AMP DISPLAY INC.

A Brighter Solution

SPECIFICATIONS

CUSTOMER	
CUSTOMER PART NO.	
AMP PART NO.	**AM-800480L6TZQW-TN0H**
APPROVED BY	
DATE	

☐ **Approved For Specifications**

☑ **Approved For Specifications & Sample**

AMP DISPLAY INC

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2015/07/16	---	New Release	Kokai

1. FEATURES

(1) Construction : a-Si TFT-LCD with driving system, White LED Backlight

(2) LCD type : Transmissive , Normally White

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

(4) RGB Interface 45 pin.

(5) LCD Power Supply Voltage : 3.3V single power input, built-in power supply circuit.

(6) Viewing Direction: Wide view angle without Gray-inversion by EVA technology.

(7) Projected Capacitive Touch Screen. I2C interface (Touch Controller: ST1633i).

(8) ROHS compliant.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display size (diagonal)	5.0	inch
Resolution	800 (W) x RGB x 480 (H)	dot
Display area	110.6 (W) x 67.4 (H)	mm
Pixel pitch	0.135 (W) x 0.135 (H)	mm
Overall dimension	118.5(W) x 135.0(H) x 6.238(D)	mm
Color configuration	R.G.B Vertical stripe	

3. ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for logic	VCC	-0.5	**5.0**	V	
Input Signal Voltage	VI	-0.5	VCC + 0.5	V	(1)
Operating Temperature	Top	-20	70	℃	(2)
Storage Temperature	Tstg	-30	80	℃	

Note 1: Hsync, Vsync, DEN, DCLK, R0~R7, G0~G7, B0~B7

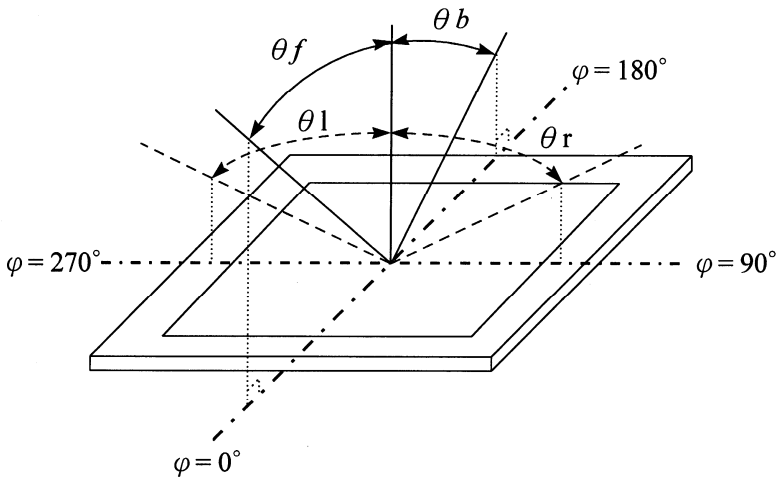
Note 2: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θ f	CR≧10	75	85	-	deg.	(1)(2)(3)
	Back	θ b		75	85	-		
	Left	θ l		75	85	-		
	Right	θ r		75	85	-		
Contrast ratio		CR	Θ=Φ=0°	150	250	--	--	(1)(3)
Response Time		T_r	Θ=Φ=0°	--	15	30	ms	(1)(4)
		T_f		--	35	50	ms	(1)(4)
Color chromaticity	Red	Rx	Θ=Φ=0°	0.585	0.615	0.645	--	(1)
		Ry		0.314	0.344	0.374		
	Green	Gx		0.277	0.307	0.337		
		Gy		0.532	0.562	0.592		
	Blue	Bx		0.103	0.133	0.163		
		By		0.120	0.150	0.180		
	White	Wx		0.279	0.309	0.339		
		Wy		0.320	0.350	0.380		
Luminance (ILED=120mA)		L	Θ=Φ=0°	409	512	--	cd/m^2	(1)(5)
Luminance Uniformity		ΔL	Θ=Φ=0°	70	-	-	%	(1)(5)(6)

Note 1: Ta=25°C. To be measured on the center area of panel after 10 minutes operation.

Note 2: Definition of Viewing Angle



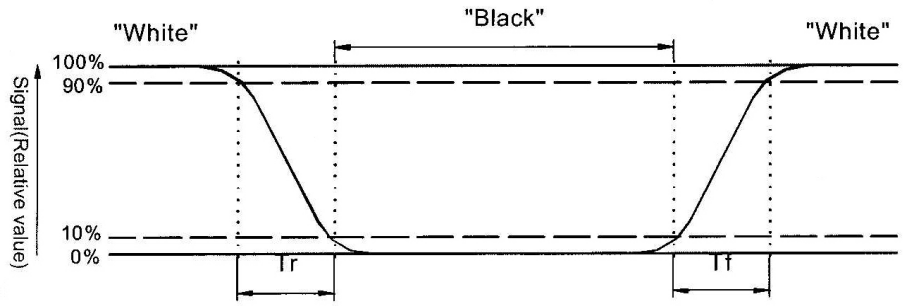
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

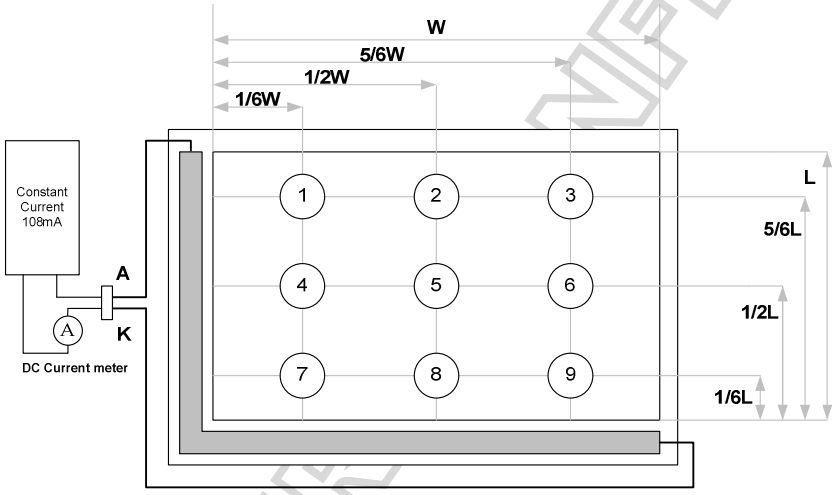
$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note 4: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black" (rising time) respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



Note 5 : Luminance is measured at point 5 of the display.



