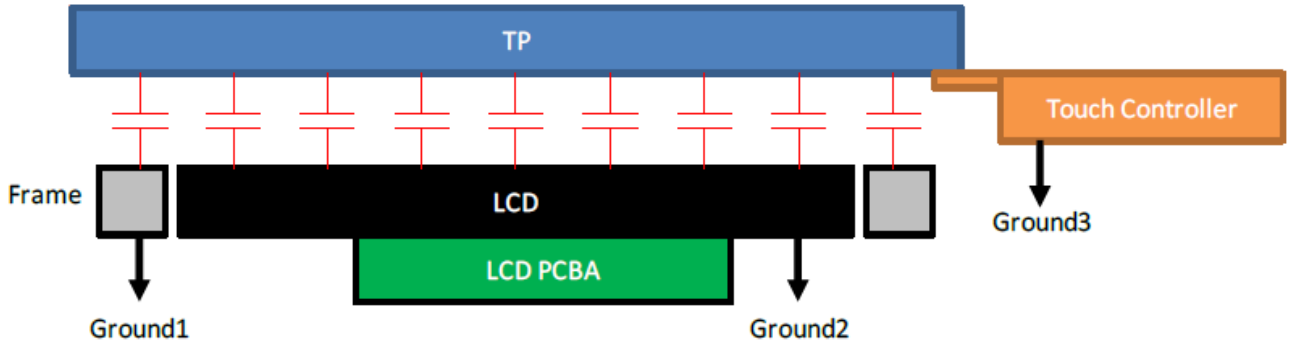
ITEM	Symbol	MIN	TYP	MAX	UNIT
Touch panel power supply	VIN	3.14	3.3	3.46	V
Touch panel power supply current at Normal operation mode	I_{VIN}	--	45(Reference)	--	mA
Touch panel power supply current at USB suspend mode	I_{VIN}	--	8(Reference)	--	mA

Interface

Pin No.	Symbol	Function
1	GND	USB POWER GND
2	SDA	I2C DATA
3	SCL	I2C CLOCK
4	VDD	5V/3.3V Regulated
5	IRQ	Interrupt Request pin
6	RST	Reset pin to Master Chip

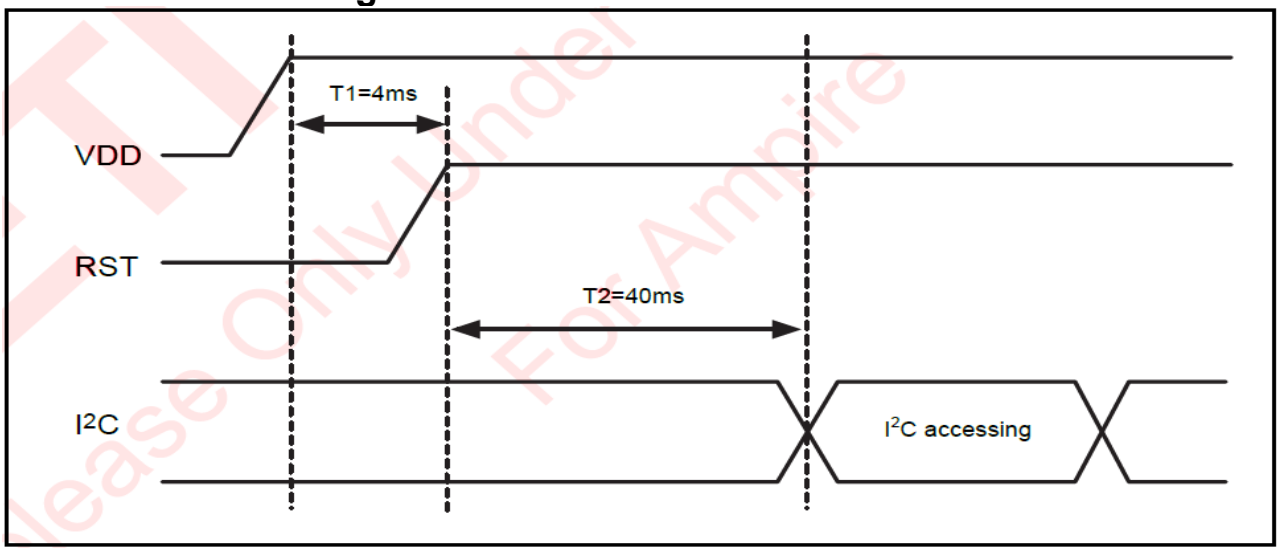
Grounding

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.

