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-640480GDTNQW-A0H
APPROVED BY	
DATE	

☐Approved For Specifications
☐Approved For Specifications & Sample

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2012/6/20	--	New Release	Rober
2012/6/25	4	Add LED Life Time	Rober
2012/6/26	3	Correct the color depth to 16.7M colors.	Emil
2012/06/27	15,16	Revised the mechanical drawing.	Emil
2012/06/27	-	Issued the official P/N to AM-640480GDTNQW-A0H.	Emil
2012/06/27	4	Mention the LED life time and revised the consumptive current of LED.	Emil

1. INTRODUCTION

This is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of a 5.7inch TFT-LCD panel , a driving circuit and LED backlight system . This TFT-LCD has a high resolution (640(R.G.B) X 480) and can display up to 16.7M colors.

1-1. Features

- VGA Resolution
- 8 Bits color driver with LVDS interface
- Wide range operation temperature
- 4 layers PCB for EMI reduction

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	640RGB (W) x 480(H)	dots
Display area	115.2 (W) x 86.4 (H)	mm
Pixel pitch	0.18 (W) x 0.18 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	127.0(W)x98.43(H)x7.5(D)---(Typ)	mm
Surface treatment	Antiglare , Hard-Coating(3H)	
Brightness	500	cd/m^2
Contrast ratio	250 : 1	
Backlight unit	LED	
Display color	16.7M	colors
Viewing Direction	12 o'clock	
Display Mode	Normally White	

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	VDD	-0.5	5	V	
Signal Input Voltage	DCLK , DE R0~R5 G0~G5 B0~B5	-0.5	Vcc + 0.5	V	
Operation Temperature	Top	-20	70	℃	
Storage Temperature	Tstg	-30	80	℃	

4. ELECTRICAL CHARACTERISTICS

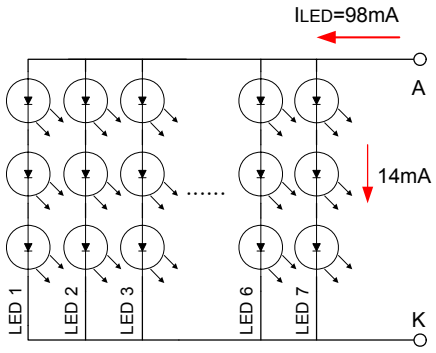
4-1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V_{DD}	3.0	3.3	3.6	V	
LCD Power Current	I_{DD}	-	106	-	mA	
Logic Input Voltage	VIH	V_{CC}*0.7	--	V_{CC}	V	
	VIL	0	--	V_{CC}*0.3	V	
ADJ Input Voltage	VIH	3.0	--	5.0	V	
	VIL	GND	--	0.3	V	

4-2 LED B/L Driving Conditions

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
LED Backlight Voltage	V_{AK}	-	9.6	-	V	I_{BL} = 180mA
LED Backlight Current	I_{AK}	-	98	-	mA	Ta=25℃
LED Life time	-		40		kHrs	Note Ta=25℃

Note* : Brightness to be decreased to 50% of the initial value.



6. INTERFACE

LVDS CN1:

Pin no	Symbol	Function
1	VDD	POWER SUPPLY:3.3V
2	VDD	POWER SUPPLY:3.3V
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	LED_A	Backlight of Anode
20	LED_K	Backlight of Cathode

NOTE :

2. VSS Pin must ground contact, can not be floating.

7. AC Timing characteristic of the LVDS

7.1 Timing Parameter

SWITCHING CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP(1)	MAX	UNIT
t_{su2}	Setup time, D0–D27 valid to CLKOUT↓	C_L = 8 pF, See Figure 6	5			ns
t_{h2}	Hold time, CLKOUT↓ to D0–D27 valid	C_L = 8 pF, See Figure 6	5			ns
t_{RSKM}	Receiver input skew margin(2)(see Figure 7)	t_c = 15.38 ns (± 0.2%), |Input clock jitter| < 50 ps(3)	490			ps
t_d	Delay time, CLKIN↑ to CLKOUT↓ (see Figure 7)	t_c = 15.38 ns (± 0.2%), C_L = 8 pF		3.7		ns
$\Delta t_{c(o)}$	Cycle time, change in output clock period(4)	t_c = 15.38 + 0.75 sin (2π500E3t) ± 0.05 ns, See Figure 8		±80		ps
		t_c = 15.38 + 0.75 sin (2π3E6t) ± 0.05 ns, See Figure 8		±300		
t_{en}	Enable time, $\overline{SHTDN}$↑ to Dn valid	See Figure 9		1		ms
t_{dis}	Disable time, $\overline{SHTDN}$↓ to off state	See Figure 10		400		ns

[redacted]

