SPECIFICATIONS   FOR LCD   MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-1280800NNTZQW-T24H
APPROVED BY	
DATE	

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

APPROVED BY	CHECKED BY	ORGANIZED BY

Date : 2019/06/11   AMPIRE CO., LTD.   1

RECORD   OF   REVISION

| Revision Date	Page	Contents	Editor
2019/06/11	-	New Release	Mark

1. Features

10.1 TFT Liquid Crystal Display module is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a timing controller, voltage reference, common voltage, column driver, and row driver circuit. This TFT LCD has a 10.1-inch diagonally measured active display area with 1280 horizontal by 800 vertical pixel array resolutions.

(1) Construction: 10.1" a-Si TFT active matrix, Projective Capacitive Touch, White LED Backlight and T/P Controller Board.

(2) Resolution (pixel): 1280(R.G.B) X 800

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

(4) LCD type: IPS, Transmissive,Normally Black.

(5) LCD Interface : 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: ILI2511

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Remark
LCD size	10.1 inch(Diagonal)	
Driver element	a-Si TFT active matrix	
Display resolution	1280 (W) × 3(RGB) x 800(H) dots	
Display mode	Normally Black, Transmissive (IPS)	
Dot pitch	0.1695 (W) x 0.1695 (H) mm	
Active area	216.96 (W) x 135.6 (H) mm	
Color arrangement	R.G.B-stripe	
Interface	LVDS	
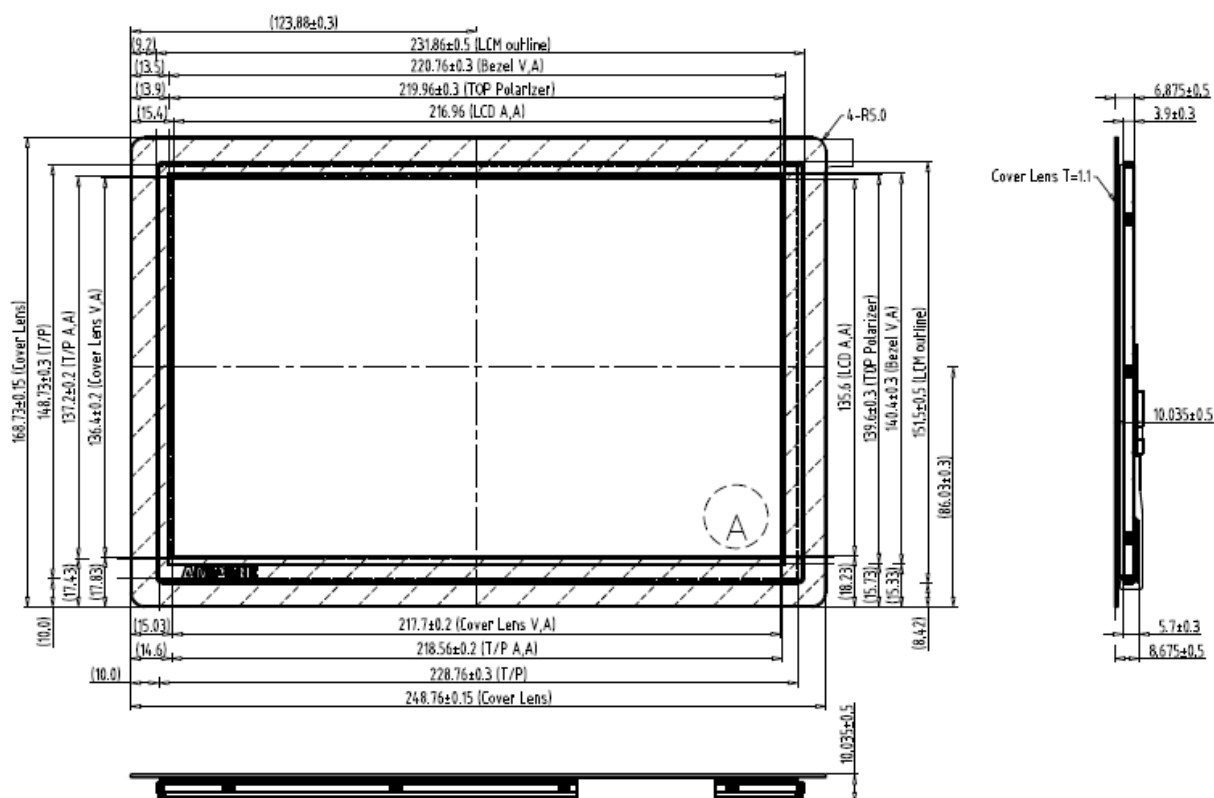
3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	VALUES		UNIT	REMARK
		MIN	MAX		
Power Voltage	V_{DD}	-0.3	4.0	V	VSS=0V, TA=25℃
Operation Temperature	T_{op}	-20	70	℃	
Storage Temperature	T_{st}	-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
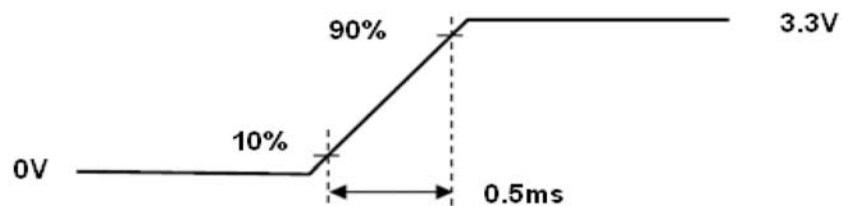
destroyed.