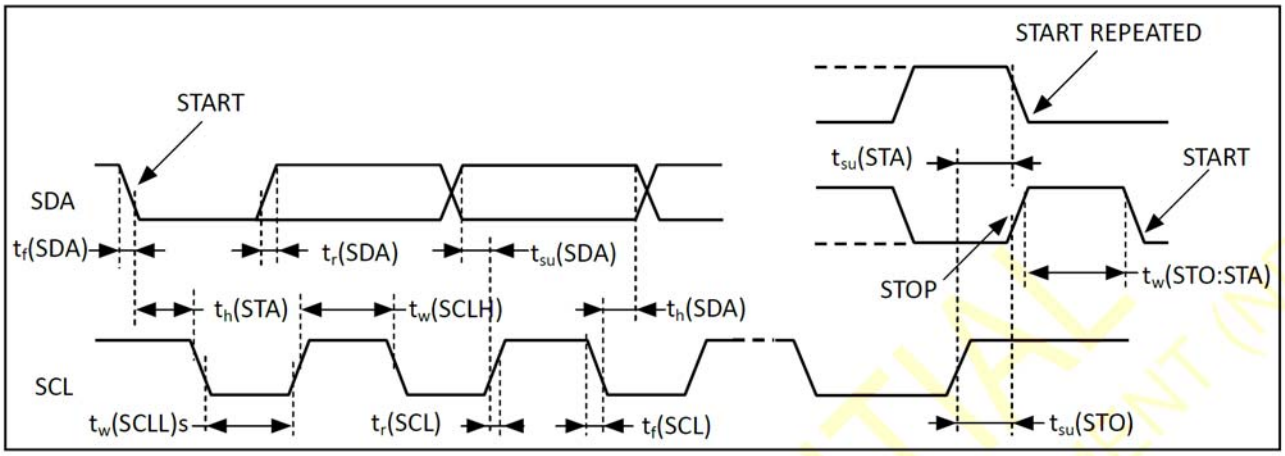


GND1, GND2 and GND3 should be connected together to have the same ground

8.3 Power- on Timing Chart



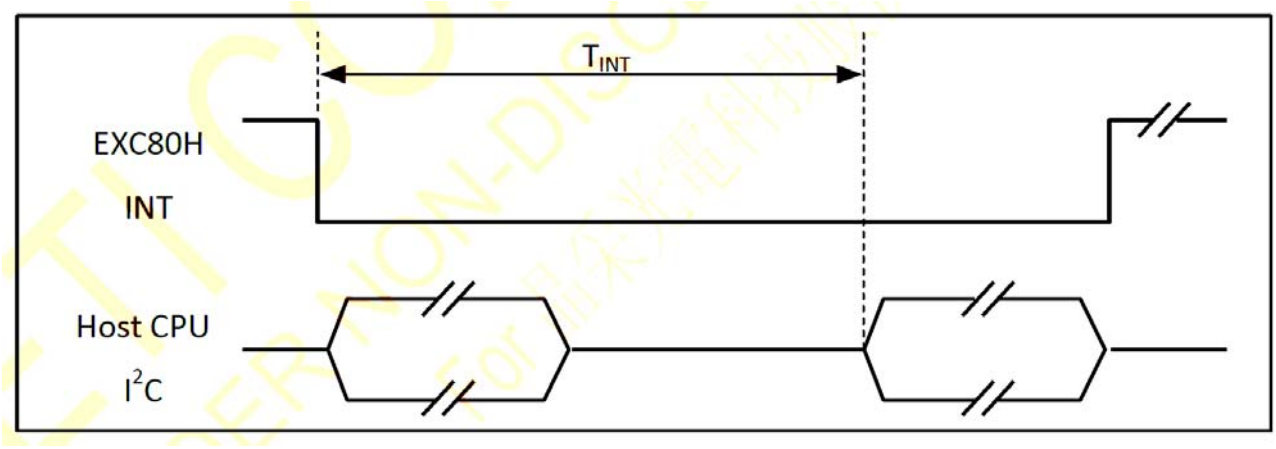
8.4 I2C AC Waveform



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		
t_w(STO:STA)	Stop to Start condition time (bus free)	4.7		1.3		

8.5 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 / T_{INT}, 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.