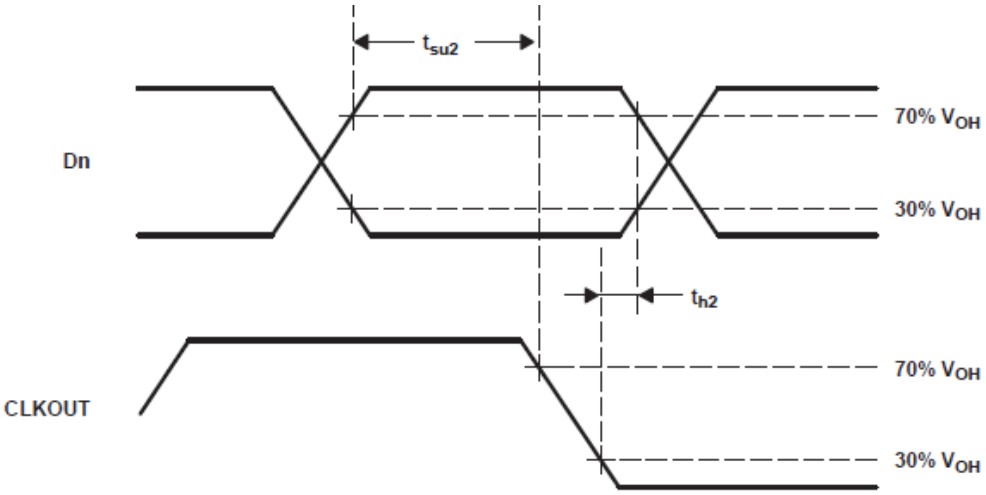
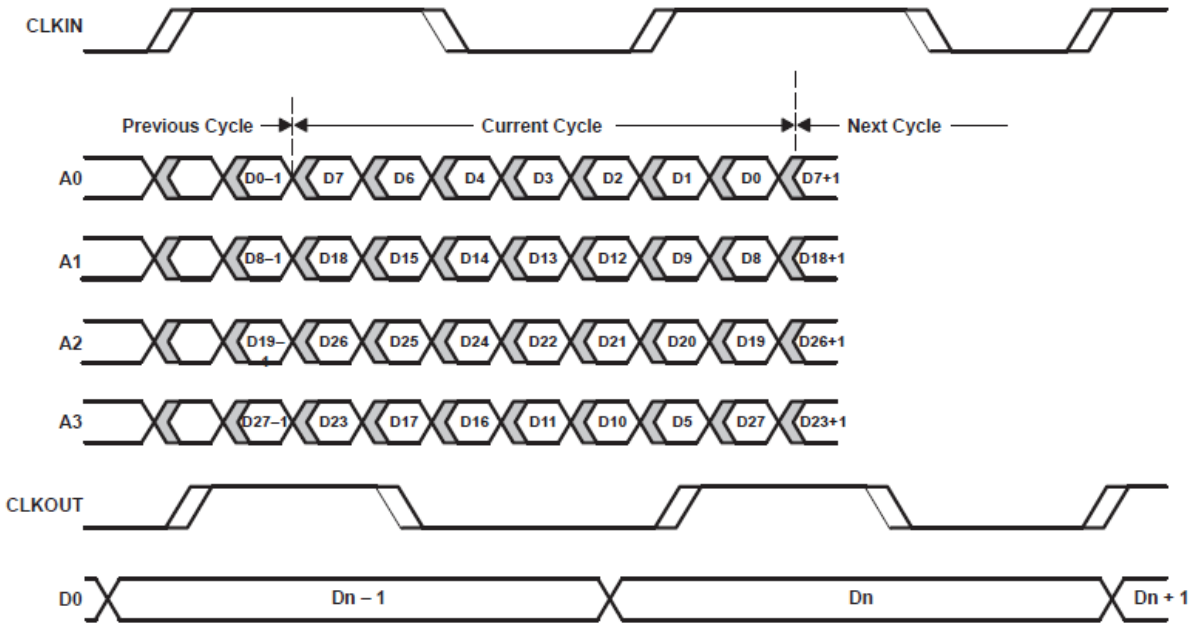
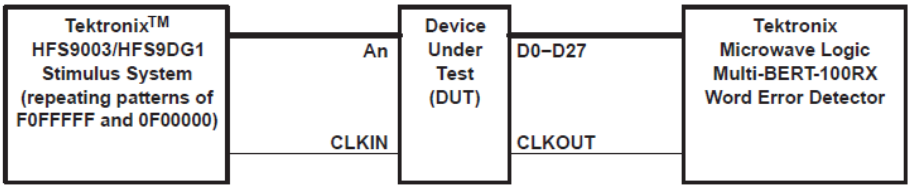


Figure 6. Setup and Hold Time Waveforms


CLKIN
Previous Cycle
Current Cycle
Next Cycle
A0
D0–1
D7
D6
D4
D3
D2
D1
D0
D7+1
A1
D8–1
D18
D15
D14
D13
D12
D9
D8
D18+1
A2
D19–
D26
D25
D24
D22
D21
D20
D19
D26+1
A3
D27–1
D23
D17
D16
D11
D10
D5
D27
D23+1
CLKOUT
D0
Dn – 1
Dn
Dn + 1

PARAMETER MEASUREMENT INFORMATION (continued)



A. CLKIN is advanced or delayed with respect to data until errors are observed at the receiver outputs. The magnitude of the advance or delay is $t_{(RSKM)}$.