4. ELECTRICAL SPECIFICATIONS

4.1 Typical Operation Conditions

Item		Symbol	Min	Typ	Max	Unit	Note
LCD Drive Voltage		VDD	3.0	3.3	3.6	V	(3)
VDD Current	White Pattern	IDD	--	0.295	--	A	(2),(3)
VDD Power Consumption	White Pattern	PDD	--	--	1.2	W	(2),(3)
Rush Current		Irush			1.5	A	(2),(3),(4)
Allowable Logic/LCD Drive Ripple Voltage		VDDrp			300	mV	(3)

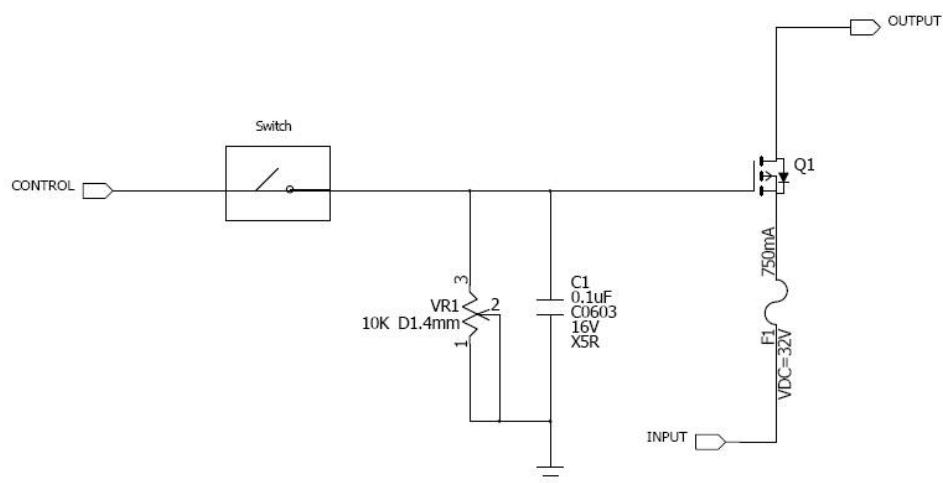Note (1).Measure Condition

Figure 9 VDD rising time

VDD rising time

Note (2) Frame Rate=60Hz, VDD=3.3V,DC Current.

Note (3) Operating temperature 25℃ , humidity 55%RH.

Note (4) The reference measurement circuit of rush current.

4-2 LED Driving Conditions

Symbol	Parameter		Min.	Typ.	Max.	Units	Condition
VLED	LED Input		(6)	(12)	(21)	[V]	Ta=25℃ Note B
PLED	LED Power Consumption		-	-	(2.5)	W	Ta=25℃ Note B
VLED_PWM	PWM Signal Voltage	High	3.0	--	3.6	V	Ta=25℃
		Low	0	--	0.4	V	
FPWM	PWM dimming Frequency		1000	-	2000	Hz	Ddim≥1%
			2000	-	20000	Hz	Ddim≥5%
VLED_EN	LED Enable Voltage	High	3.0	--	3.6	V	-
		Low	0	--	0.4	V	
LT	LED Life Time		20K	30K	-	Hours	Ta=25℃ Note A

Note A: The LED life time define as the estimated time to 50% degradation of initial luminous.

Note B: A higher LED power supply voltage will result in better power efficiency.

Keep the VLED between 12V and 12.6V is strongly recommended.

