A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

7.0-IN COLOR TFT MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	AM-800480E2TNQW-T06(SYNC mode)
APPROVED BY:	
DATE:	

☐ APPROVED FOR SPECIFICATIONS

☐ APPROVED FOR SPECIFICATION AND PROTOTYPES

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2009/7/16	-	New Release	Eric
2009/7/27	-	Revised P/N from TF800480-32A-0 to AM-800480E2TMQW-T06H	Eric

1. INTRODUCTION

Ampire Display Module AM800480E2 is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD panel , a driving circuit and a backlight system . This TFT-LCD has a high resolution (800(R.G.B) X 480) and can display up to 262,144 colors.

1-1. Features

- WVGA (15:9 diagonal) configuration
- Input interface voltage : 3.3V
- SYNC mode.

1-2. Applications

- Portable TV
- Car user DVD
- Industrial application
- HMI (Human machine interface)

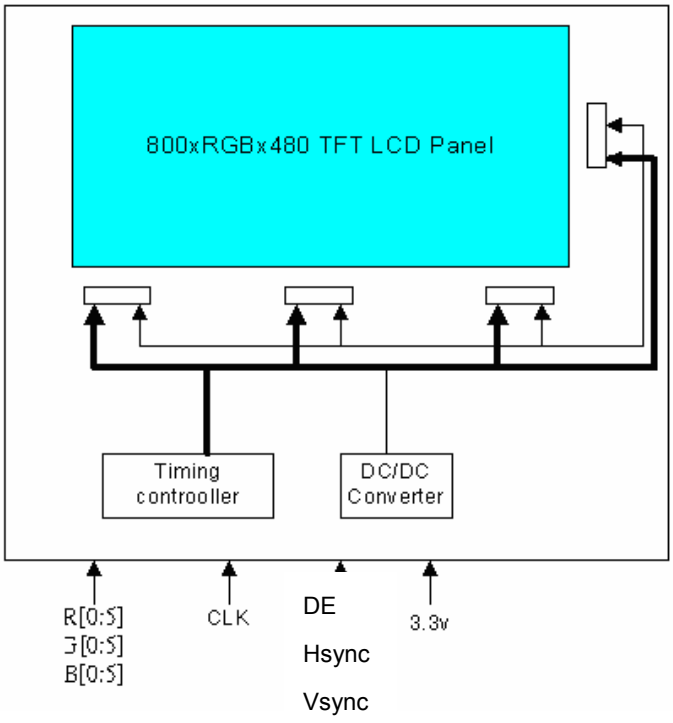
2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	800RGB (W) x 480(H)	dots
Active area	152.4 (W) x 91.44 (H)	mm
Pixel pitch	0.1905 (W) x 0.1905 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	165.0(W)x104.0(H)x6.6(D)---(Typ)	mm
Brightness	240nit	cd/m^2
Contrast ratio	250 : 1	
Backlight unit	LED	
Display color	262,144	colors

3. ABSOLUTE MAX. RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT
Power Supply Voltage for LCD	Vcc	-0.5	5.0	V
Signal input voltage	DCLK DE HSYNC VSYNC R0~R5 G0~G5 B0~b5	-0.5	VCC+0.5	V
Operation Temperature	Top	-10	60	℃
Storage Temperature	Tstg	-20	70	℃

The following values are maximum operation conditions , If exceeded , it may cause faulty operation or damage



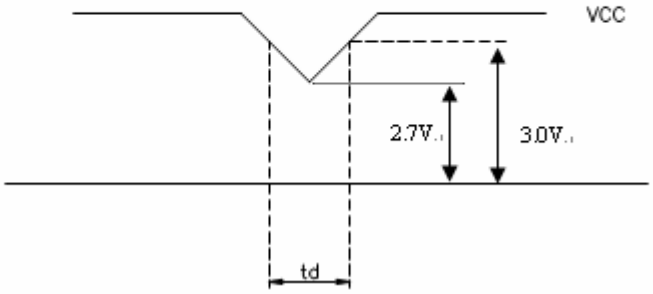
4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Module voltage

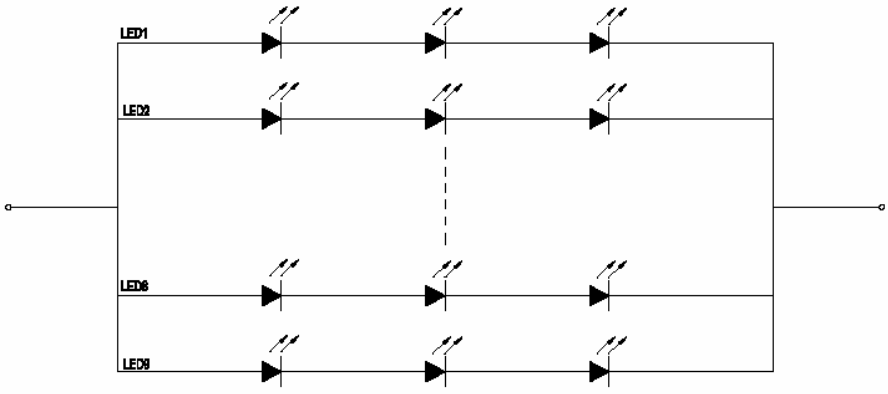
ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Power Supply Voltage For LCD	Vcc	3.0	3.3	3.6	V
Power Supply Current For LCD	Idd	200	250	300	mA
Power Supply Voltage For LED	VLED	9.3	9.6	10	V
Power Supply Current For LED	ILED	-	-	180	mA
Logic input Voltage(High)	V_{TH}	0.7Vcc	-	Vcc	V
Logic input Voltage(Low)	V_{TL}	GND	-	0.3Vcc	V

VCC –dip codition:

1) When 2.7 V≦VCC＜3.0V，td≦10ms.
2) VCC＞3.0V，VCC-dip condition should be same as VCC-turn-on condition.