Note 6 : Definition of Luminance Uniformity

ΔL = [L(min.) of 9 points / L(max.) of 9 points] X 100%

Note 7: Condition: Ta=25℃, continuous lighting, Life time is estimated data.

Definitions of failure:

1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.

5. ELECTRICAL CHARACTERISTICS

5.1 LCD driving

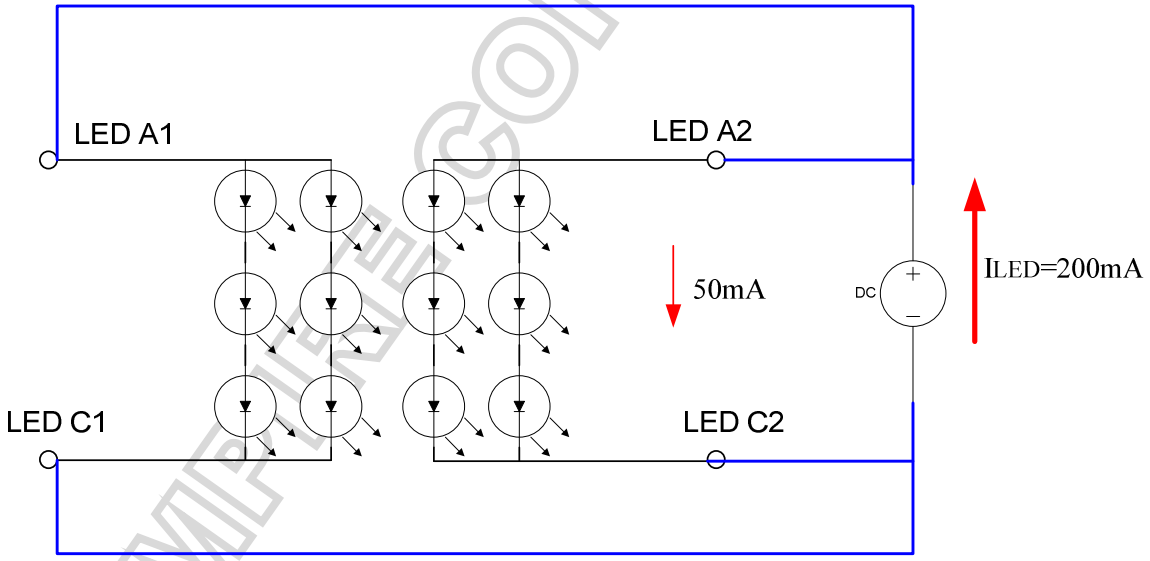
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage		VCC	3.0	3.3	3.6	V	
Input voltage for logic	H Level	V_{IH}	0.7 VCC	--	VCC	V	(1)
	L Level	V_{IL}	0	--	0.3 VCC	V	
Power Supply current		IDD	--	170	220	mA	(2)

Note 1: Hsync, Vsync, DEN, DCLK, R0~R7, G0~G7, B0~B7

Note 2: fV =60Hz , Ta=25℃ , Display pattern : All Black

5.2 Electrical characteristic of LED Back-light

Paramenter	Symbol	Min.	Typ.	Max.	Unit	Condiction
LED voltage	V_{AK}	--	9.9	10.8	V	I_{LED} =120mA,Ta=25℃
LED forward current	I_{LED}	--	200	--	mA	Ta=25℃
LED life time	--	--	30,000	--	Hrs	Ta=25℃ (Note1)

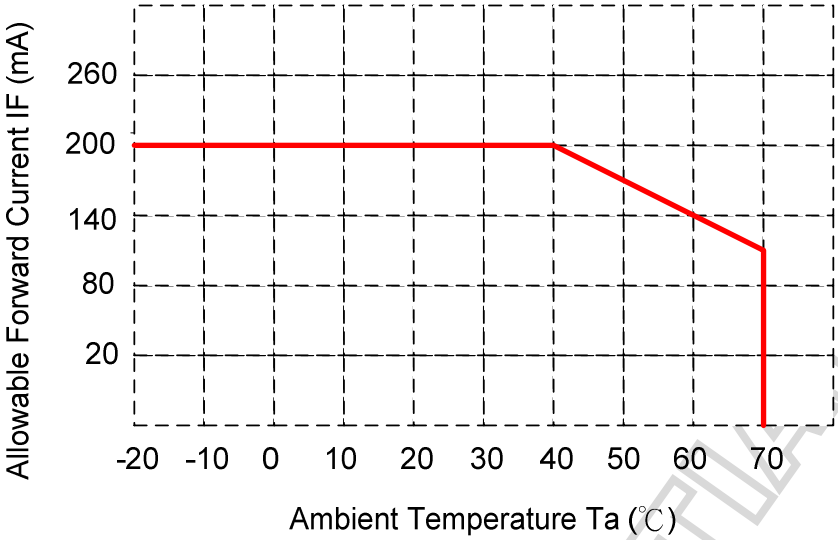


■ The constant current source is needed for white LED back-light driving.

Note 1: Condition: Ta=25℃, continuous lighting, Life time is estimated data.

Definitions of failure:

1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.