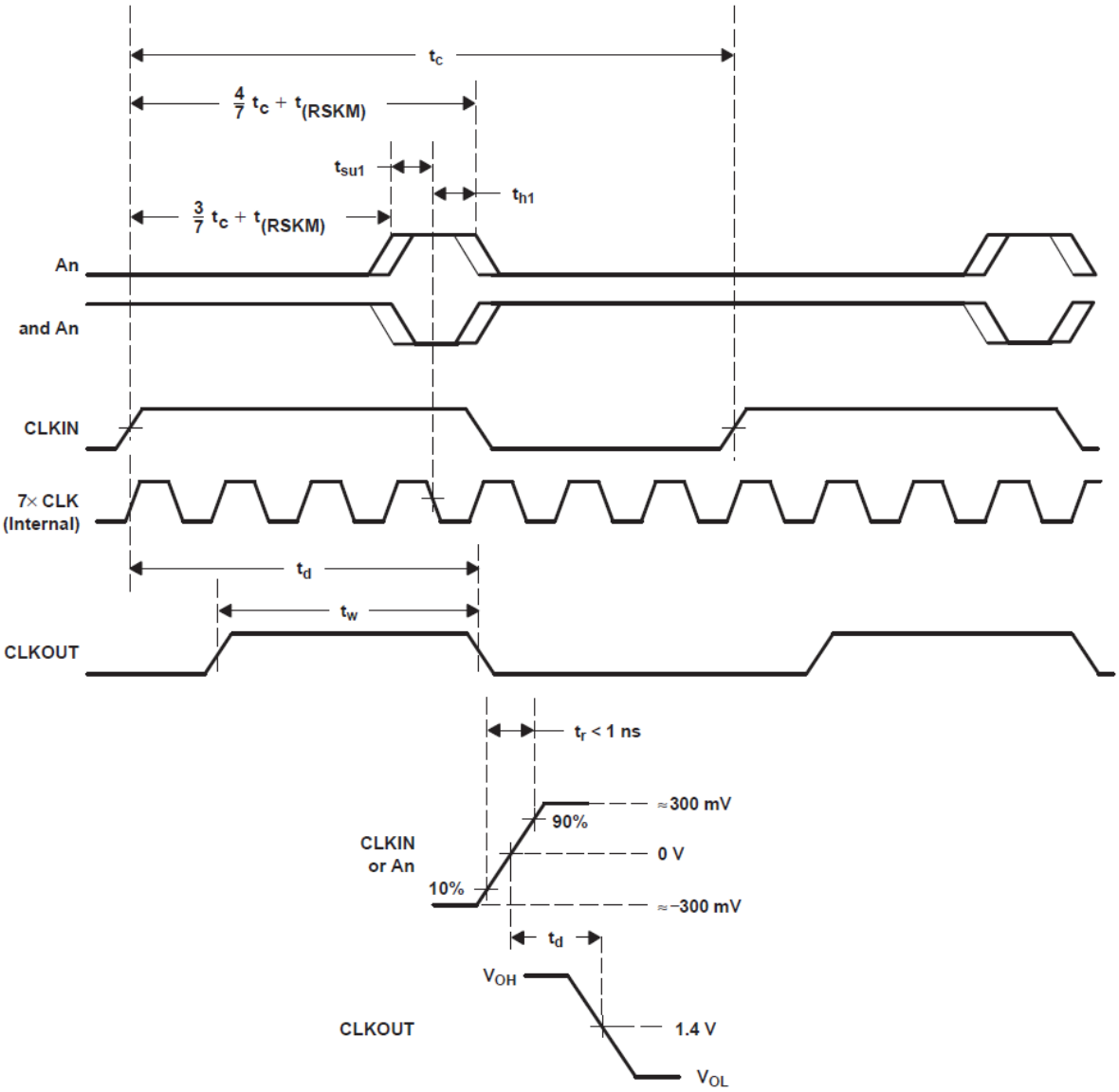


Figure 7. Receiver Input Skew Margin and Delay Timing Waveforms

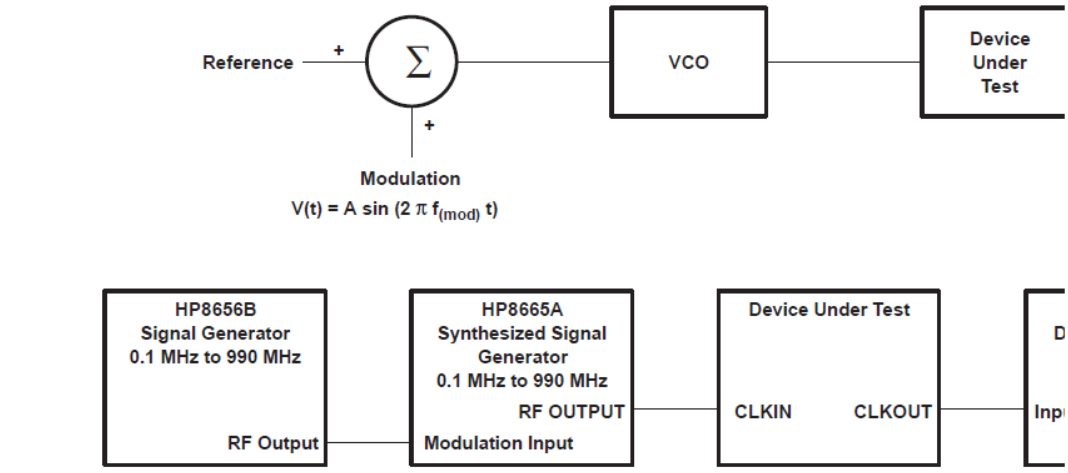


Figure 8. Input Clock Jitter Test

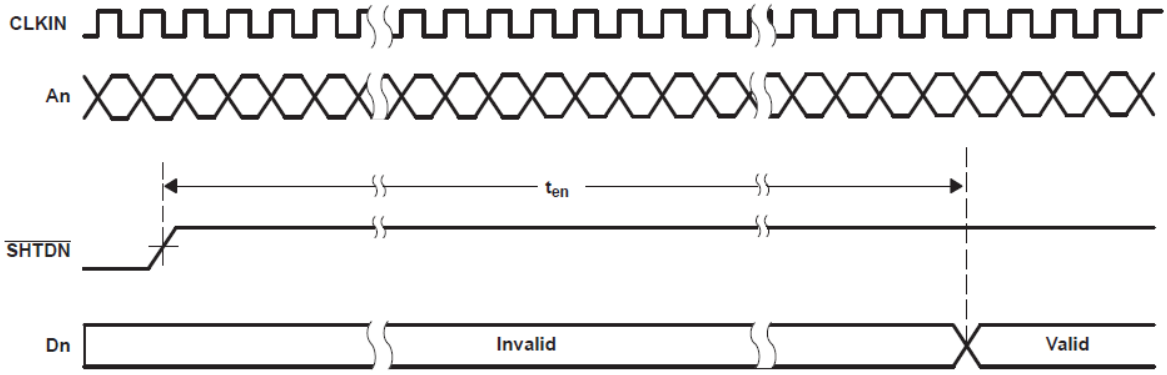


Figure 9. Enable Time Waveforms