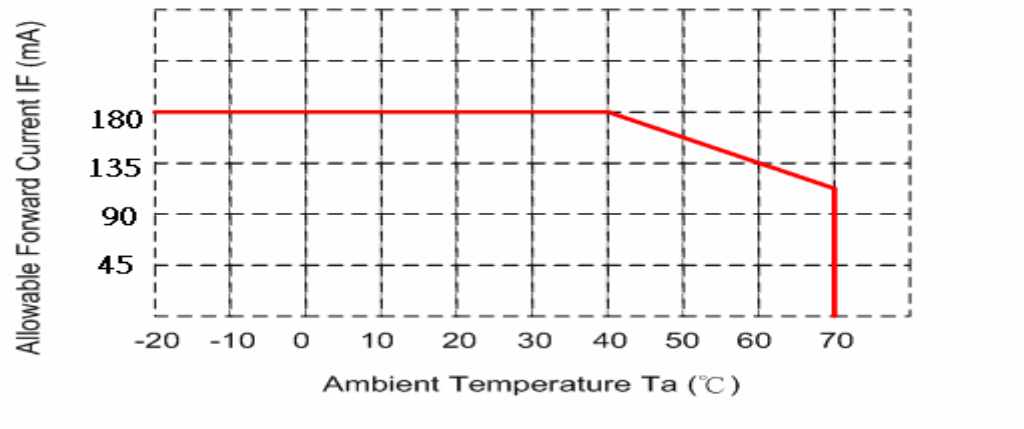
4-2 Backlight structure



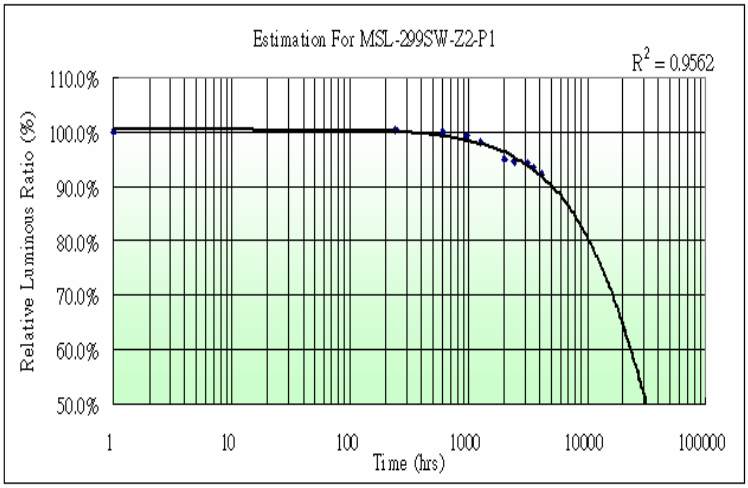
1) The LED Life Time define : Module brightness decay to 50% , Ta=25℃ , IL=20mA

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

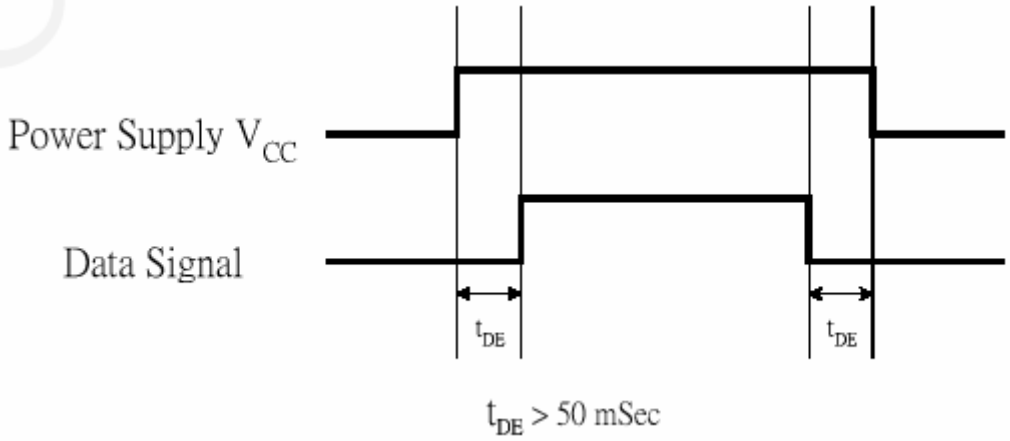
When LCM is operated over 60℃ ambient temperature, the I_{LED} of the LED back-light should be adjusted to 135mA max



■ The Estimation of LED Curve



4-3 Power Sequence



$t_{DE} > 50$ mSec

5. INTERFACE

Pin no	Symbol	Function	Remarks
1	Vss	Ground	
2	CK	Clock signal for sampling each data signal	
3	VSS	Ground	
4	R0	Red data (LSB)	
5	R1	Red data	
6	R2	Red data	
7	R3	Red data	
8	R4	Red data	
9	R5	Red data(MSB)	
10	Vss	Ground	
11	G0	Green data (LSB)	
12	G1	Green data	
13	G2	Green data	
14	G3	Green data	
15	G4	Green data	
16	G5	Green data(MSB)	
17	Vss	Ground	
18	B0	Blue data(LSB)	
19	B1	Blue data	
20	B2	Blue data	
21	B3	Blue data	
22	B4	Blue data	
23	B5	Blue data(MSB)	
24	Vss	Ground	
25	HSYNC	Horizontal Signal input	
26	HENAB	Data enable Signal input	
27	VSYNC	Vertical Signal input	
28	Vss	Ground	
29	NC	No connection	
30	NC	No connection	
31	NC	No connection	
32	NC	No connection	
33	Vss	Ground	
34	HVR	Horizontally and Vertically inverted	
35	RST	Reset signal for controlled IC	
36	VCC	3.3V power supply	
37	VCC	3.3V power supply	
38	VCC	3.3V power supply	
39	Vss	Ground	
40	Vss	Ground	

6. TOUCH PANEL ELECTRICAL SPECIFICATION

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	180 ~ 670 Ω
	Y Axis	140 ~ 560 Ω
Insulating Resistance	DC 25 V	More than 20MΩ
Linearity	--	≦1.5 %
Notes life by Pen	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

Note A .

Notes area for pen notes life test is 10 x 9 mm.