5.3 Touch Panel Specification

5.3.1 Basic Characteristic

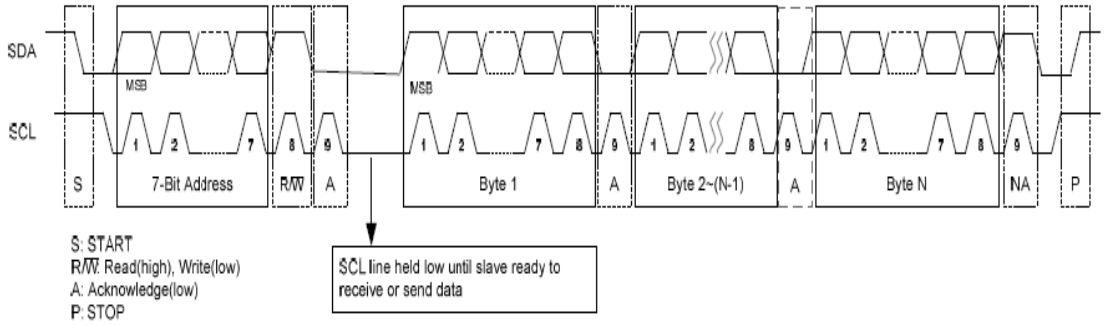
ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	5-fingers or Signal-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx 60 points/sec
Control IC	SITRONIX ST1633i

5.3.2 Capacitive Touch Panel FPC Descriptions

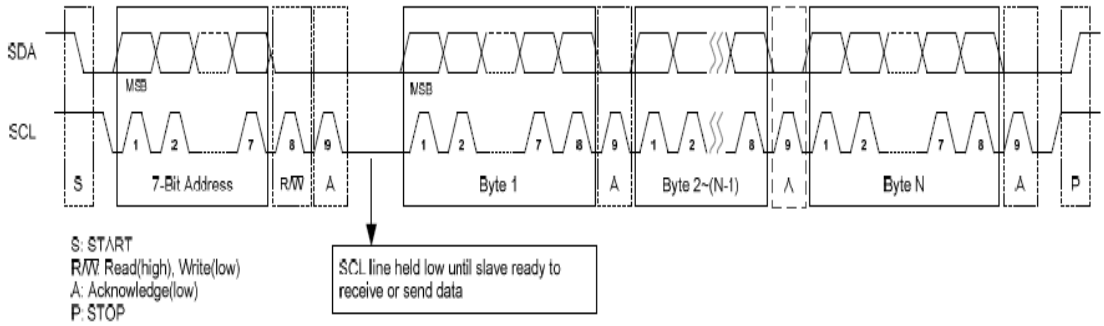
No.	Symbol	I/O	Description	Remark
1	GND	-	Ground.(0V)	
2	SDA	I/O	I2C Interface.	
3	SCL	I		
4	VDD	-	Power Supply for TP controller.(3.3V)	Note1
5	INT	O	IRQ Terminal.	
6	XRES	I	Terminal of Reset TP controller.	

5.3.3 I2C Slave Interface

Read



Write



5.3.4 Default I2C Address

I2C address is default to **0x55** (7-bits address) for Sitronix Touch IC. If the I2C address is conflict with another I2C device's address on same bus, user can change I2C address by TTK PC Utility.

5.3.5 Register Read

For reading register value from I2C device, host has to tell I2C device the *Start Register Address* before reading corresponding register value.

I2C Start	I2C Header (W)	Start Reg. Addr. (a)	I2C Stop	I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	…	Value of Reg(a+n)	I2C Stop

Sitronix Touch IC I2C host interface protocol supports Repeated Register Read. That is, once the Start Register Address has been set by host, consequent I2C Read(R) transactions will directly read register values starting from the Start Register Address without setting address first, as shown in Figure

I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	…	Value of Reg(a+n)	I2C Stop	I2C Start	I2C Header (R)	Value of Reg(a)	Value of Reg(a+1)	…	Value of Reg(a+n)	I2C Stop

5.3.6 Register Write

For writing register to I2C device, host has to tell I2C device the Start Register Address in each I2C Register Write transaction. Register values to the I2C device will be written to the address starting from the Start Register Address described in Register Write I2C transaction as shown in Figure

I2C Start	I2C Header (W)	Start Reg. Addr. (a)	Value to Reg(a)	Value to Reg(a+1)	…	Value to Reg(a+n)	I2C Stop

5.3.7 SAMPLE CODES

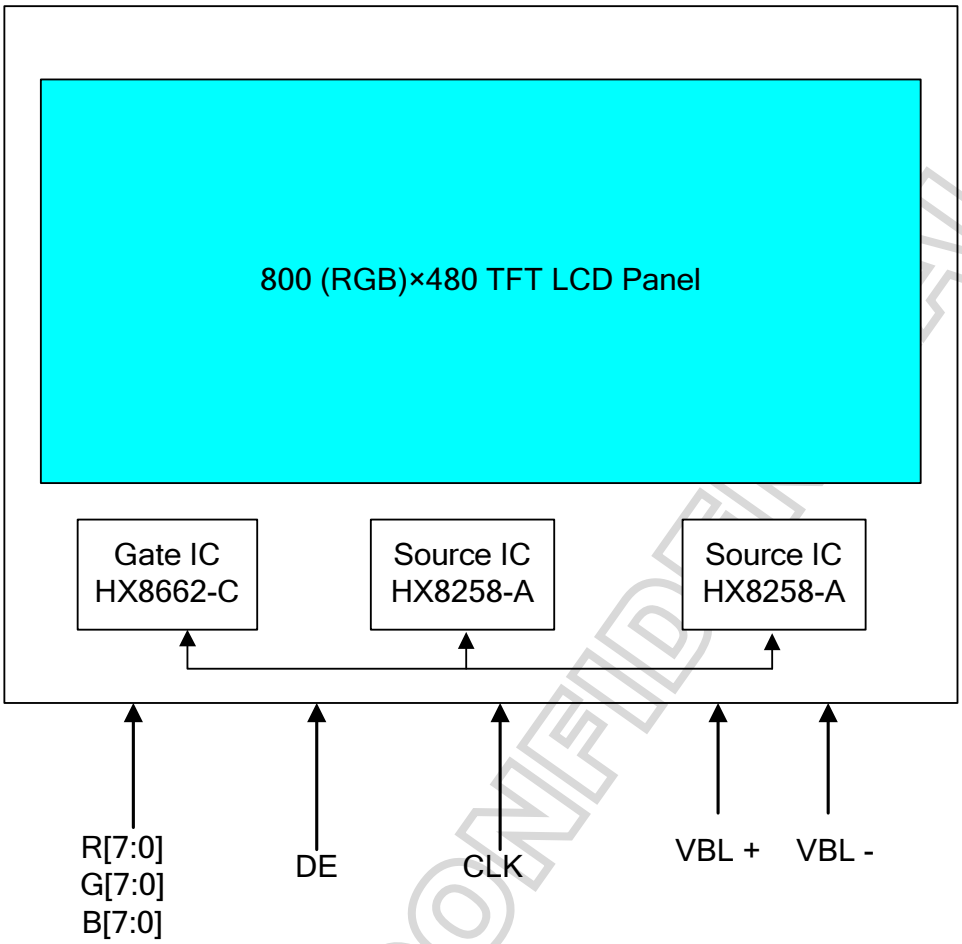
```
typedef struct {
        u8 y_h: 3,
        reserved: 1,
        x_h: 3,
        valid: 1;
        u8 x_l;
        u8 y_l;
        u8 z;
    } xyz_data_t;

typedef struct {
        u8 fingers: 4,
        reserved: 4;
        u8 keys;
        xyz_data_t xyz_data[10];
} stx_report_data_t;

// I2C Master sends count bytes data stored in buf to I2C Slave.
// I2C package: | S | I2C Addr | W | Data (buf) | P |
extern int i2c_master_send(const char *buf, int count);

// I2C Master reads count bytes data to buf from I2C Slave.
// I2C package: | S | I2C Addr | R | Data (buf) | Nak | P |
extern int i2c_master_recv(char *buf, int count);
```