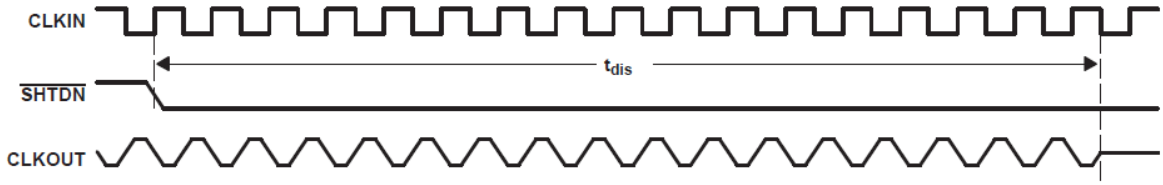


Figure 10. Disable Time Waveforms

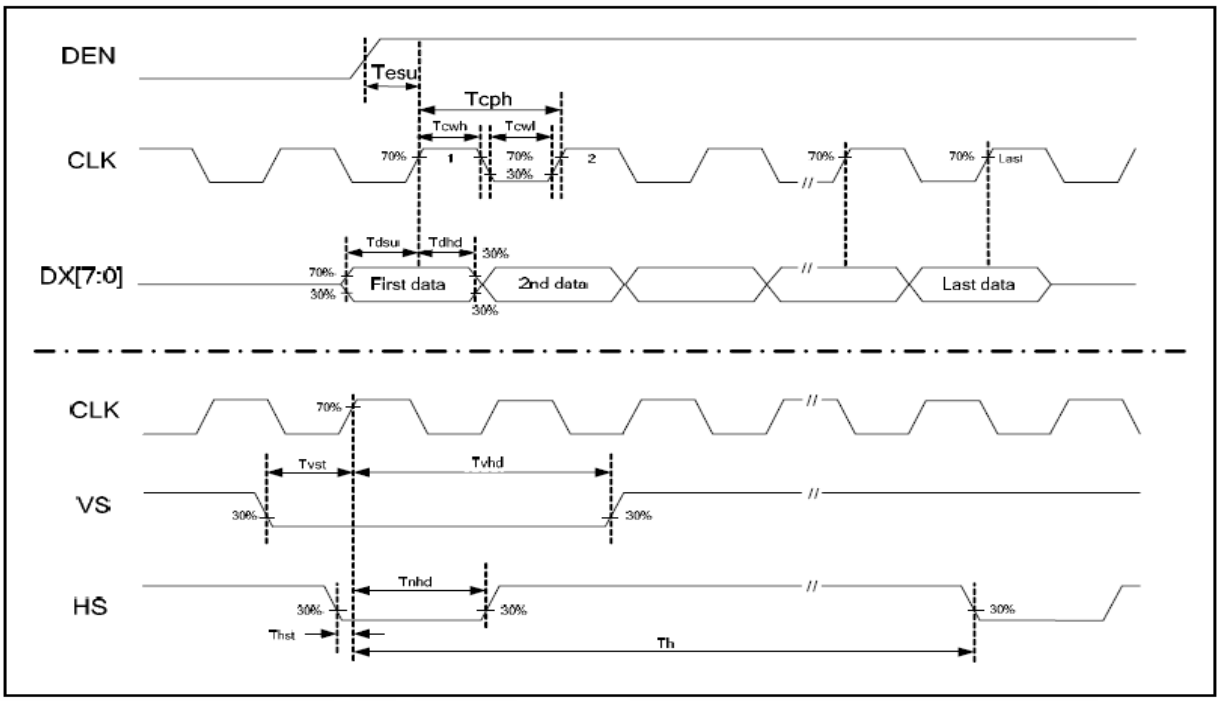
7.2 Recommended Input Timing of LVDS transmitter

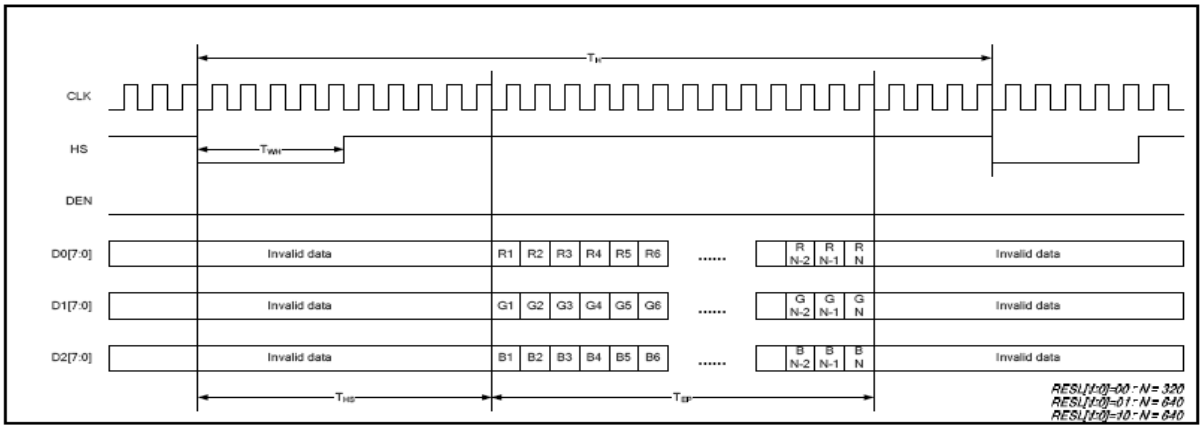
PARAMETER	Symbol	Min.	Typ.	Max	Unit