Size of word is 7.5 x 6.75

Shape of pen end : R0.8mm

Load : 250 g

Note B

By Silicon rubber tapping at same point

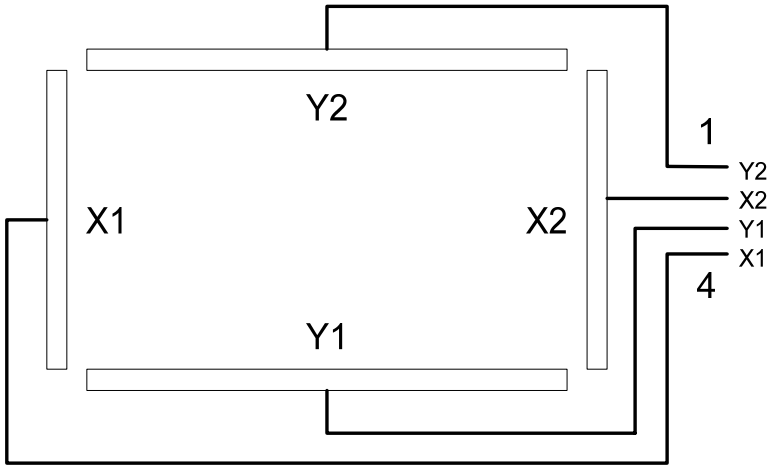
Shape of rubber end : R8mm

Load : 250gf

Frequency : 5 Hz

Interface

No.	Symbol	Function
1	Y2	Touch Panel Top Signal in Y Axis
2	X2	Touch Panel Right Signal in X Axis
3	Y1	Touch Panel Bottom Signal in Y Axis
4	X1	Touch Panel Left Signal in X Axis



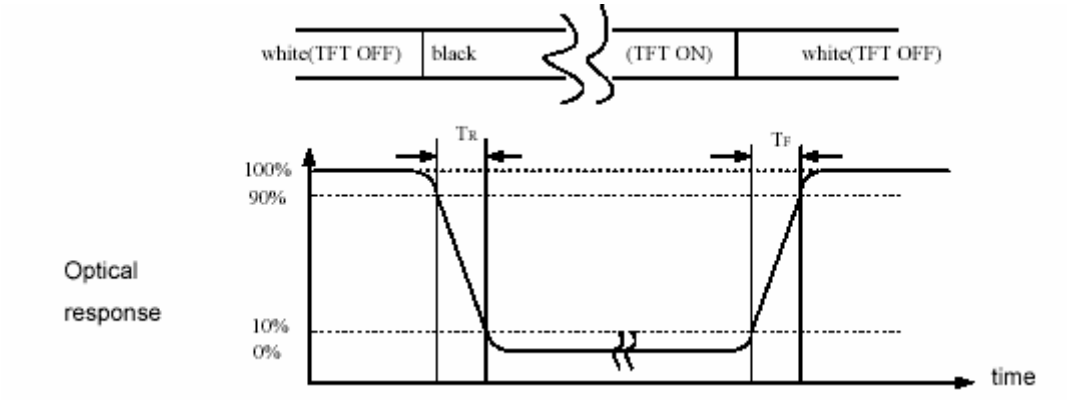
7. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Response Time		$T_r + T_f$	Θ=Φ=0°	-	25	50	ms	(1)
Contrast ratio		CR		--	250	-	-	(2)(3)
Viewing Angle	Vertical	Θ	CR≧10	--	120	-	Deg.	(5)
	Horizontal	Φ		--	140	-		
Luminance		L	Θ=Φ=0°	--	240	-	cd/m^2	(3)(4)
Luminance Uniformity		ΔL		-	70	-	%	(3)(4)
Color chromaticity	Red	Rx	Θ=Φ=0°	0.541	0.581	0.621	-	(3)
		Ry		0.321	0.361	0.401		
	Green	Gx		0.314	0.354	0.394		
		Gy		0.524	0.564	0.604		
	Blue	Bx		0.108	0.148	0.188		
		By		0.084	0.124	0.164		
	White	Wx		0.277	0.317	0.357		
		Wy		0.315	0.355	0.395		

NOTE :

- These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light)
- T.B.D means To be define.

(1) Definition of Response Time (White-Black)



(2) Definition of Contrast Ratio

Measure contrast ratio on the below 5 points(refer to figurel,#1~#5point) and take the average value

Contrast ratio is calculated with the following formula :

Contrast Ratio(CR)=(White)Luminance of ON ÷ (Black)Luminance of OFF

(3) Definition of Luminance :

Measure white luminance on the same 5 points and take the average value

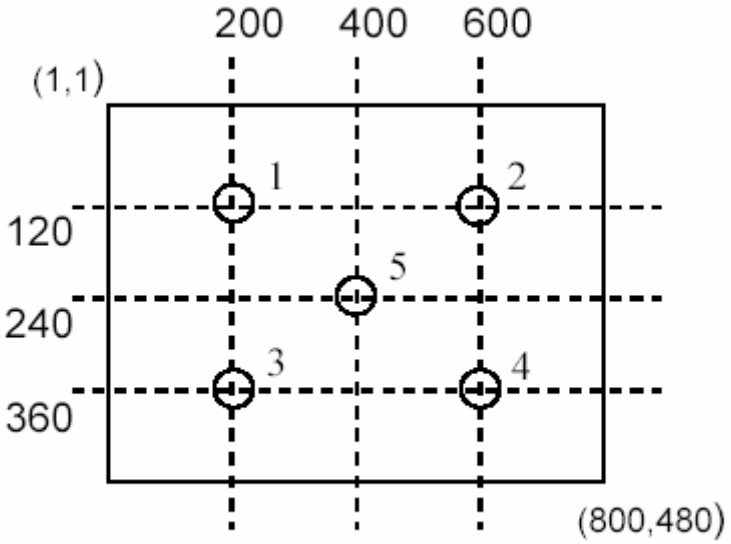
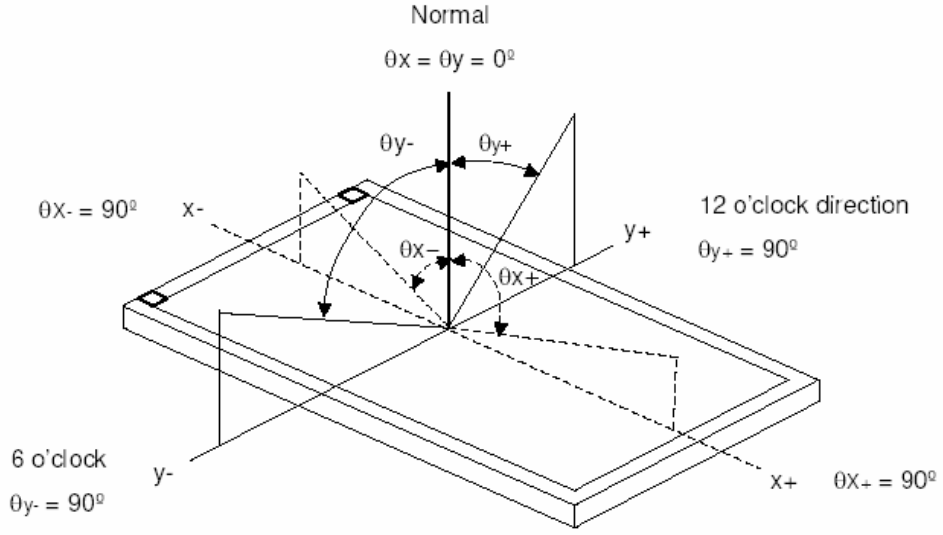