6. BLOCK DIAGRAM



7. INTERFACE PIN ASSIGNMENT

Pin No	Symbol	Function
1	GND	Power Ground
2	GND	Power Ground
3	VCC	3.3V Power Supply for LCD
4	VCC	3.3V Power Supply for LCD
5	R0	Red Data 0 (LSB)
6	R1	Red Data 1
7	R2	Red Data 2
8	R3	Red Data 3
9	R4	Red Data 4
10	R5	Red Data 5
11	R6	Red Data 6
12	R7	Red Data 7 (MSB)
13	G0	Green Data 0 (LSB)
14	G1	Green Data 1
15	G2	Green Data 2
16	G3	Green Data 3
17	G4	Green Data 4
18	G5	Green Data 5
19	G6	Green Data 6
20	G7	Green Data 7 (MSB)
21	B0	Blue Data 0 (LSB)
22	B1	Blue Data 1
23	B2	Blue Data 2
24	B3	Blue Data 3
25	B4	Blue Data 4
26	B5	Blue Data 5
27	B6	Blue Data 6
28	B7	Blue Data 7(MSB)
29	GND	Power Ground
30	DCLK	Clock Signals
31	DISP	Display on/off (High: on, Low :off)
32	HSYNC	Horizontal SYNC signal.
33	VSYNC	Vertical SYNC signal
34	DENA	Data Enable signal (to settle the viewing area)
35	NC	No Connect
36	NC	No Connect
37	NC	No Connect
38	NC	No Connect
39	SC	Scan direction control (Low= Reverse, High= Normal)
40	GND	Power Ground
41	GND	Power Ground

42	LED C1	LED cathode 1
43	LED A1	LED anode 1
44	LED C2	LED cathode 2
45	LED A2	LED anode 2

Remark:

1. GND Pin must ground contact, can not be floating.
2. SC are controlled function

(L/R)	(U/D)	Function
1	0	Normally display
0	1	Left and Right opposite , Up and Down opposite

8. INTERFACE TIMING

PARAMETER	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
HS setup time	T_{hst}	6	-	-	ns
HS hold time	T_{hhd}	6	-	-	ns
VS setup time	T_{vst}	6	-	-	ns
VS hold time	T_{vhd}	6	-	-	ns
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DEN setup time	T_{esu}	6	-	-	ns
Source output settling time	T_{ST}	-	-	15	µs
Source output loading R	R_{SL}	-	2	-	kΩ
Source output loading C	C_{SL}	-	60	-	pF
Repair OP output loading C	C_{RL}	-	150	-	pF
Repair OP output settling time	T_{RT}	-	-	15	µs
POL output delay time	T_{DP}	-	-	40	ns