VLED rising time
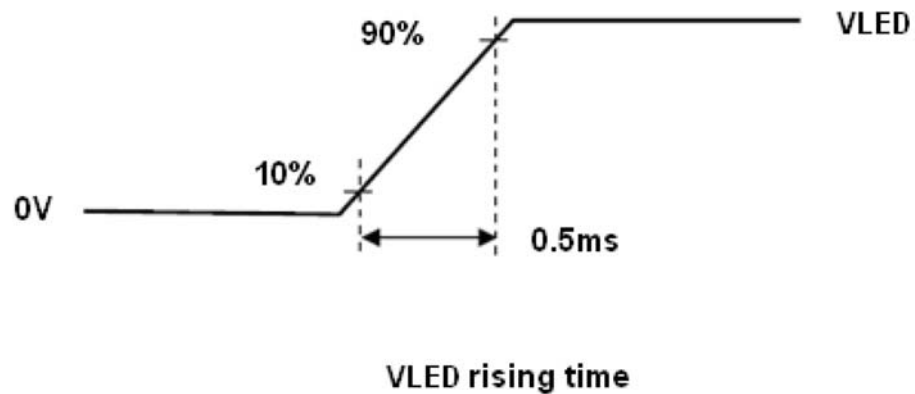
4.3 Power Sequence
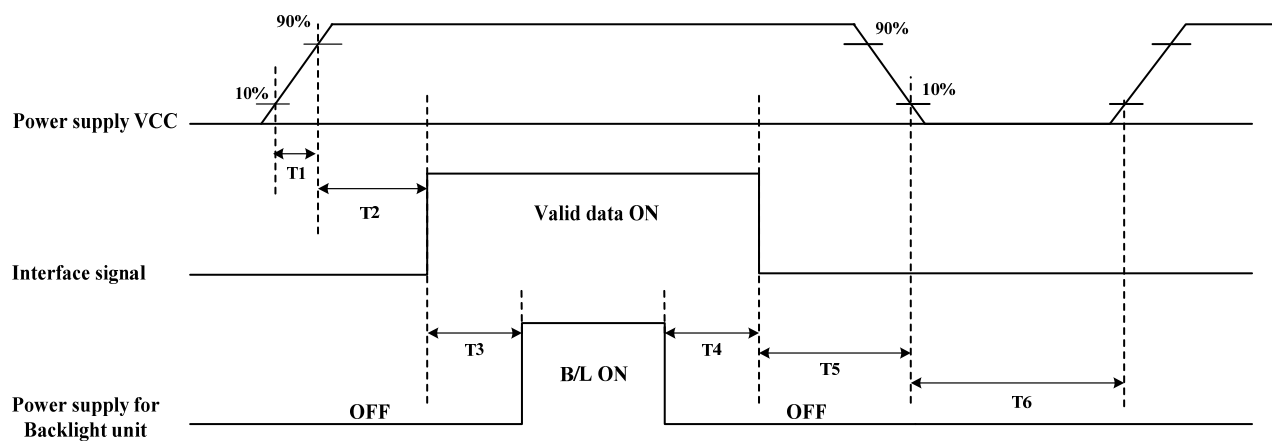
Parameter	SPEC.			Unit
	Min.	Typ.	Max.	
T1	1	-	2	[ms]
T2	0	60	100	[ms]
T3	200	-	-	[ms]
T4	200	-	-	[ms]
T5	1	-	-	[ms]
T6	1000	-	-	[ms]

4.4 LVDS Signal Timing Characteristics

4.4.1 AC Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High	V_{th}	-	-	+100	mV	V_{CM}=+1.2V
Differential Input Low	V_{tl}	-100	-		mV	V_{CM}=+1.2V
Magnitude Differential Input	$\lvert V_{ID} \rvert$	200	-	400	mV	-
Common Mode Voltage	V_{CM}	0.3+ (VID/2)	-	VDD-1.2- (VID/2)	V	-
Common Mode Voltage	ΔV_{CM}	-	-	50	mV	V_{CM}=+1.2V

Note (1) Input signals shall be low or Hi-Z state when VDD is off.