Fig.1 Measuring point

(1) Definition of Luminance Uniformity :
Measured Maximum luminance[L(MAX)] and Minimum luminance[L(MIN)] on the 5 points
Luminance Uniformity is calculated with the following formula :

ΔL =[L(MIN)/ L(MAX)] X 100%

(2) Definition of Viewing Angle



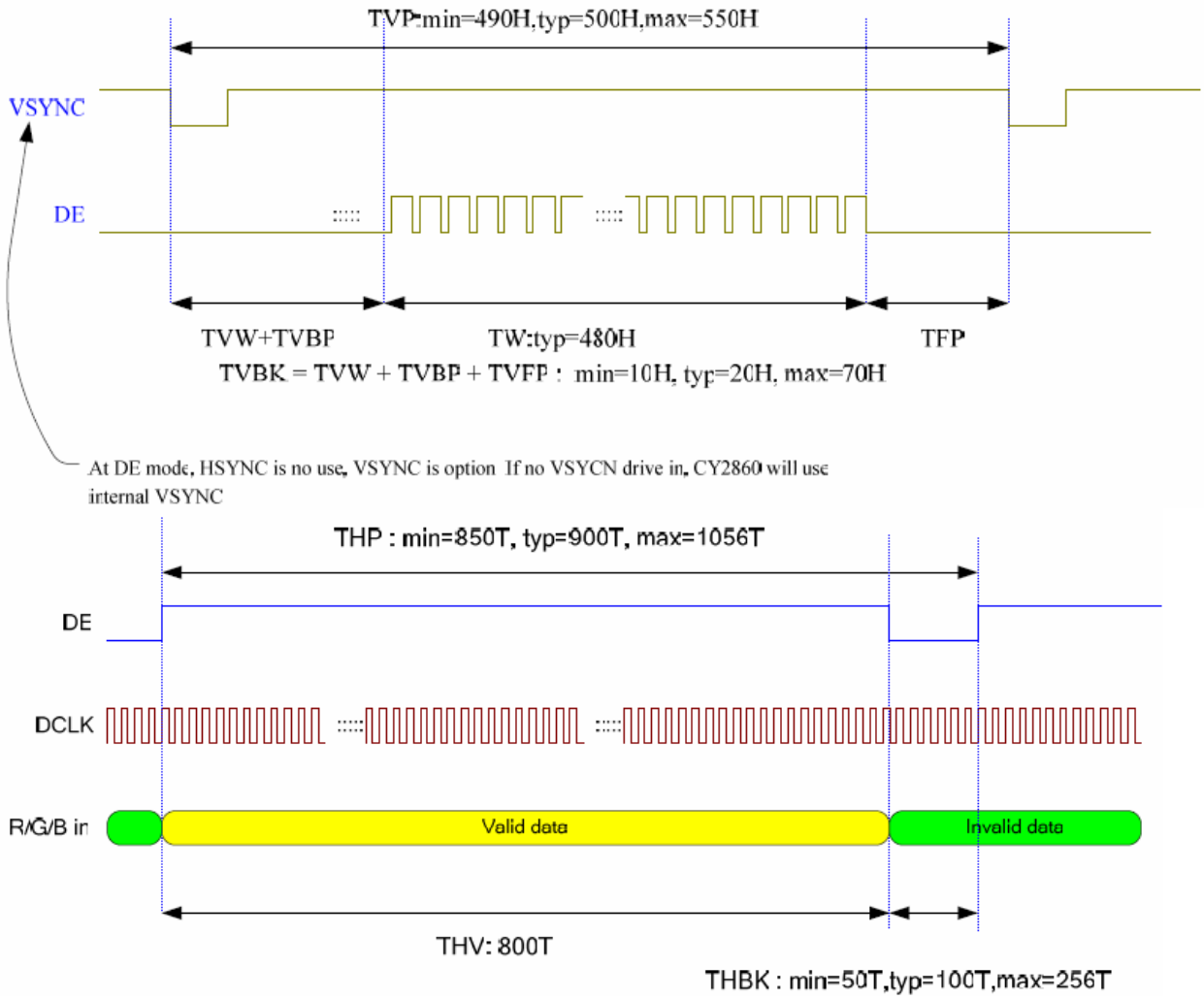
Φ =(Θx+)+(Θx-) Θ =(Θy+)+(Θy-)