- **Sync mode**

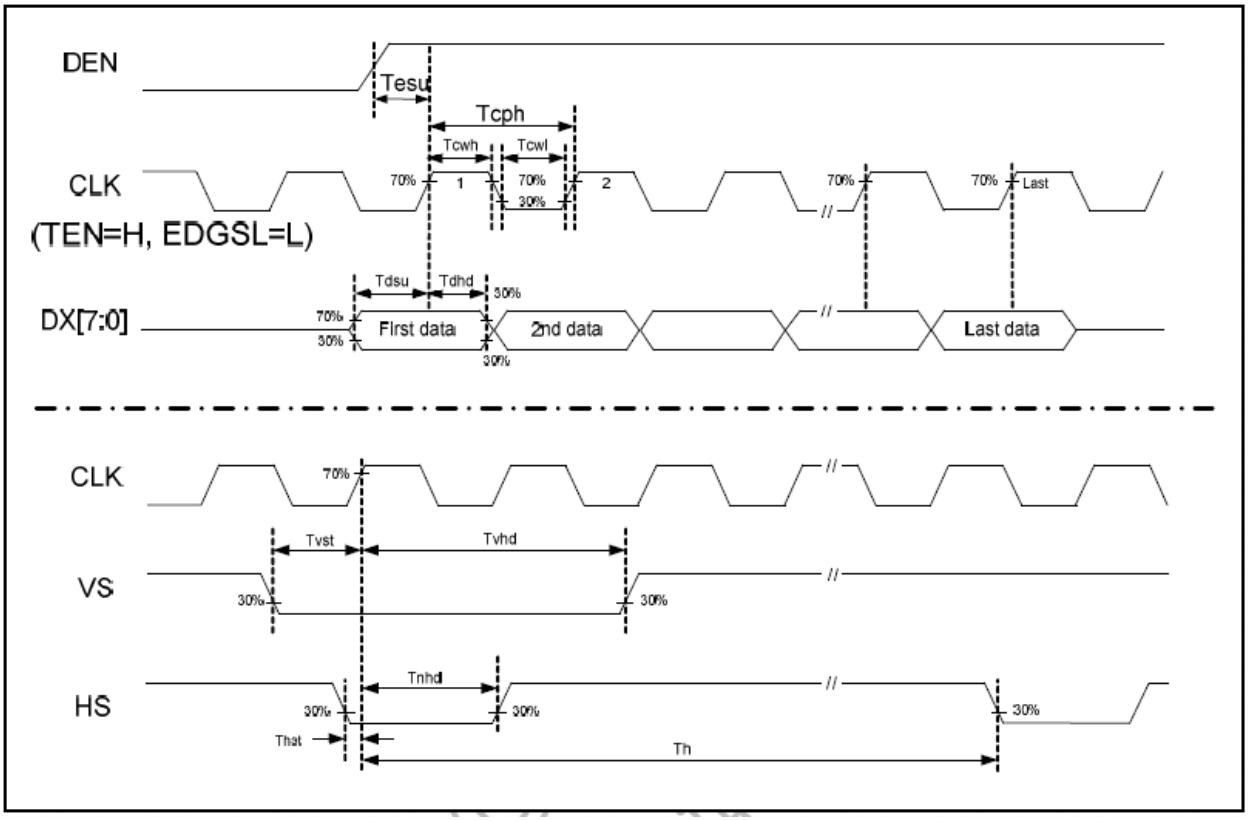
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	29.93	33.26	36.59	MHz
CLK period	T_{CPH}	-	30.06	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	930	1056	1057	T_{CPH}
HS pulse width	T_{WH}	1	128	-	T_{CPH}
HS-first horizontal data time	T_{HS}	STHD[7:0]+88			T_{CPH}
HS Active Time	T_{HA}	-	800	-	T_{CPH}
VS period	T_V	490	525	526	T_H
VS pulse width	T_{WV}	1	2	-	T_H
VS-DE time	T_{VS}	STVD[6:0]+8			T_H
VS Active Time	T_{VA}	-	480	-	T_H