(2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.
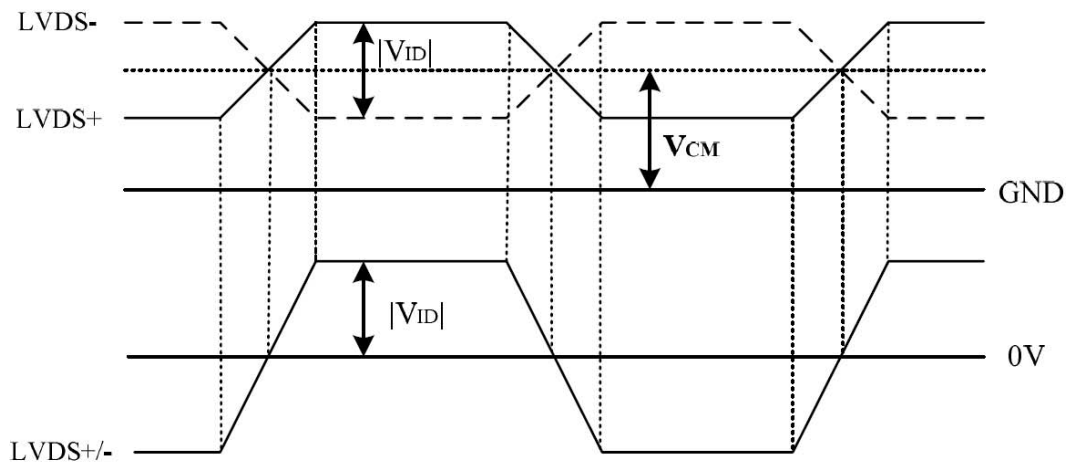
Figure 9 LVDS Data Mapping
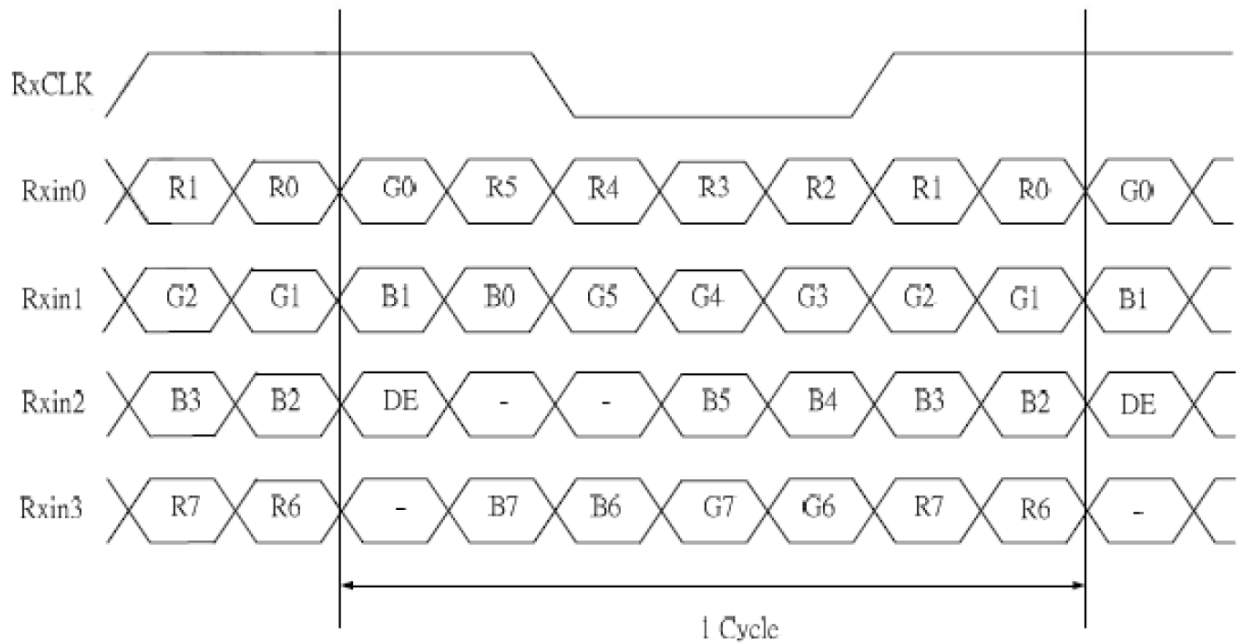
4.4.2 Timing Table

Parameter	Symbol	Unit	Min.	Typ.	Max.
Frame Rate	--	Hz	-	60	-
Frame Period	tv	line	(815)	(823)	(1023)
Vertical Display Time	tVD	line		800	
Vertical Blanking Time	tVW+tVBP+tVFP	line	(15)	(23)	(33)
1 Line Scanning Time	tH	clock	(1410)	(1440)	(1470)
Horizontal Display Time	tHD	clock		1280	
Horizontal Blanking Time	tHW+tHBP+tHFP	clock	(60)	(160)	(190)
Clock Rate	1/TC	MHz	(68.9)	(71.1)	(73.4)
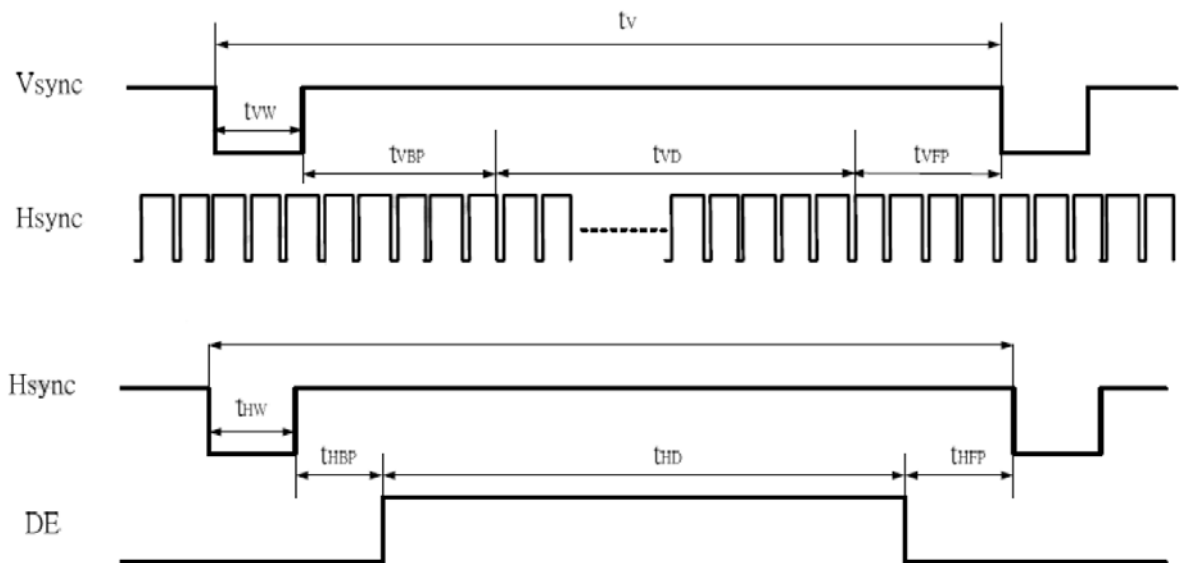
5. INTERFACE