Read mode: Host-receiver, Device-transmitter

Orange	From Host to Device
Green	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

S	Address	R	Ack	Len-LSB	Ack	Len-MSB	Ack	DATA 0	Ack
DATA 1	Ack			DATA n	Nak	P			

HID over I2C Format

The Input Report is defined as below:

Byte0	Byte1	Byte2~Byte (Len-1)
Length		Input Data
Len(LSB)	Len(MSB)	

The Input Data packet format inside the I2C payload is defined as below:

Byte2 ~ Byte (Len-1)	
Report ID	Data

The Input Report consists of two parts: Length and Input Data. The maximum value of Length in Input Report is 66 bytes.

Host can use Length to determine how many bytes need to read.

For example, if (Len-LSB, Len-MSB) = (0x42, 0x00), that means the total length of Input Report is 6 bytes.

The Report ID of Input Data and Length of Input Report can be used to determine the report format of this Input Data.

Multi-Touch Report Format (without width and height, 4K X/Y resolution)

Each Multi-Touch report format is 64 bytes.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
Report ID = **0x06**	Num Of Contacts	Contact Data 1							
Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16	Byte17	Byte18	Byte19
Contact Data 1		Contact Data 2							
Byte20	Byte21	Byte22	Byte23	Byte24	Byte25	Byte26	Byte27	Byte28	Byte29
Contact Data 2		Contact Data 3							
Byte30	Byte31	Byte32	Byte33	Byte34	Byte35	Byte36	Byte37	Byte38	Byte39
Contact Data 3		Contact Data 4							
Byte40	Byte41	Byte42	Byte43	Byte44	Byte45	Byte46	Byte47	Byte48	Byte49
Contact Data 4		Contact Data 5							
Byte50	Byte51	Byte52	Byte53	Byte54	Byte55	Byte56	Byte57	Byte58	Byte59
Contact Data 5		Dummy bytes							
Byte60	Byte61	Byte62	Byte63						
Dummy bytes									

Each Contact Data format is **10** bytes.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
State[1]	Contact ID[2]	X (LSB) [3]	X (MSB) [3]	Y (LSB) [3]	Y (MSB) [3]	reserved		reserved	

1. State: Bit0 = Down/Up bit

   1: Touch Down,

   0: Lift off.

2. Contact ID: specifies for the identifier of the current contact

3. The X/Y resolution is 4096 (0~4095)

When number of contacts is greater than 5 (e.g. 8 contacts), it will take 2 times HID transmissions to describe a complete contact. The [Number of contacts] in first transmission represents the total contacts, the [Number of contacts] in other transmission(s) will be 0.

1st transmission	0x06	0x08	Contact #1	Contact #2	Contact #3	Contact #4	Contact #5

2nd transmission	0x06	0x00	Contact #6	Contact #7	Contact #8		

Multi-Touch Report Format (width and height supported, 16K X/Y resolution)

Each Multi-Touch report format is 64 bytes.

Byte0	Byte1
Report ID = **0x17**	Num Of Contacts

Byte2	Byte3	Byte4	Byte5	...	Byte12	Byte13	Byte14	Byte15
Contact Data 1								
Byte16	Byte17	Byte18	Byte19	...	Byte26	Byte27	Byte28	Byte29
Contact Data 2								
Byte30	Byte31	Byte32	Byte33	...	Byte40	Byte41	Byte42	Byte43
Contact Data 3								
Byte44	Byte45	Byte46	Byte47	...	Byte54	Byte55	Byte56	Byte57
Contact Data 4								

Byte58	Byte59	Byte60	Byte61	Byte62	Byte63
Dummy bytes					

Each Contact Data format is **14 bytes**.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
State[1]	Contact ID[2]	X (LSB)[3]	X (MSB)[3]	Center X (LSB)[3]	Center X (MSB)[3]	Y (LSB)[3]	Y (MSB)[3]	Center Y (LSB)[3]	Center Y (MSB)[3]

Byte10	Byte11	Byte12	Byte13
Width[4]	Height[4]	Reserved	

1. State: Bit0 = Down/Up bit

   1: Touch Down,

   0: Lift off.