8. TIMING CHARACTERISTICS

DE only mode

DE mode Input signal characteristics, 800 x 480

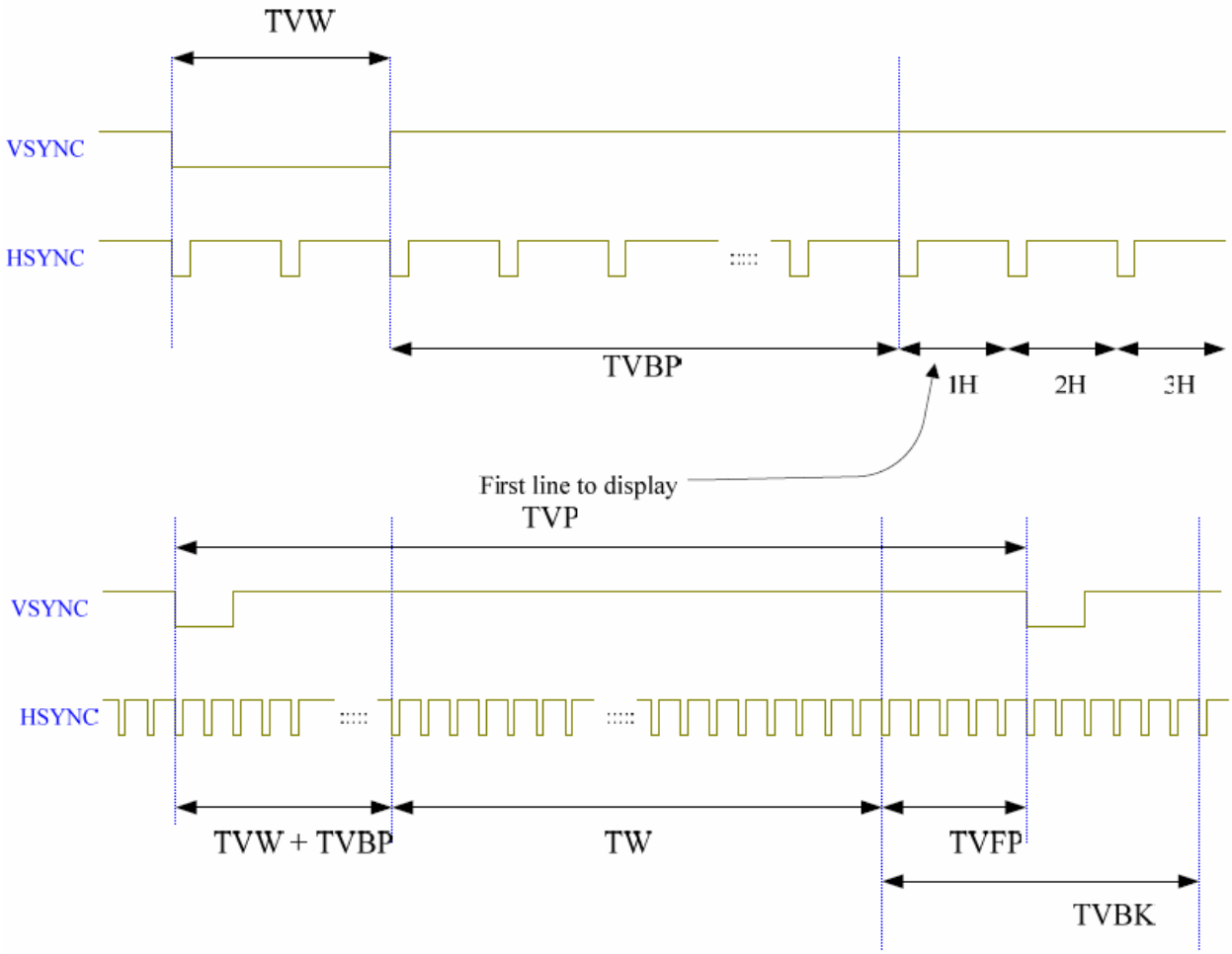
PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT	REMARK
DCLK	PERIOD	TCLK	25	34	-	NS	
	FREQUENCY	FCLK	-	29.5	40	MHZ	
	LOW LEVEL WIDTH	TWCL	6	-	-	NS	
	HIGH LEVEL WIDTH	TWCH	6	-	-	NS	
	RISE, FALL TIME	TCLKR, TCLKF	-	-	3	NS	
	DUTY	-	0.45	0.50	0.55	-	
DE	SETUP TIME	TDES	5	-	-	NS	
	HOLD TIME	TDEH	5	-	-	NS	
	RISE, FALL TIME	TDER, TDEF	-	-	5	NS	
	HORIZONTAL PERIOD	THP	810	928	1600	TCLK	
	HORIZONTAL VALID	THV	800			TCLK	
	HORIZONTAL BLANK	THBK	THP - THV			TCLK	
	VERTICAL PERIOD	TVP	485	525	960	THP	
	VERTICAL VALID	TW	480			THP	
	VERTICAL BLANK	TVBK	TVP - TW			THP	
DATA	SETUP TIME	TDS	5	-	-	NS	
	HOLD TIME	TDH	5	-	-	NS	
	RISE, FALL TIME	TDR, TDF	-	-	3	NS	