Interface Connector (Input signal): Starconn / 300E40-0010RA-G3

Pin #	Singnal Name	Description	Remarks
1	NC	Not Connect	-
2	VDD	Power Supply, 3.3V (typical)	-
3	VDD	Power Supply, 3.3V (typical)	
4	VDD_EDID	Power Supply for EDID I2C Flash IC	
5	SCL_EDID	I2C Serial Clock for EDID I2C Flash IC	
6	SDA_EDID	I2C Serial Data for EDID I2C Flash IC	
7	NC	Not Connect	
8	LV0N	-LVDS differential data input	
9	LV0P	+LVDS differential data input	
10	GND	Ground	
11	LV1N	-LVDS differential data input	
12	LV1P	+LVDS differential data input	
13	GND	Ground	
14	LV2N	-LVDS differential data input	
15	LV2P	+LVDS differential data input	
16	GND	Ground	
17	LVCLKN	-LVDS differential data input	
18	LVCLKP	+LVDS differential data input	
19	GND	Ground	
20	LV3N	-LVDS differential data input	
21	LV3P	+LVDS differential data input	
22	GND	Ground	
23	LED_GND	Ground for LED Driving	
24	LED_GND	Ground for LED Driving	
25	LED_GND	Ground for LED Driving	
26	NC	Not Connect	
27	LED_PWM	PWM Input signal for LED driver	
28	LED_EN	LED Enable Pin	
29	CABC_EN	Please fixed to VDD or GND	
30	NC	Not Connect	
31	LED_VCC	Power Supply for LED Driver	
32	LED_VCC	Power Supply for LED Driver	
33	LED_VCC	Power Supply for LED Driver	
34	NC	Not Connect	
35	BIST	BIST pin	
36-40	NC	Not Connect	

Note: All input signals shall be low or Hi-resistance state when VDD is off.

6. Optical Specifications

Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	θx+	(75)	(85)	-	degree	(1),(2),(3)
		θx-	(75)	(85)	-		
	Vertical	θy+	(75)	(85)	-		
		θy-	(75)	(85)	-		
Contrast Ratio	Center		(600)	(800)	-	-	(1),(2),(4)
Response Time	Rising		-	-	-	ms	(1),(2),(5)
	Falling		-	-	-	ms	
	Rising + Falling		-	25	-	ms	
Color Chromaticity (CIE1931)	NTSC		-	45	-	%	(1),(2)
	Red	x	Typ. -0.05	0.561	Typ. +0.05	-	(1),(2)
	Red	y		0.334		-	
	Green	x		0.341		-	
	Green	y		0.568		-	
	Blue	x		0.161		-	
	Blue	y		0.129		-	
	White	x		0.313		-	
	White	y		0.329		-	
White Luminance	Center		240	300	-	cd/m^2	(1),(2),(6)
Luminance Uniformity	9Points		70	75	-	%	(1),(2),(6)