2. Contact ID: specifies for the identifier of the current contact

3. The X/Y and center X/Y resolution is 16384 (0~16383).

4. Unit of width and height is mm.

When number of contacts is greater than 4 (e.g. 9 contacts), it will take 3 times of HID transmissions to describe a complete contacts. The [Number of contacts] in first transmission represents the total contacts, the [Number of contacts] in other transmission(s) will be 0.

1st transmission	0x17	0x09	Contact #1	Contact #2	Contact #3	Contact #4
2nd transmission	0x17	0x00	Contact #5	Contact #6	Contact #7	Contact #8
3rd transmission	0x17	0x00	Contact #9			

Multi-Touch Report Format (without width and height, 16K X/Y resolution)

Each Multi-Touch report format is 64 bytes.

Byte0	Byte1
Report ID = **0x18**	Num Of Contacts

Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11
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	Byte56	Byte57	Byte58	Byte59	Byte60	Byte61
Dummy bytes									

Byte62	Byte63
Dummy bytes	

Each Contact Data format is 10 bytes.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
State[1]	Contact ID[2]	X (LSB) [3]	X (MSB) [3]	Y (LSB) [3]	Y (MSB) [3]	reserved		reserved	

1. State: Bit0 = Down/Up bit

   1: Touch Down,

   0: Lift off.

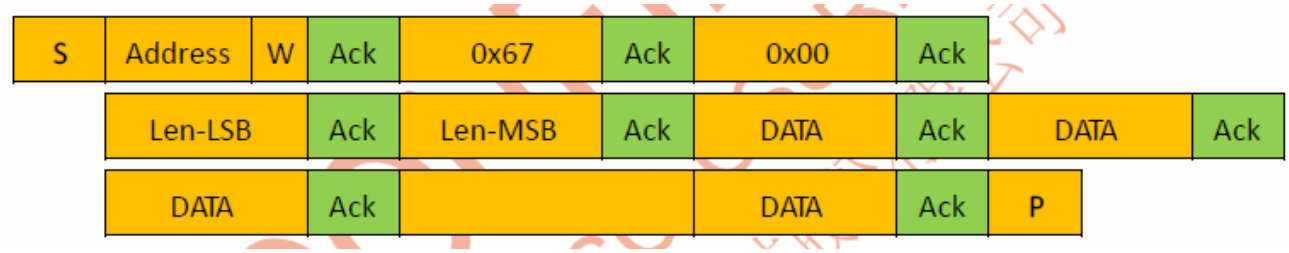
2. Contact ID: specifies for the identifier of the current contact

3. The X/Y resolution is 16384 (0~16383).

Write mode: Host-receiver, Device-transmitter

Orange	From Host to Device
Green	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



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.

Byte0	Byte1	
Report ID = 0x03	Length	data stream

8.6 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								

Query Controller Model Name

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'	'O'	'r'	'i'	'o'	'n'
Byte10	Byte11	Byte12	Byte13	Byte14	BYTE15	Byte16 → Byte65			
'-'	PID[1]				0x00	0x00			

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

Loop Back Command

Host → Device

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x67	0x00	0x42	0x00	0x03	0x01	'A'	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	0x01	'A'	0x00	0x00	0x00	0x00	0x00
Byte10 → Byte65									
0x00									

Host computer can send above command packet to touch controller device to check communication is ready or not.