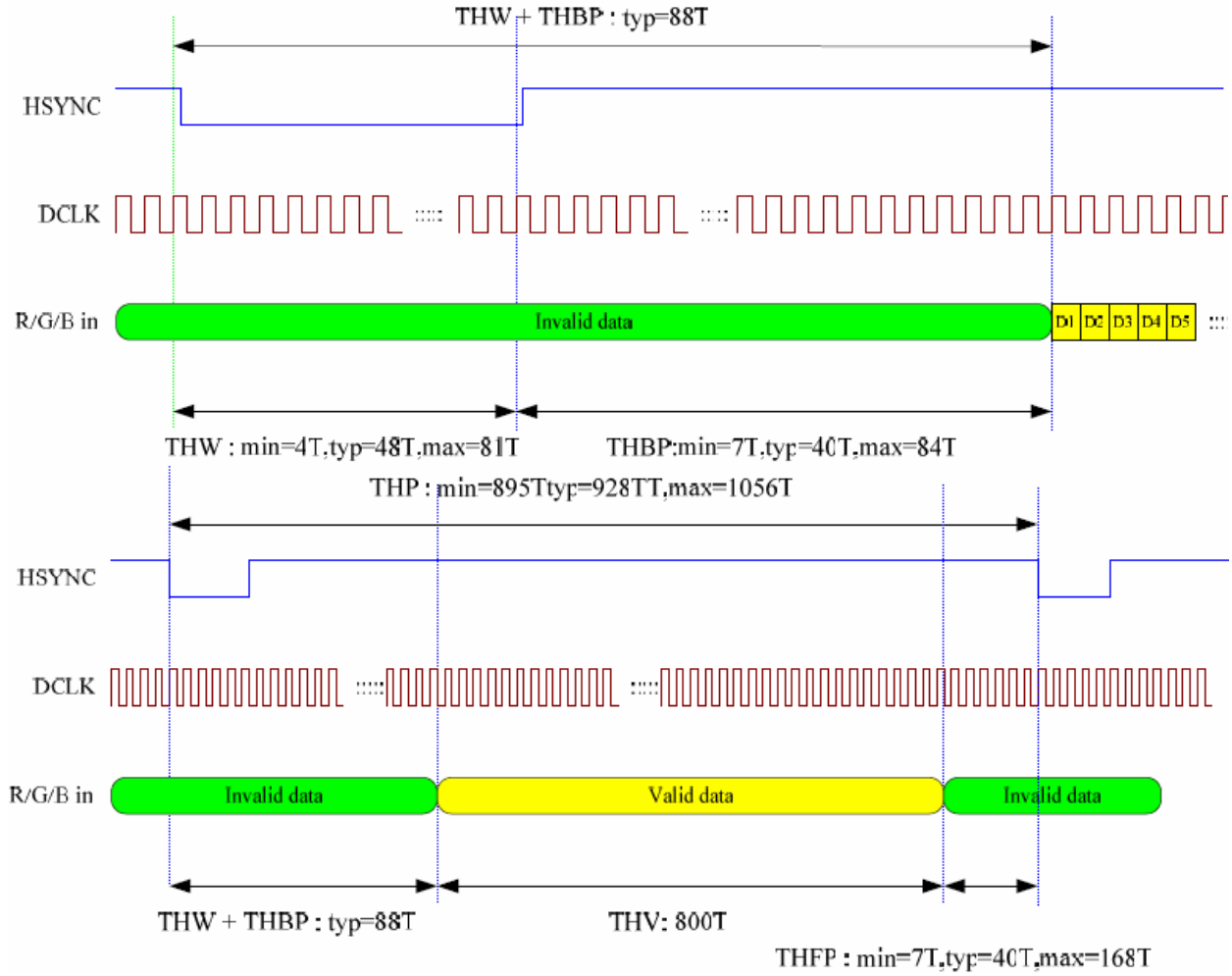


SYNC mode

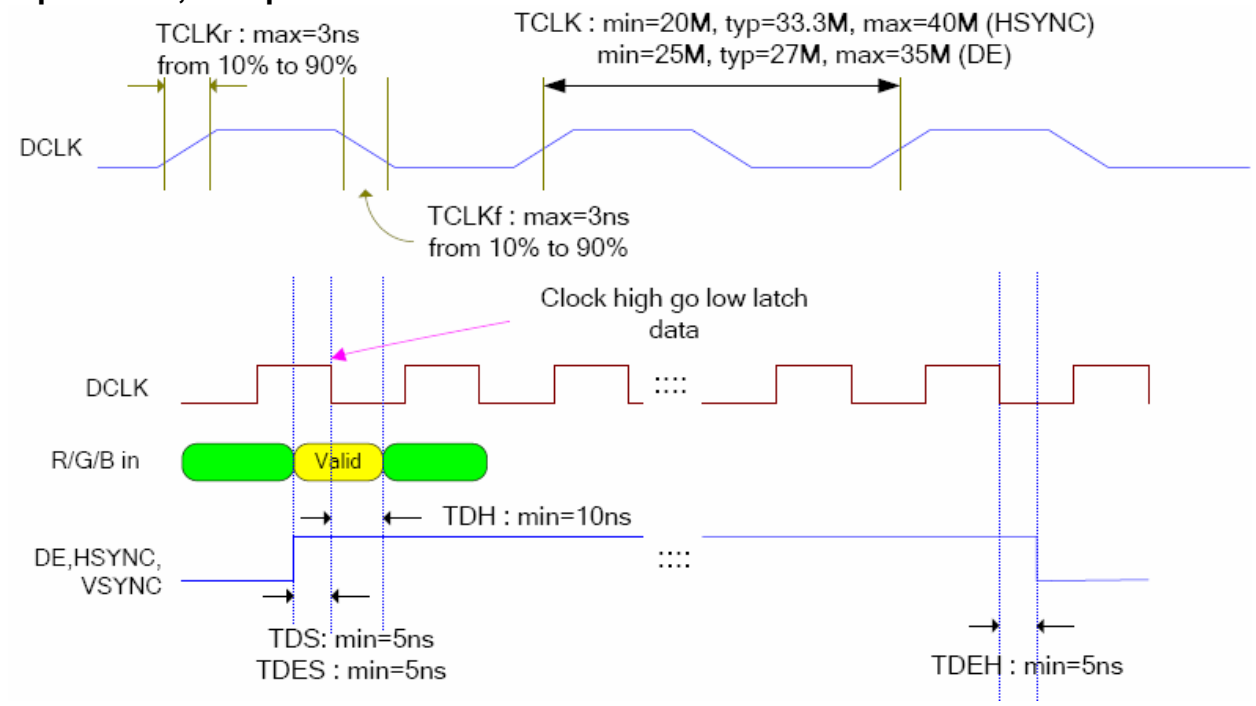
SYNC mode Input signal characteristic, 800 x 480

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
CLOCK PERIOD	TCLK	25	34	-	NS	
CLOCK FREQUENCY	FCLK	-	29.5	40	MHZ	
CLOCK LOW LEVEL WIDTH	TWCL	8	-	-	NS	
CLOCK HIGH LEVEL WIDTH	TWCH	8	-	-	NS	
CLOCK RISE, FALL TIME	TCLKR, TCLKF	-	-	3	NS	
HSYNC PERIOD	THP	810	928	1600	TCLK	
HSYNC PULSE WIDTH	THW	-	48	-	TCLK	
HSYNC BACK PORCH	THBP	-	40	-	TCLK	
HSYNC WIDTH + BACK PORCH	THW+ THBP	88			TCLK	
HORIZONTAL VALID DATA WIDTH	THV	800			TCLK	
HSYNC FRONT PORCH	THFP	THP – THW - THBP - THV			TCLK	
HORIZONTAL BLANK	THBK	THP – THV			TCLK	
VSYNC PERIOD	TVP	485	525	960	THP	
VSYNC PULSE WIDTH	TVW	-	3	-	THP	
VSYNC BACK PORCH	TVBP	29			THP	
VERTICAL DATA VALID WIDTH	TW	480			THP	
VSYNC FRONT PORCH	TVFP	TVP – TVW - TVBP - TW			THP	
VERTICAL BLANK	TVBK	TVP – TW			THP	
DATA SETUP TIME	TDS	5	-	-	NS	
DATA HOLD TIME	TDH	5	-	-	NS	





Input clock, Setup/Hold time



9. QUALITY AND RELIABILITY

9.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

9.2 SAMPLING PLAN

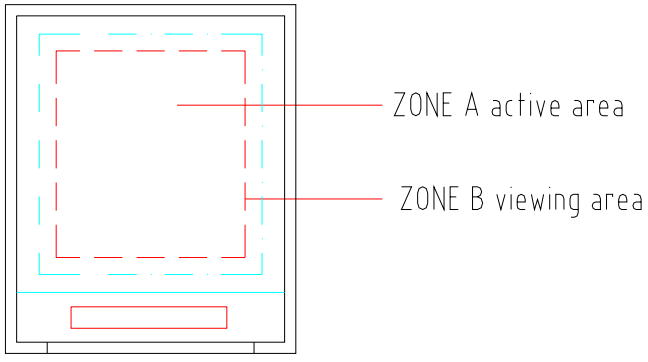
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

9.3 ACCEPTABLE QUALITY LEVEL

A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

9.4 APPEARANCE

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under florescent light. The inspection area of LCD panel shall be within the range of following limits.