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 4 Measurement Setup

LCD Module
LCD Panel
Center of the Screen
Photo meter (DMS 1140)
180 mm
Light Shield Room
*Ambient Luminance<2lux
*Ambient Temperature
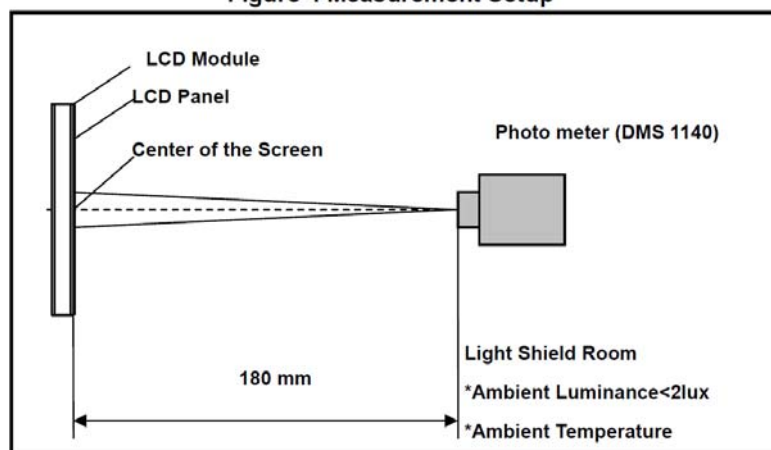
Figure 5 Definition of Viewing Angle
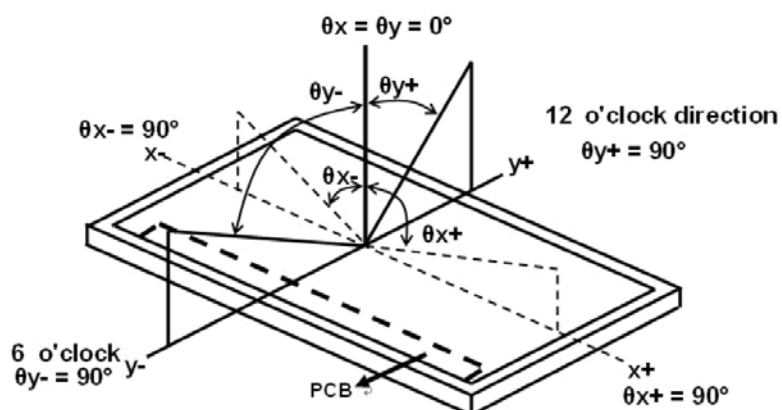
Note (4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L63: Luminance of gray level 255, L0: Luminance of gray level 0

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

Figure 6 Definition of Response Time

(6) : Definition of Luminance Uniformity

$$\Delta L = [\text{L(min.) of 9 points} / \text{L(max.) of 9 points}] \times 100\%$$

7. Touch Panel Unit

7.1 Basic Characteristic

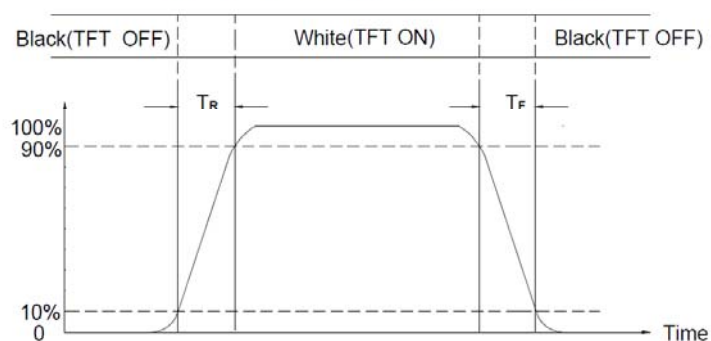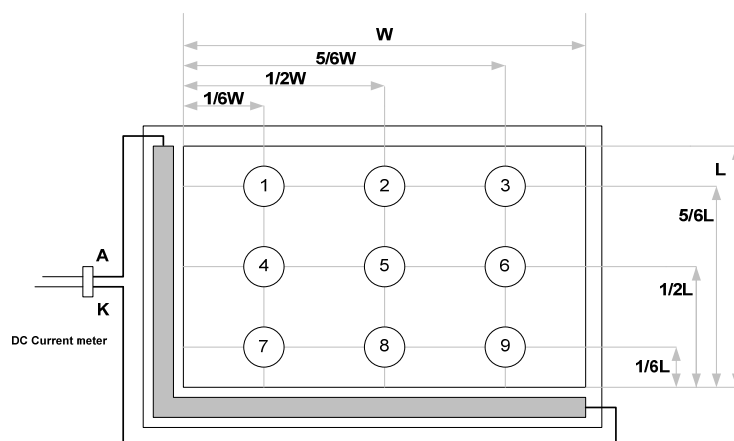| ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Max 10-fingers or Signal-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 80 points/sec
Control IC	IL2511
Interface	I2C

Specify the normal operating condition

(DGND=0V)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	3.14	3.3	3.46	V	
Low Level Input Voltage	VIL	0	--	0.3*VDD	V	1
High Level Input Voltage	VIH	0.6*VDD	--	VDD	V	1
Power Consumption	I$_{VDD}$		T.B.D		mA	

Note 1: SDA , SCL ,/RESET

INTERFACE PIN ASSIGNMENT

Connector : 9827WRS-06B-9TV01E or Equivalent.