CLK frequency	F_{CPH}		25.175		MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when STHD[5:0]=00000)

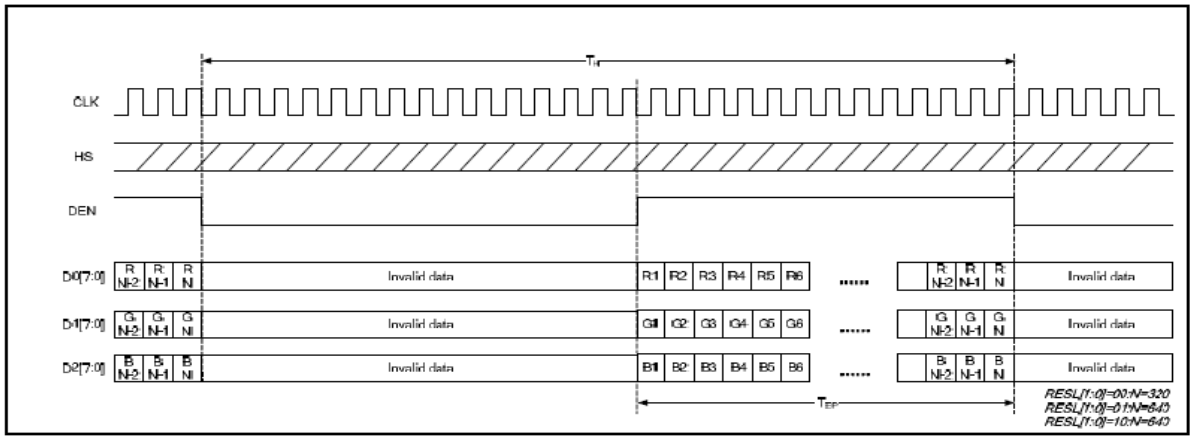
PARAMETER	Symbol	Min.	Typ.	Max	Unit
OEV pulse width	T_{OEV}		100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