Query Controller Type

Host → Device

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9
0x67	0x00	0x42	0x00	0x03	0x01	'F'	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	0x12	'F'	'P'	'C'	'A'	'P'	'8'
Byte10	Byte11	Byte12	Byte13	Byte14	BYTE15	BYTE16	Byte17	Byte18	Byte19
'0'	'H'	'8'	'4'	' '	'S'	'e'	'r'	'i'	'e'
Byte20	Byte21	Byte22 → Byte65							
's'	0x00	0x00							

8.7 Power Saving Mechanism

EXC80W series – support 3 working mode (fully working, idle (doze), and deep sleep) for power saving.

Fully working mode:

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

Idle (Doze) mode:

After EXC80W 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 replay 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 sends this command as above for idle state configuration setting. Where, T means the scanning interval when in idle state. The touch controller will wake up every that period of time to scan touch screen to check if the touch screen touched or not. Once it detects sensor touched, the controller will back to fully working state automatically.

The reasonable value of T is 0~ 4. The interval = (T+1)*50ms.

Thus, the interval range is 50~ 250ms. (Unit is 50ms)

If Host needs precision or longer interval time, host can send below command.

Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10
0x67	0x00	0x42	0x00	0x03	0x04	0x36	0x3F	0x03	T(MSB)	T(LSB)
Byte11 → Byte67										
0x00										

The reasonable value of T (LSB, MSB) is 0~ 65534. The interval = T+1ms.

Thus, the interval range is 1~ 65535ms. (Unit is 1ms)

Deep 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 deep 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 can send above command packet to touch controller device to make the device enter sleep state for power saving.

9. RELIABILITY TEST CONDITIONS

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

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.

10. General Precautions

10.1 Safety

(1) Liquid crystal is poisonous. Do not put it your month. If the liquid crystal touches you skin or clothes, you need to wash it off immediately with the soap and water.

10.2 Handling

(1) The LCD panel is plate glass. Do not subject the panel to mechanical shock or excessive force on its surface.

(2) The polarizer which 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 on cover board such as acrylic board, which covers on the surface of LCD panel to protect panel from damages.

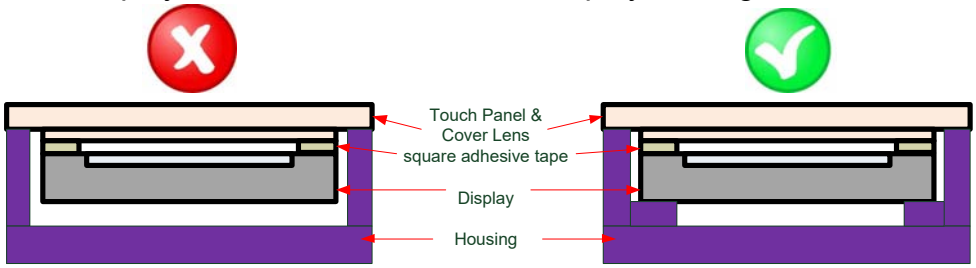
(6) Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.

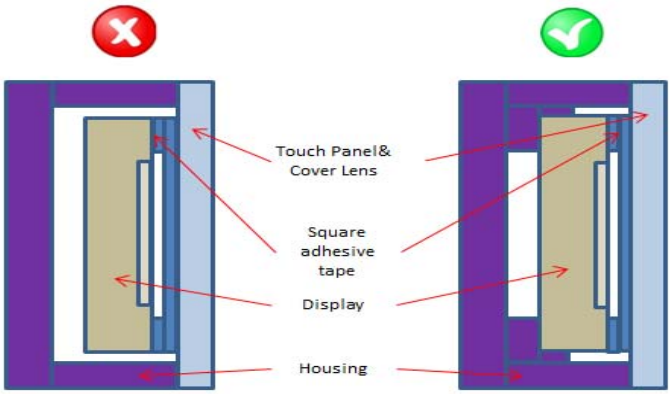
(7) Do not leave module in direct sunlight to avoid malfunction of the ICs.

10.3 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.





10.4 Static Electricity

(1) Be sure to ground module before you turn on power or operation module.

(2) Do not apply voltage which exceeds the absolute maximum rating value.

10.5 Storage

(1) Store the module in a dark room where it must keep at +25±10℃ and 65%RH or less.