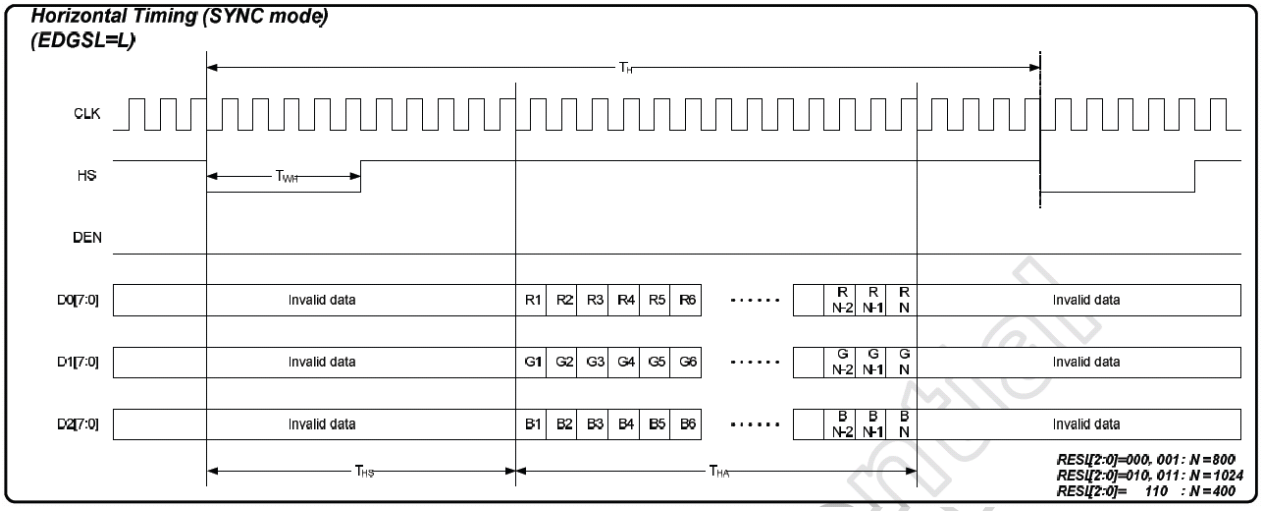
Note: (1) $T_{HS}+T_{HA}<T_H$

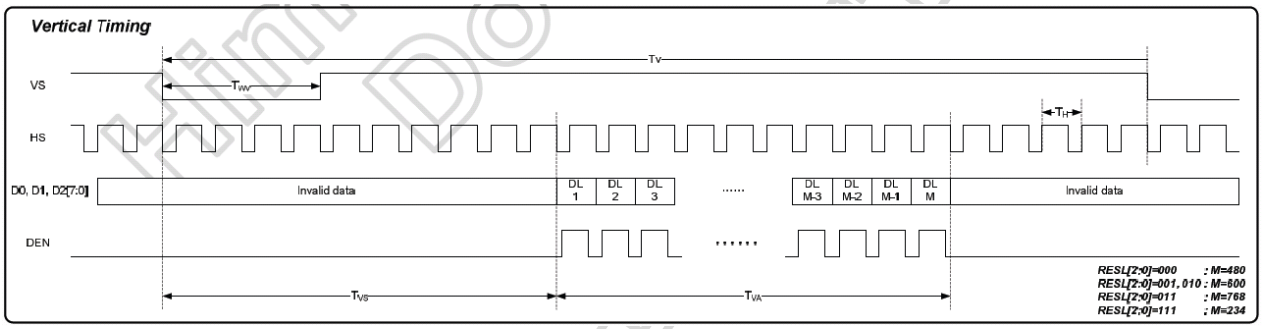
- **DE mode**

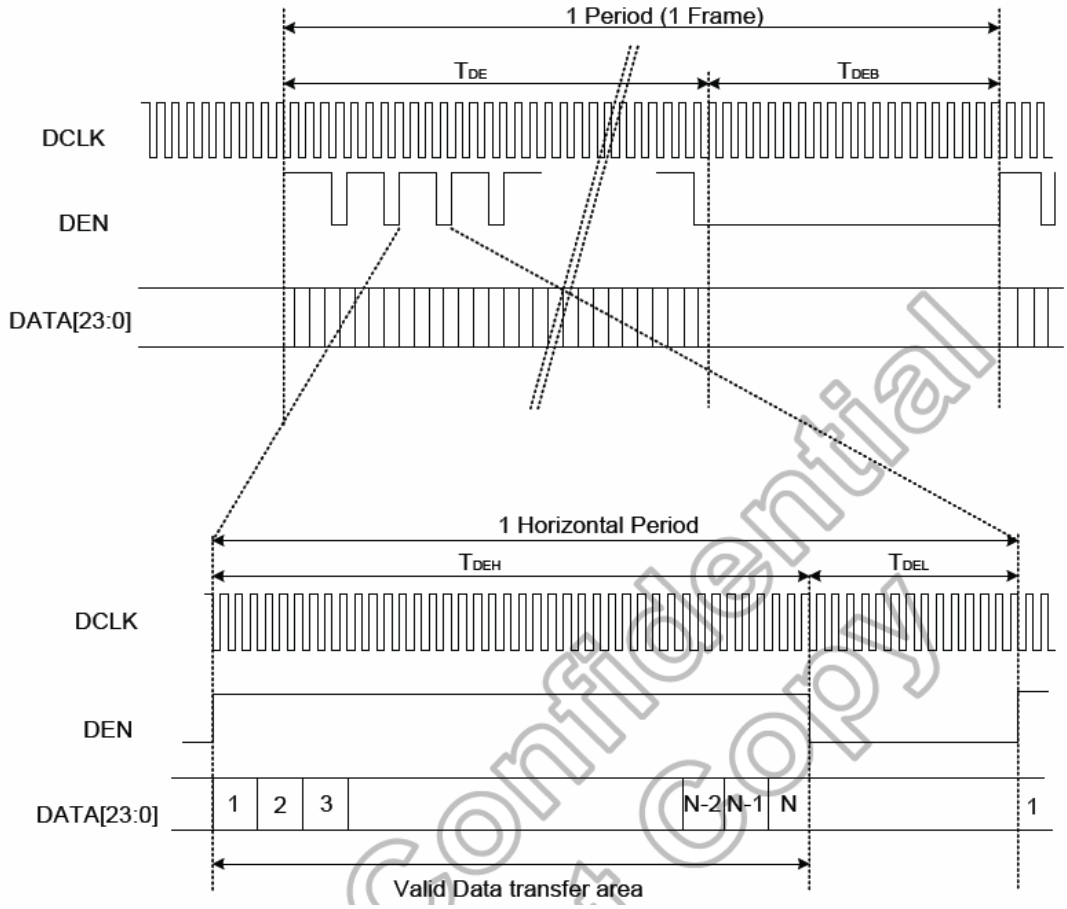
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
CLK frequency	F_{CPH}	29.93	33.26	36.59	MHz
CLK period	T_{CPH}	-	30.06	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
OEV pulse width	T_{OEV}	-	150	-	T_{CPH}
CKV pulse width	T_{CKV}	-	133	-	T_{CPH}
DE(internal)-STV time	T_1	-	4	-	T_{CPH}
DE(internal)-CKV time	T_2	-	40	-	T_{CPH}
DE(internal)-OEV time	T_3	-	23	-	T_{CPH}
DE(internal)-POL time	T_4	-	157	-	T_{CPH}
STV pulse width	-	-	1	-	T_H









9. DISPLAYED COLOR AND INPUT DATA

DATA SIGNAL

COLOR		INPUT DATA																							
		R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

10. Reliability Test

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).

11. USE PRECAUTIONS

11.1 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 benzene 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.

11.2 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.

11.3 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.