Clock and Data input waveforms





Parallel RGB SYNC Mode Horizontal Data Format



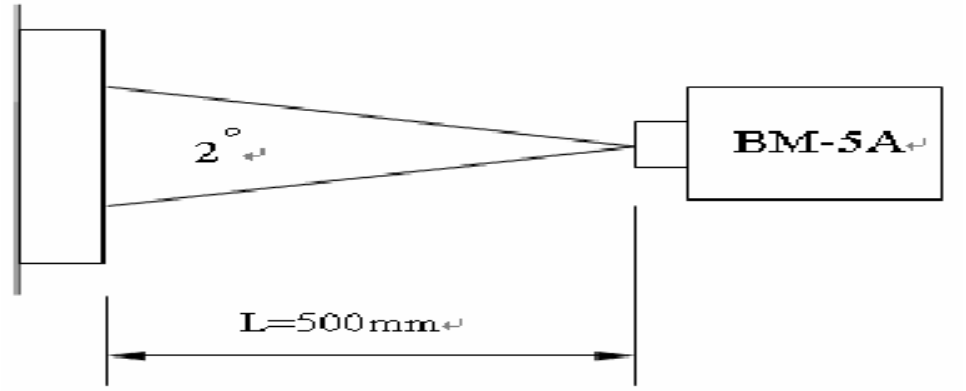
Parallel RGB DE Mode Horizontal Data Format

8. OPTICAL CHARACTERISTICS

Item			Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast ratio			CR	Point - 5 Θ=Φ=0°	200	250	--	--	(1)(2)(3)
Luminance			Lw		350	500	-	cd/m²	(1)(3)
Luminance Uniformity			ΔL		70	75	-	%	(1)(3)
Response Time (White – Black)			$T_r + T_f$		--	50	--	ms	(1)(3)(5)
Viewing Angle	Vertical		Θ	CR≧10 Point – 5	80	100	-	Deg.	(1)(2)(4)
	Horizontal		Φ		120	140	-		
Color chromaticity		Red	Rx	Point - 5 Θ=Φ=0°	0.566	0.616	0.666	--	(1)(3)
			Ry		0.302	0.352	0.402		
		Green	Gx		0.308	0.358	0.408		
			Gy		0.518	0.568	0.618		
		Blue	Bx		0.096	0.146	0.196		
			By		0.086	0.136	0.186		
		White	Wx		0.296	0.346	0.396		
			Wy		0.328	0.378	0.428		

NOTE :

(1) Measure conditions : 25℃±2℃ , 60±10%RH under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VCC=3.3V , VDD=3.3V



(2) Definition of Contrast Ratio :

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

(3) Definition of Luminance :

Definition of Luminance Uniformity

Measure white luminance on the point 5 as figure9-1

Measure white luminance on the point 1 ~ 9 as figure9-1

ΔL = [L(MIN) / L(MAX)] X 100%

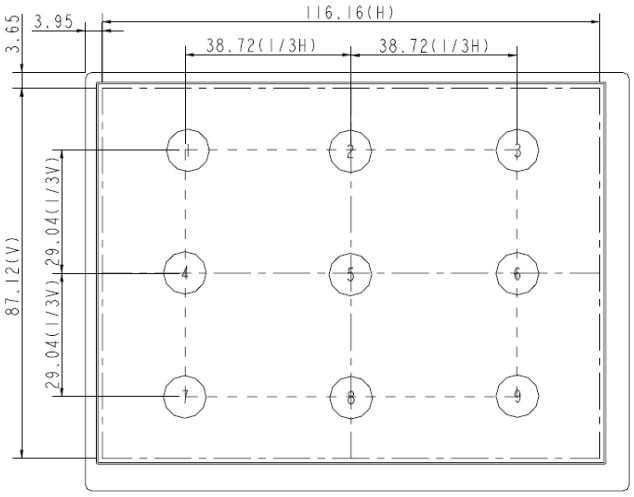


Fig9-1 Measuring point

(4) Definition of Viewing Angle(Θ,Φ), refer to Fig9-2 as below :