(2) Do not store the module in surroundings which are containing organic solvent or corrosive gas.

(3) Store the module in an anti-electrostatic container or bag.

10.6 Cleaning

(1) Do not wipe the polarizer with dry cloth. It might cause scratch.

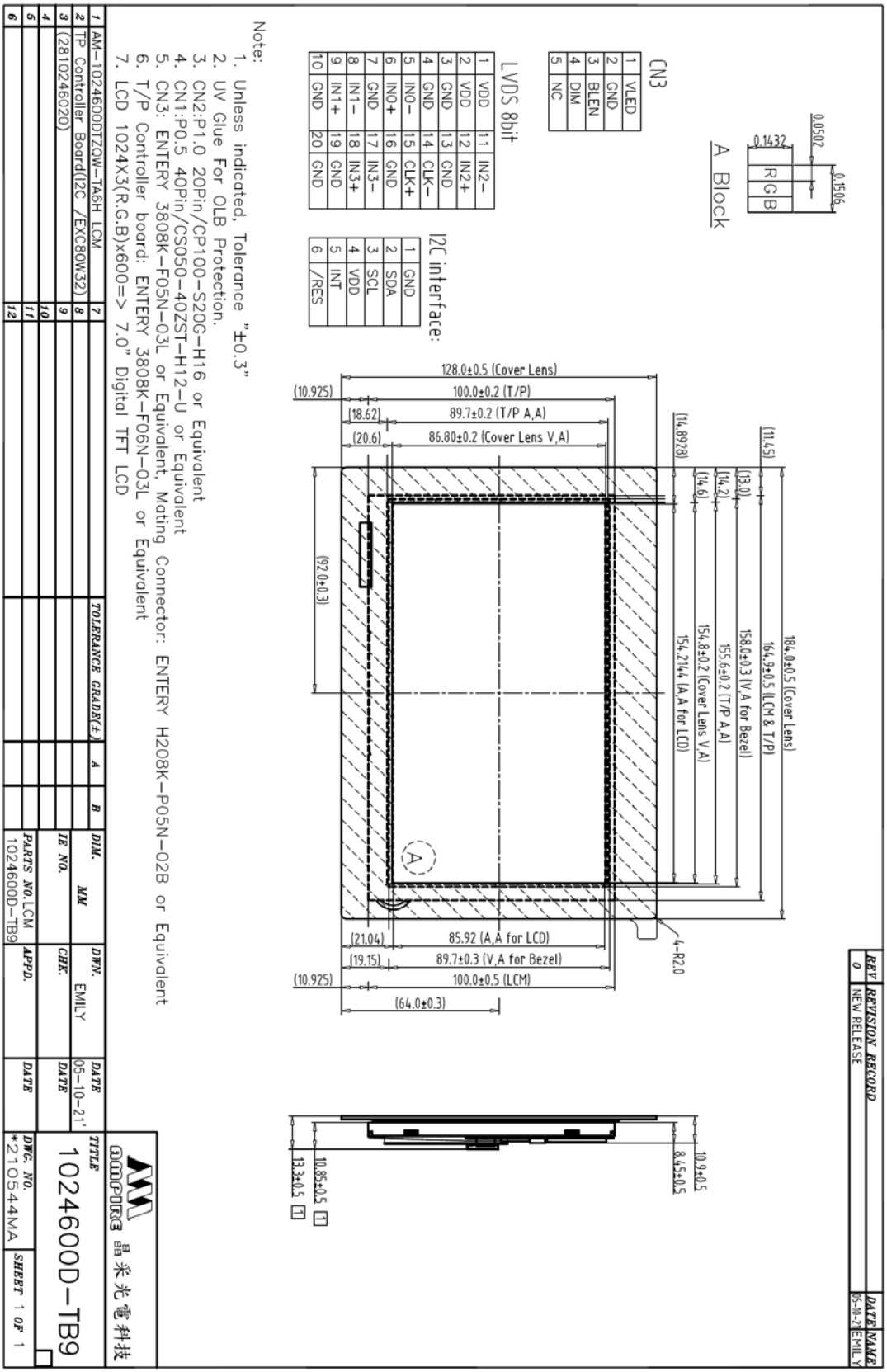
(2) Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

10.7 Others

(1) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

(2) Do not apply fixed pattern data signal to the LCD module as you are using the product.