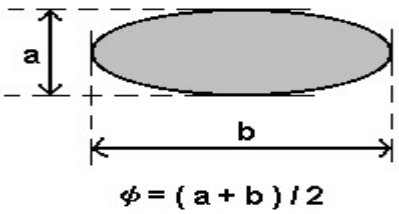
9.5 INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

DEFECT TYPE			LIMIT						Note
VISUAL DEFECT	INTERNAL	SPOT	φ < 0.15mm			Ignore			Note1
			0.15mm ≦ φ ≦ 0.5mm			N≦4			
			0.5mm < φ			N=0			
		FIBER	0.03mm<W≦0.1mm, L≦ 5mm			N≦3			Note1
			1.0mm < W, 1.5mm < L			N=0			
		POLARIZER BUBBLE	φ < 0.15mm			Ignore			Note1
			0.15mm ≦ φ ≦ 0.5mm			N≦2			
			0.5mm < φ			N=0			
		Mura	It' OK if mura is slight visible through 6%ND filter						
ELECTRICAL DEFECT	BRIGHT DOT		A Grade			B Grade			
			C Area	O Area	Total	C Area	O Area	Total	Note3
			N≦0	N≦2	N≦2	N≦2	N≦3	N≦5	Note2
	DARK DOT		N≦2	N≦3	N≦3	N≦3	N≦5	N≦8	
	TOTAL DOT		N≦4			N≦5	N≦6	N≦8	Note2
	TWO ADJACENT DOT		N≦0	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	Note4
	THREE OR MORE ADJACENT DOT		NOT ALLOWED						
	LINE DEFECT		NOT ALLOWED						

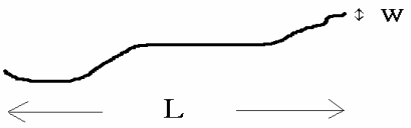
(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

(2) LITTLE BRIGHT DOT ACCEPTITABLE UNDER 6 % ND-Filter

[Note1] W : Width[mm], L : Length[mm], N : Number, φ : Average Diameter

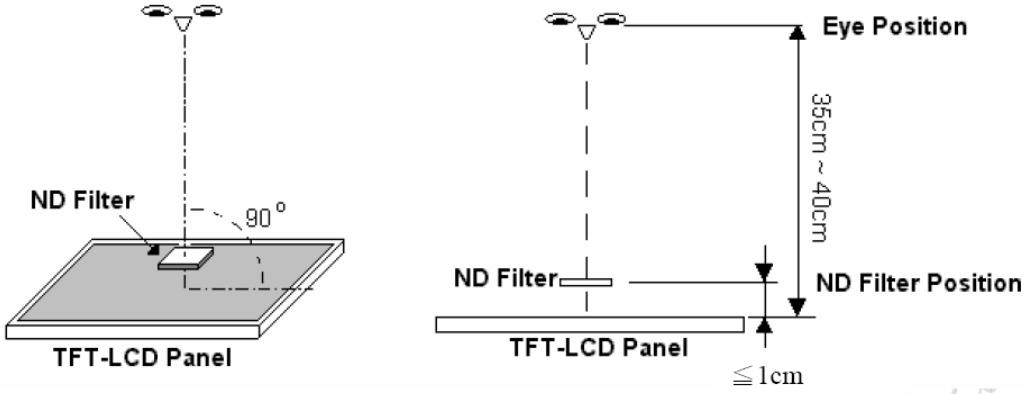


1. (White, black) Spot
2. Polarizer Bubble

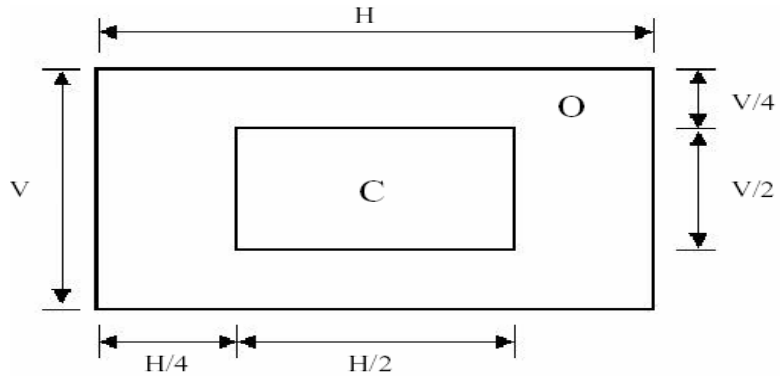


1. fiber

[Note2] Bright dot is defined through 6% transmission ND Filter as following.



[Note3]

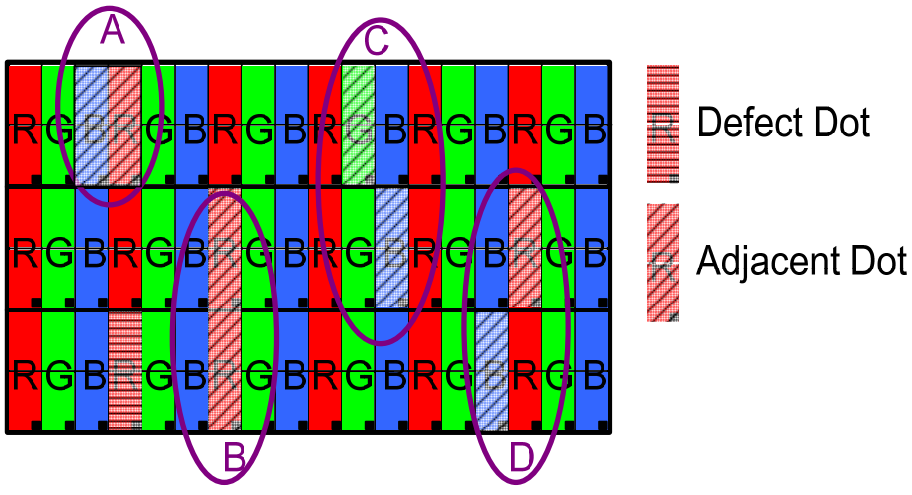


C Area: Center of display area

C Area: Outer of display area

[Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.