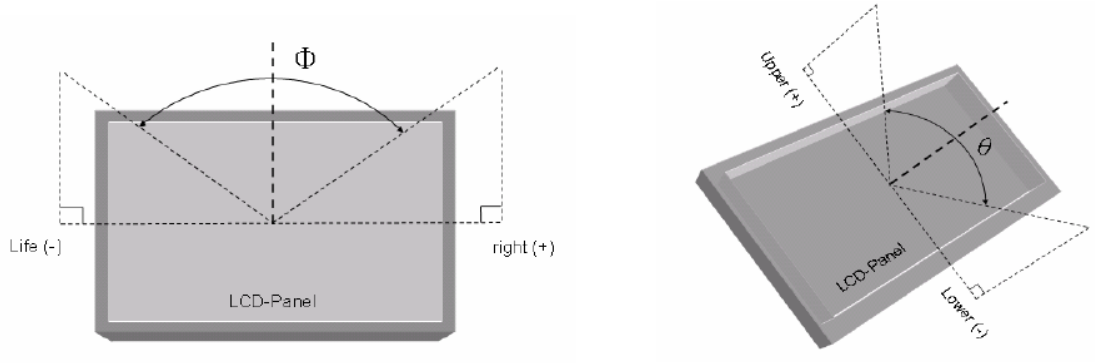


Fig9-2 Definition of Viewing Angle

(5) Definition of Response Time.(White – Black)

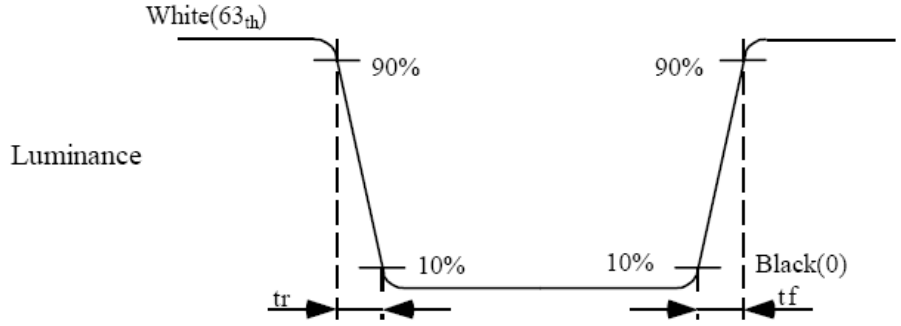


Fig9-3 Definition of Response Time(White-Black)

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
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

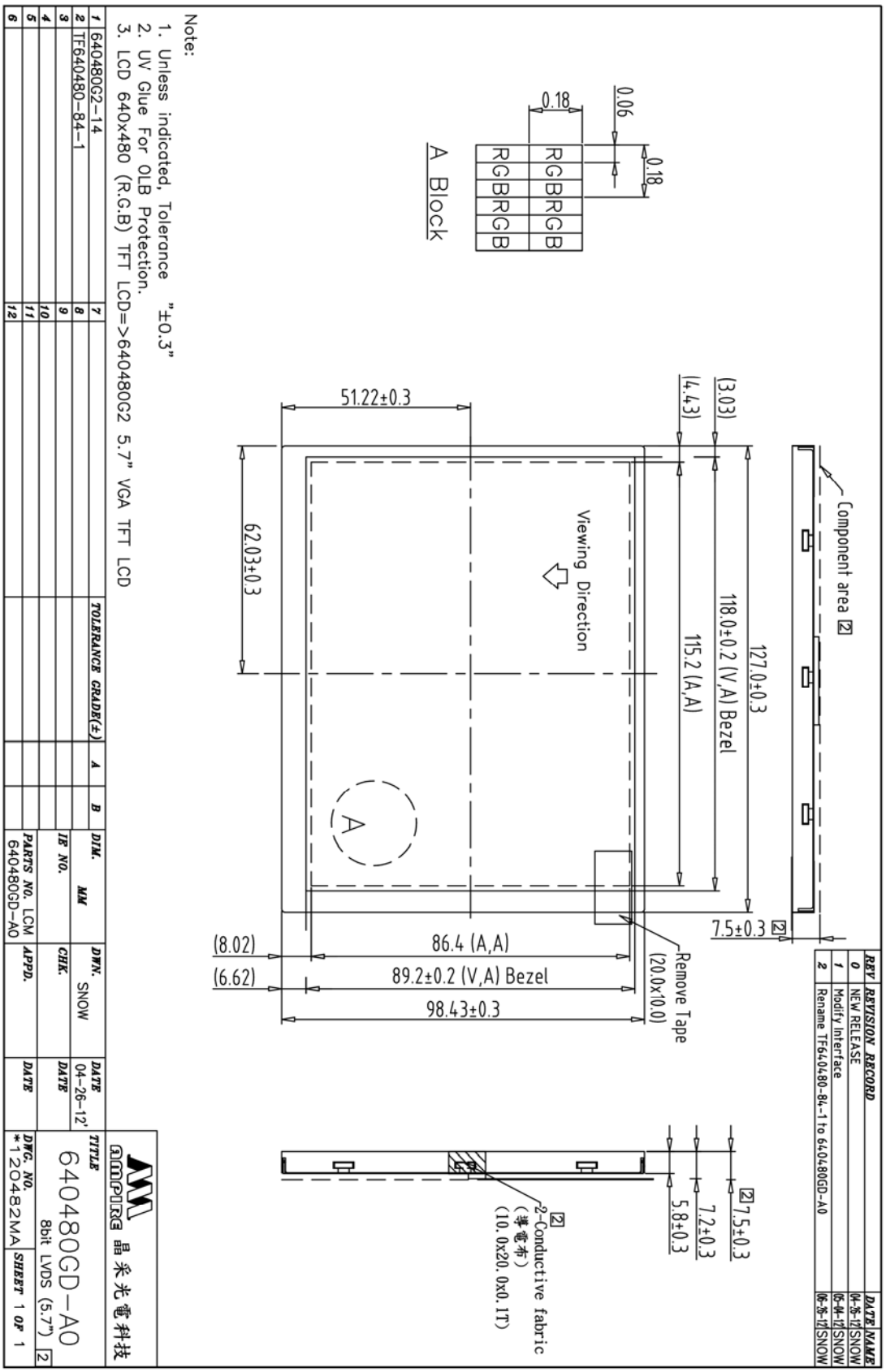
Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