11. OUTLINE DIMENSION



Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN2:P1.0 20Pin/CP100-S20G-H16 or Equivalent
4. CN1:P0.5 40Pin/CS050-40ZST-H12-U or Equivalent
5. CN3: ENTERY 3808K-F05N-03L or Equivalent, Mating Connector: ENTERY H208K-P05N-02B or Equivalent
6. T/P Controller board: ENTERY 3808K-F06N-03L or Equivalent
7. LCD 1024X3(R.G.B)x600=> 7.0" Digital TFT LCD

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	05-10-21	EMILY

1	AM-1024600DTZQW-TA6H LCM	7		TOLERANCE GRADE(±)	A	B	DIM.	MM
2	TP Controller Board(I2C /EXC80W32)	8					TB NO.	
3	(2810246020)	9					DRN.	EMILY
4		10					CHK.	
5		11					APPD.	
6		12					DATE	

DATE 05-10-21
DATE

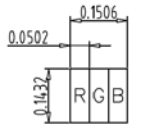
PARTS NO. LCM 1024600D-TB9

TITLE 1024600D-TB9

DWG. NO. *21054-4MA

SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	05-10-21	EMILY



A Block

CN3

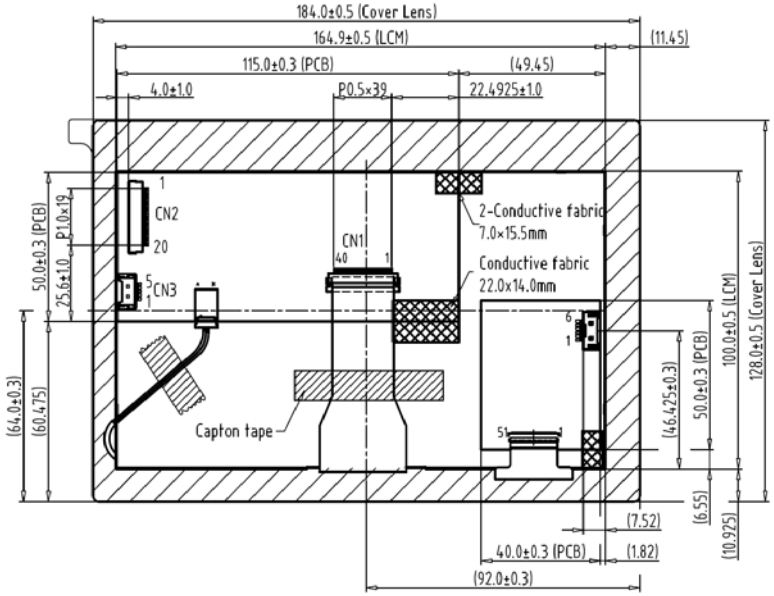
1	VLED
2	GND
3	BLEN
4	DIM
5	NC

LVDS 8bit

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	IN3−
8	IN1−	18	IN3+
9	IN1+	19	GND
10	GND	20	GND

I2C interface:

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



Back View

Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN2:P1.0 20Pin/CP100−S20G−H16 or Equivalent
4. CN1:P0.5 40Pin/CS050−40ZST−H12−U or Equivalent
5. CN3: ENTERY 3808K−F05N−03L or Equivalent, Mating Connector: ENTERY H208K−P05N−02B or Equivalent
6. T/P Controller board: ENTERY 3808K−F06N−03L or Equivalent
7. LCD 1024X3(R.G.B)x600=> 7.0" Digital TFT LCD

1	AM−1024600DTZQW−TA6H LCM	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 05−10−21'	TITLE 1024600D−TB9
2	TP Controller Board(I2C /EXC80W32)	8								
3	(2810246020)	9					IE NO.	CHK.	DATE	
4		10								
5		11					PARTS NO. LCM−1 1024600D−TB9	APPD.	DATE	DWG. NO. *210545MA / SHEET 1 OF 1
6		12								

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