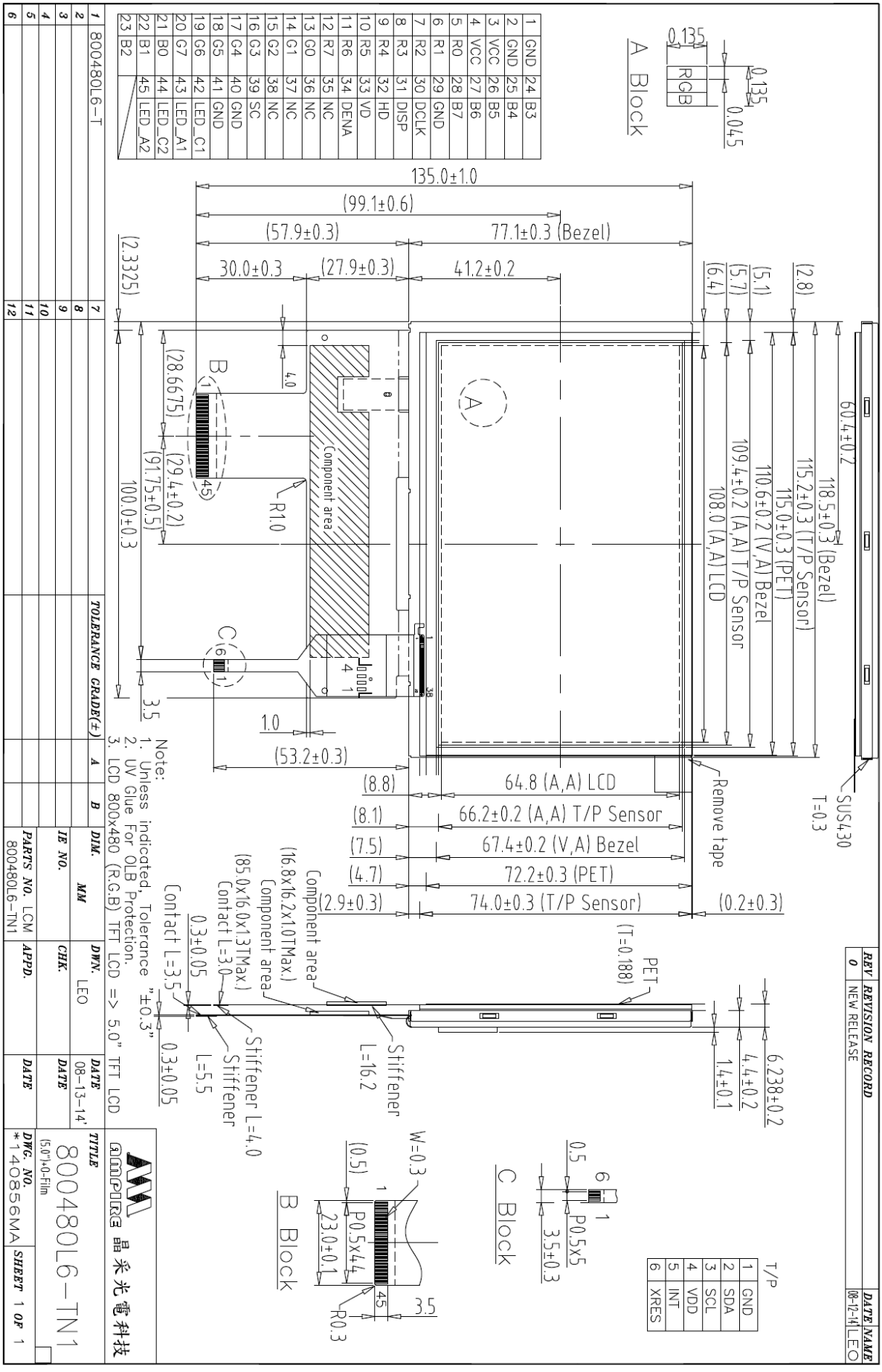
11.4 Operating precautions

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: 0.2VCC or less and H level: 0.8VCC 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.

11.5 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) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.
3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

12. OUTLINE DIMENSION



1	GND	24	B3
2	GND	25	B4
3	VCC	26	B5
4	VCC	27	B6
5	R0	28	B7
6	R1	29	GND
7	R2	30	DCLK
8	R3	31	DISP
9	R4	32	HD
10	R5	33	VD
11	R6	34	DENA
12	R7	35	NC
13	G0	36	NC
14	G1	37	NC
15	G2	38	NC
16	G3	39	SC
17	G4	40	GND
18	G5	41	GND
19	G6	42	LED_C1
20	G7	43	LED_A1
21	B0	44	LED_C2
22	B1	45	LED_A2
23	B2		

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	08-12-14	LEO

TOLERANCE GRADE(±)	A
	B
DIM.	MM
DWN.	LEO
CHK.	
APPD.	
PARTS NO.	LCM 800480L6-TN1
DATE	08-13-14'
DATE	
DATE	

800480L6-T

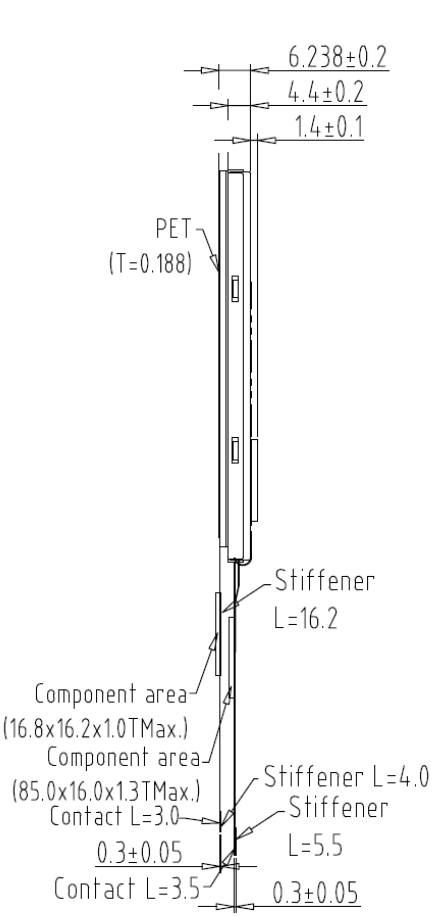
AMPIRE 晶采光電科技

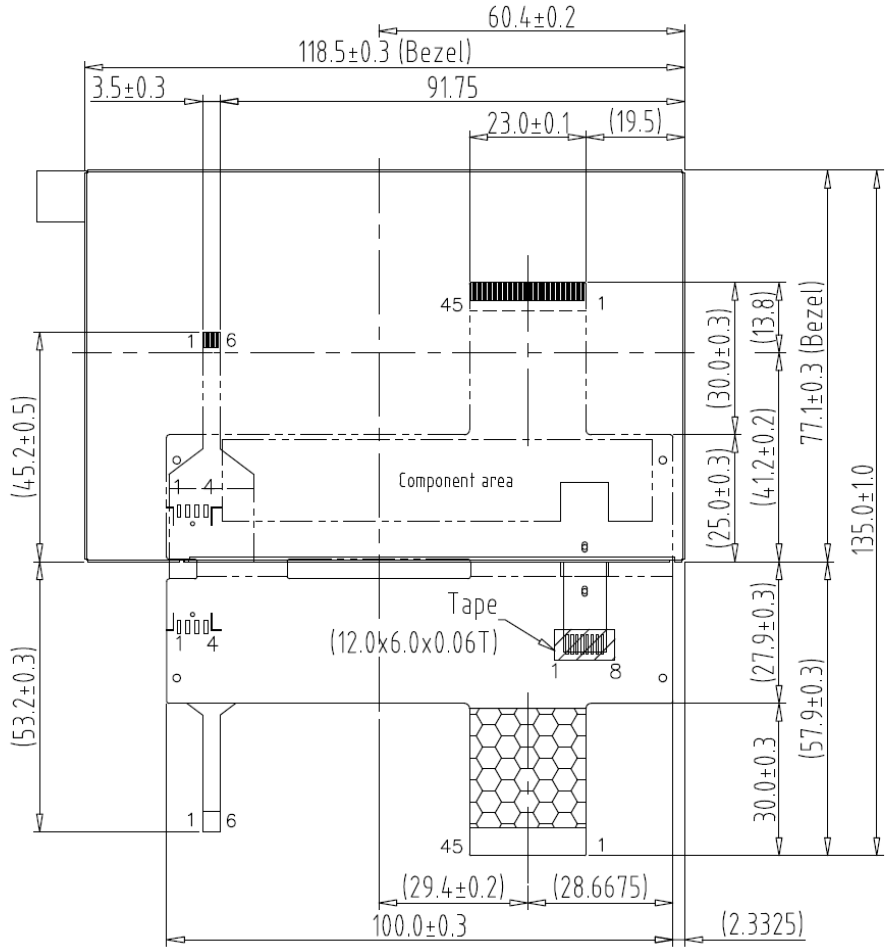
TITLE: 800480L6-TN1 (5.0"+0-Film)