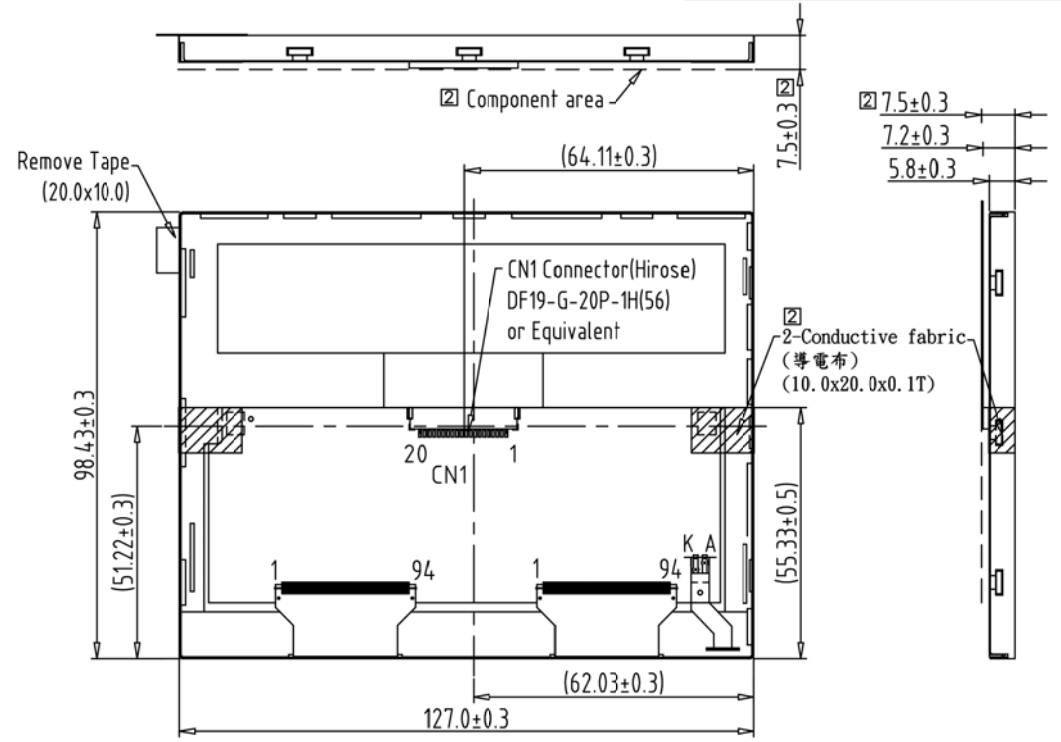
10. OTHERS

AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

11. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	04-26-12	SNOW
1	Modify Interface	05-04-12	SNOW
2	Rename TF640480-84-1 to 640480GD-A0	06-26-12	SNOW



Back view

1 CN1

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	LED_A
10	GND	20	LED_K

Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. LCD 640x480 (R.G.B) TFT LCD=>640480G2 5.7" VGA TFT LCD

				TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. SNOW	DATE 04-26-12'	TITLE 640480GD-A0 8bit LVDS (5.7") 2
1	640480G2-14	7								
2	TF640480-84-1	8					IE NO.	CHK.	DATE	
3		9								
4		10					PARTS NO. LCM-1 640480GD-A0	APPD.	DATE	DWG. NO. *120483MA SHEET 1 OF 1
5		11								
6		12								

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