Pin	Name	Description
1	GND	Power GND
2	SDA	I^{2}C Data
3	SCL	I^{2}C Clock
4	VDD	Power supply 3.3V
5	INT	Active "Low"
6	/RESET	Active "Low"

I²C Timming
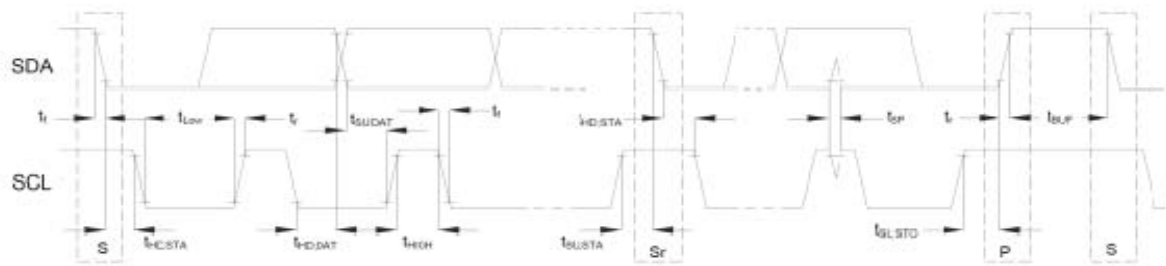
Symbol	Parameter	100KHz			400KHz		
		Min	Max	Unit	Min	Max	Unit
f$_{SCL}$	SCL clock frequency	0	100	kHz	0	400	KHz
t$_{HD:STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated	4.0	–	µs	0.6	–	µs
t$_{LOW}$	LOW period of the SCL clock	4.7	–	µs	1.3	–	µs
t$_{HIGH}$	HIGH period of the SCL clock	4.0	–	µs	0.6	–	µs
t$_{SU:STA}$	Set-up time for a repeated START condition	4.7	–	µs	0.6	–	µs
t$_{HD:DAT}$	Data hold time	0	3.45	µs	0	0.9	µs
t$_{SU:DAT}$	Data set-up time	250	–	ns	100	–	ns
t$_r$	Rise time of both SDA and SCL signals	–	1000	ns	–	300	ns
t$_f$	Fall time of both SDA and SCL signals	–	300	ns	–	300	ns
t$_{SU:STO}$	Set-up time for STOP condition	4.0	–	µs	0.6	–	µs
t$_{BUF}$	Bus free time between a STOP and START condition	4.7	–	µs	1.3	–	µs

8. 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
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 100 cycle(Dry)	1,2
Storage Humidity Test	60 °C, Humidity 90%, 240 hrs	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).

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.

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. GENERAL PRECAUTION

9.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control   systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

9.2 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. AMPIRE does not warrant the module, if customers disassemble or modify the module.

9.3 Breakage of LCD Panel

(1) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.

(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.

(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

(1) Disconnect power supply before handling LCD module.

(2) Do not pull or fold the LED cable.

(3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit

(1) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.

(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

(3) It's recommended to employ protection circuit for power supply.

9.6 Operation

    (1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

    (2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

    (3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

    (4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may cause deformation or color fading.

    (5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

9.7 Mechanism

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

    (2)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.
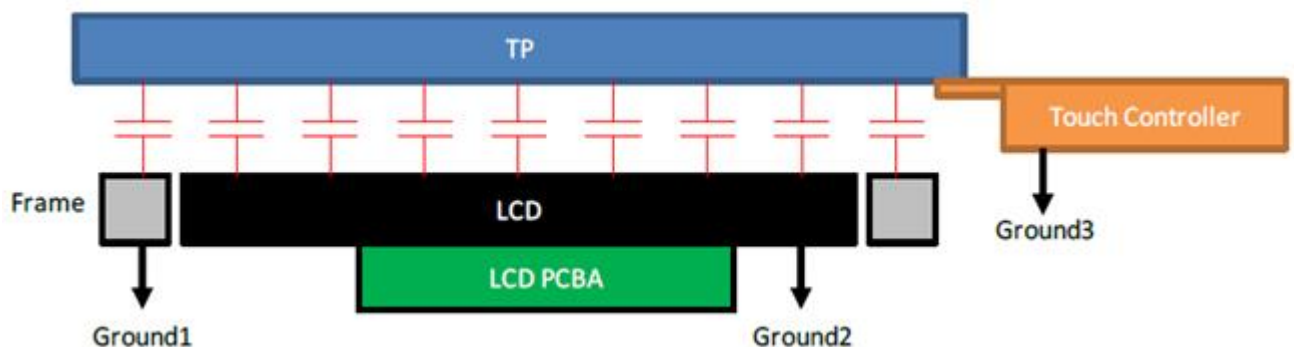
GND1, GND2 and GND3 should be connected together to have the same ground

9.8 Static Electricity

    (1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

    (2) Because LCD modules use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

9.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

9.10 Disposal

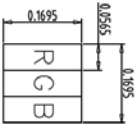When disposing LCD module, obey the local environmental regulations.

9.11 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.