DWG. NO.: *140856MA

SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	08-12-14	SNOW





Back view

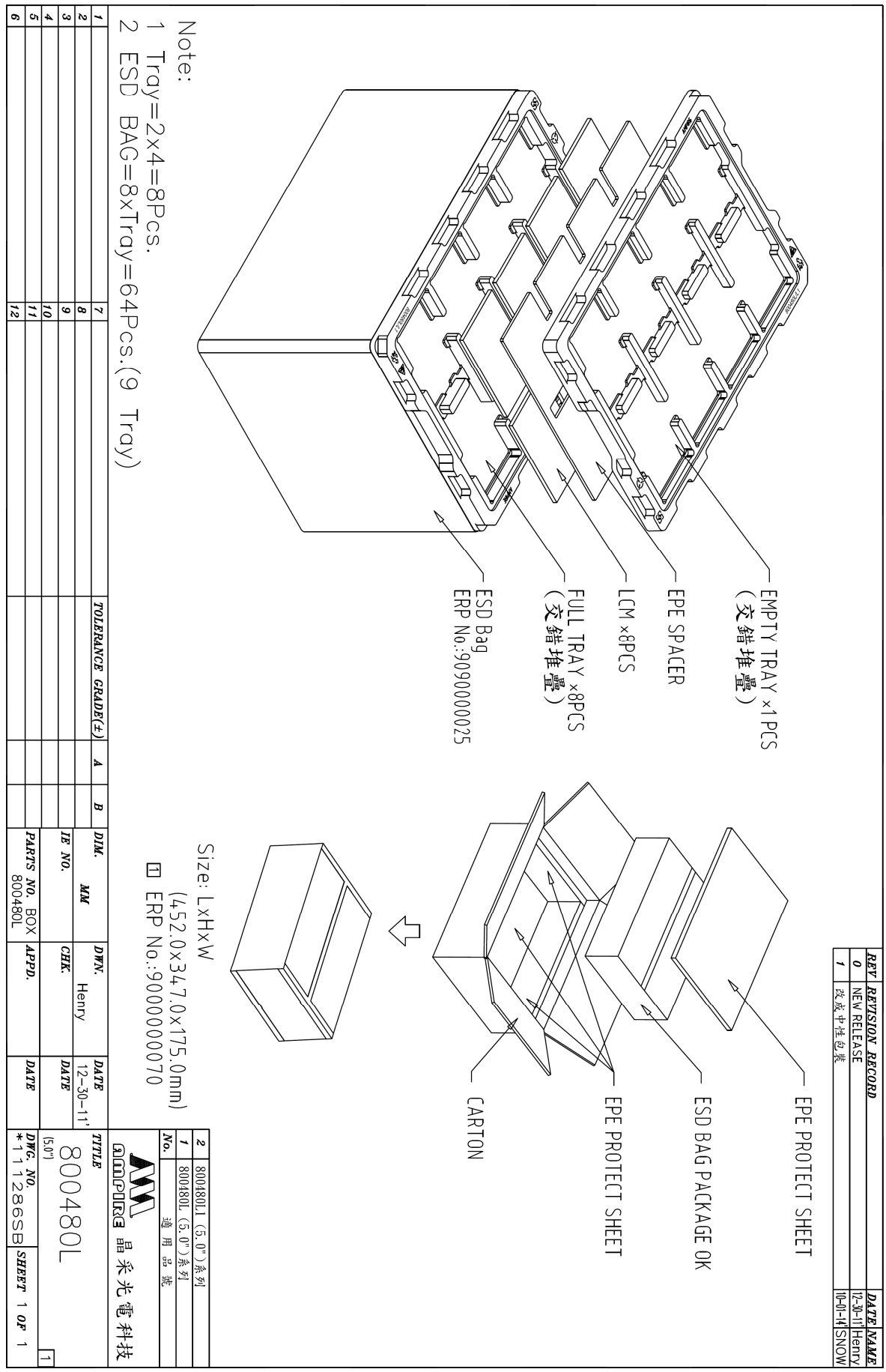
Note:
1. Unless indicated, Tolerance " ±0.3 "
2. UV Glue For OLB Protection.
3. LCD 800x480 (R.G.B) TFT LCD => 5.0" TFT LCD

1	800480L6-T	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. SNOW	DATE 08-12-14'	TITLE 800480L6-TN1 (5.0")	
2		8					IE NO.	CHK.	DATE		
3		9									
4		10									
5		11					PARTS NO. LCM-1 800480L6-TN1	APPD.	DATE	DWG. NO. *140848MA	SHEET 1 OF 1
6		12									

AMPIRE 晶采光電科技

Date : 2015/07/16 AMPIRE CO., LTD. 23

13. PACKING DRAWING



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	12-30-11	Henry
1	改成中性包裝	10-01-14	SNOW

	TOLERANCE GRADE(±)	A	B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

DIM.	DWN.	DATE
MM	Henry	12-30-11'
IE NO.	CHK.	DATE
PARTS NO. BOX 800480L	APPD.	DATE

2	800480L1 (5.0")系列	
1	800480L (5.0")系列	
No.	適用品號	

AMPIRE 晶采光電科技 AMPIRE CO., LTD.

TITLE 800480L (5.0")

DWG. NO. *1112865B

1

SHEET 1 OF 1