(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

9.6 RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	60±3°C , t=96 hrs	
Low Temperature Operation	-10±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	1,2
Low Temperature Storage	-20±3°C , t=96 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 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.

10 USE PRECAUTIONS

10-1 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.

(1) 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.

10-2 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

10-3 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.

10-4 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.

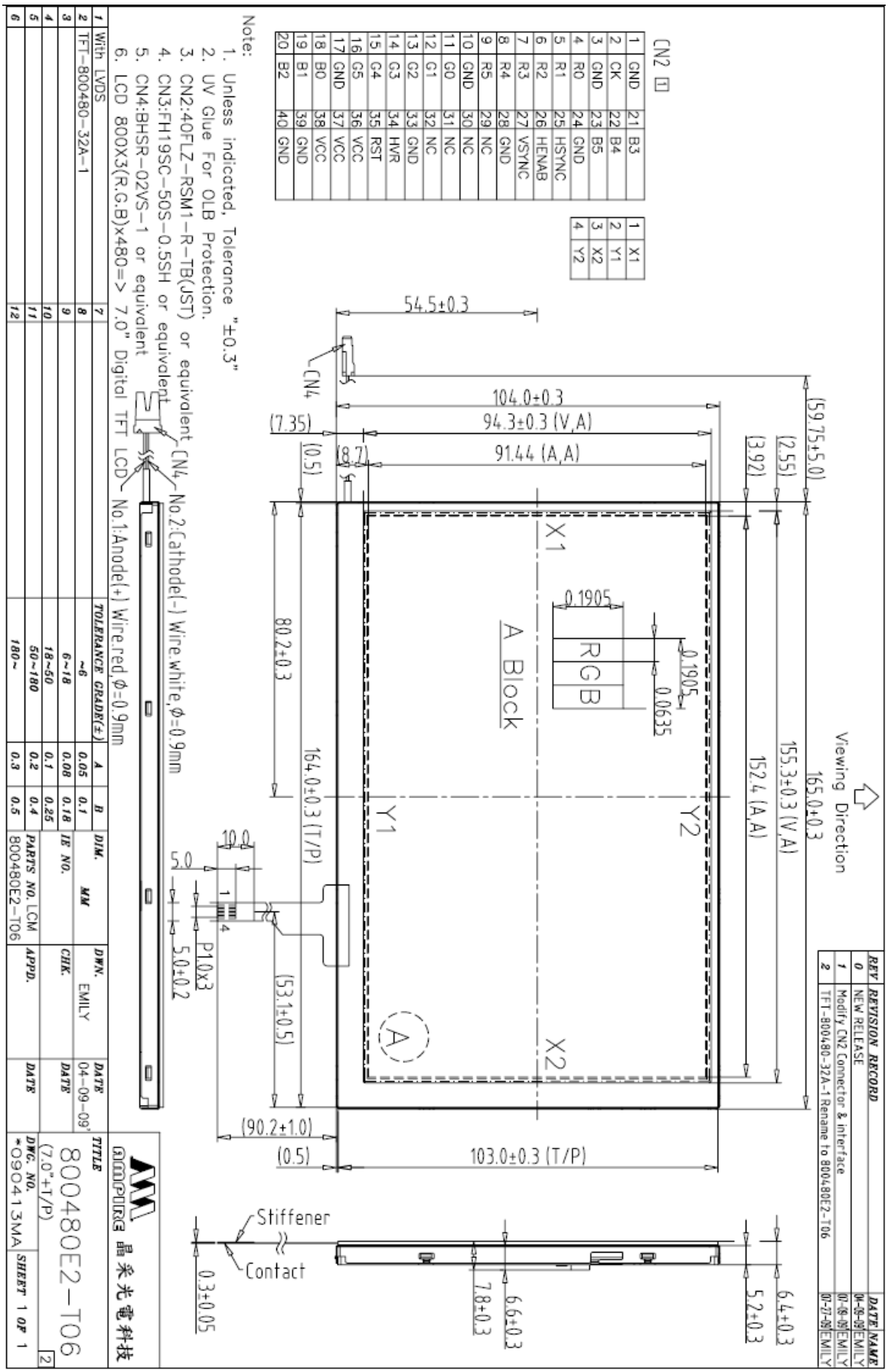
10-5 Other

(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 warrantee for all products and three months warrantee for all repairing products.

11. OUTLINE DIMENSION



CN2
1 GND 21 B3
2 CK 22 B4
3 GND 23 B5
4 R0 24 GND
5 R1 25 HSYNC
6 R2 26 HENAB
7 R3 27 VSYNC
8 R4 28 GND
9 R5 29 NC
10 GND 30 NC
11 G0 31 NC
12 G1 32 NC
13 G2 33 GND
14 G3 34 HVR
15 G4 35 RST
16 G5 36 VCC
17 GND 37 VCC
18 B0 38 VCC
19 B1 39 GND
20 B2 40 GND
1 X1
2 Y1
3 X2
4 Y2
Note:
1. Unless indica
2. UV Glue For
3. CN2:40FLZ-RSM1-R-TB(JST) or equivalent
4. CN3:FH19SC-50S-0.5SH or equivalent
5. CN4:BHSR-02VS-1 or equivalent
6. LCD 800X3(R.G.B)x480=> 7.0" Digital TFT LCD
90.2±1.0
54.5±0.3
49.5±0.3
42.9±0.5
32.8±0.5
84.8±0.5
53.6±0.5
84.8±0.3
P1.0x3
5.0±0.2
5.0
10.0
CN3
CN2
80.2±0.3
40.4±0.5
CN4
Back View
0.1905
RGB
0.1905
0.0635
A Block
REV REVISION RECORD DATE NAME
0 NEW RELEASE 04-09-09 EMILY
1 Modify CN2 Connector & interface 07-09-05 EMILY
2 TFT-800480-32A-1 Rename to 800480E2-T06 07-07-26 EMILY
1 With LVDS
2 TFT-800480-32A-1
TOLERANCE GRADE(±) A B
~6 0.05 0.1
6~18 0.08 0.18
18~50 0.1 0.25
50~180 0.2 0.4
180~ 0.3 0.5
DIM. MM
IE NO.
PARTS NO.LCM-1 800480E2-T06
DWN. EMILY
CHK.
APPD.
DATE 04-09-09
DATE
DATE
TITLE 800480E2-T06 (7.0"+T/P)
DWG. NO. *090414-MA
SHEET 1 OF 1
晶采光電科技