10. OUTLINE DIMENSION

CN1

1	NC	21	LV3P
2	VDD	22	GND
3	VDD	23	LED_GND
4	VDD_EDID	24	LED_GND
5	SCL_EDID	25	LED_GND
6	SDA_EDID	26	NC
7	NC	27	LED_PWM
8	NC	28	LED_EN
9	LV0N	29	CABC_EN
10	GND	30	NC
11	LV1N	31	LED_VCC
12	LV1P	32	LED_VCC
13	GND	33	LED_VCC
14	LV2N	34	NC
15	LV2P	35	BIST
16	GND	36	NC
17	LVCLKN	37	NC
18	LVCLKP	38	NC
19	GND	39	NC
20	LV3N	40	NC

JP3

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

Note:
1. Unless indicated, Tolerance "±0.5"
2. LVDS Connector:Starconn./300E40-0010RA-G3 or Equivalent
3. T/P Controller board: ENTERY 3808K-F06N-03L or Equivalent

A Block

R G B

0.1695
0.0565
0.1695

168.73±0.15 (Cover Lens)
148.73±0.3 (T/P)
137.2±0.2 (T/P A,A)
136.4±0.2 (Cover Lens V,A)
(10.0)
(17.43)
(17.83)
(23.88±0.3)
231.86±0.5 (LCM outline)
220.76±0.3 (Bezel V,A)
219.96±0.3 (TOP Polarizer)
216.96 (LCD A,A)
217.7±0.2 (Cover Lens V,A)
218.56±0.2 (T/P A,A)
228.76±0.3 (T/P)
248.7±0.15 (Cover Lens)
135.6 (LCD A,A)
139.6±0.3 (TOP Polarizer)
140.4±0.3 (Bezel V,A)
151.5±0.5 (LCM outline)
(18.23)
(15.73)
(15.33)
(8.42)
(86.03±0.3)
10.035±0.5
4-R5.0

Cover Lens T=1.1
8.675±0.5
6.875±0.5
3.9±0.3
5.7±0.3
10.035±0.5

REV'	REVISION RECORD	DATE	NAME
0	NEW RELEASE	06-06-19	EMILY

1	1280800N3TZQW-00H LCM			7	
2	1024600LD-T CTP (179102462O)			8	
3	281024601I (ILI 2511)			9	
4	I2C interface			10	
5				11	
6				12	

TOLERANCE GRADE(±)	A	B	DIM.
			MM
IF NO.			D'W'N. EMILY DATE 06-06-19
PARTS NO. LCM 1280800NN-T24			CHK. DATE
			APPD. DATE

ampire 晶采光電科技

TITLE 1280800NN-T24
(10.1")
DWG. NO. *190638MA
SHEET 1 OF 1

CN1

1	NC	21	LV3P
2	VDD	22	GND
3	VDD	23	LED_GND
4	VDD_EDID	24	LED_GND
5	SCL_EDID	25	LED_GND
6	SDA_EDID	26	NC
7	NC	27	LED_PWM
8	NC	28	LED_EN
9	LV0N	29	CABC_EN
10	GND	30	NC
11	LV1N	31	LED_VCC
12	LV1P	32	LED_VCC
13	GND	33	LED_VCC
14	LV2N	34	NC
15	LV2P	35	BIST
16	GND	36	NC
17	LVCLKN	37	NC
18	LVCLKP	38	NC
19	GND	39	NC
20	LV3N	40	NC

JP3

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

A Block

R
G
B

0.1695
0.0565
0.1695

Note:
1. Unless indicated, Tolerance "±0.5"
2. LVDS Connector:Starconn/300E40-0010RA-G3 or Equivalent
3. T/P Controller board: ENTERY 3808K-F06N-03L or Equivalent

Back view

(54.23±3.0)   40.0±0.3 (PCB)
(9.42±3.0)
(68.105)   P1.25x5
7.4±0.5
90.0±0.3 (PCB)
248.76±0.15 (Cover Lens)
231.86±0.5 (LCM outline)
(123.88±0.3)
Kapton(70.0x10.0)
Conductive fabric 7.0x5.5mm
(77.78±0.5)
(114.68±0.3)
40
Starconn / 300E40-0010RA-G3 or equivalent
(8,42)
(59.95±0.5)
(9.2)
Black print
151.5±0.5 (LCM outline)
168.73±0.15 (Cover Lens)
(86.03±0.3)

No.	PART'S NO.		
1	1280800N3TZQW-00H LCM	7	
2	1024600LD-T CTP (179102462O)	8	
3	2810246011 (IL 2511)	9	
4	I2C interface	10	
5		11	
6		12	

TOLERANCE GRADE(±)		A	B
DIM.	MM		

PART'S NO.LCM-1	1280800NN-T24		
IE NO.	DWN. EMILY	DATE 06-06-19'	
CHK.		DATE	
APPD.		DATE	

Note block labels

AMPIRE 晶采光電科技

TITLE
1280800NN-T24
(10.1")

DWG. NO.
*190639MA

SHEET 1 OF 1