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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-1024768YTZQW-00H
APPROVED BY	
DATE	

□ Approved For Specifications

□ Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2016/5/24 2016/8/16 2016/8/16	- 11 15	New Release Update electrical characteristic	Alan Jessica
2010/8/10	15	Opdate backlight condition	Jessica

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1. General specification

AM-1024768YTZQW-00H is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.4 inch diagonally measured active display area with HD (1024 horizontal by 768 vertical pixels) resolution.

- (1) Construction: 10.4" a-Si TFT active matrix, White LED Backlight.
- (2) Resolution (pixel): 1024(R.G.B) X 768
- (3) Number of the Colors : 16.2M (R , G , B 8 bit digital each)
- (4) LCD type : Normally black
- (5) Interface : LVDS interface

Item Specification						
Outline Dimensio	on	236 (H) x 174.3 (V) x 7.4 (D) (Typ)	mm			
Display area		211.2(H) x 158.4(V) (10.4" diagonal)	mm			
Number of Pixel		1024(H) x 768(V)	pixels			
Pixel pitch		0.20625(H) x 0.20625(V)	mm			
Pixel arrangeme	nt	RGB Vertical Stripe				
Display mode		Normally Black				
NTSC		70(Тур.)	%			
Surface treatmer	nt	Antiglare, Hard-Coating (3H)				
Weight		500	g			
Back-light		Single LED (Side-Light type)				
Power	Logic System (White Pattern)	Logic 2.0W(typ) TBD(max) @V _{DVDD} =3.3V	W			
	B/L System	6.528(Max.)	W			

1.1 Display Characteristics

1.2 Mechanical Information

	Item	Min.	Тур.	Max.	Unit
Madula	Horizontal (H)	235.5	236	236.5	mm
Size	Vertical (V)	174.0	174.3	174.6	mm
Size	Depth (D)	7.1	7.4	7.7	mm
Weight		_	500	_	g

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2. Optical Characteristics

Item	ı	Symbol	Condition	Min.	Тур.	Max.	Unit	Note
Contrast		CR		600	900			(1)(2)
Response _ time	Rising Falling	TR+TF		_	30	40	msec	(1)(3)
White luminance (Center)		YL		500	600	_	cd/m ²	(1)(4)
Color	Mhito	W _x	⊖=0	0.263	0.313	0.363		
	vvnite	Wy	Normal	0.279	0.329	0.379		
	Ded	R _x	viewing		TBD			
	Red	Ry	angle		TBD			(1)(4)
(CIE1931)		Gx			TBD			
	Green	Gy			TBD			
		B _x			TBD			
	Blue	By			TBD			
		θι		80	85	_		
Viewing	Hor.	θ _R		80	85	_		
angle	Mari	θu	GR>10	80	85			
	ver.	θD		80	85	_		
Brightness u	niformity	B _{UNI}	⊖=0	70	80	—	%	(5)
Optima View	Direction			Fre	e			(6)

Measuring Condition

- Measuring surrounding : dark room
- LED current I_L : 480mA
- Ambient temperature : 25±2°C
- 15min. warm-up time.

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Measuring Equipment

- FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- Measuring spot size : 20 ~ 21 mm

Note (1) Definition of Viewing Angle:



Note (2) Definition of Contrast Ratio (CR) : measured at the center point of panel

Luminance with all pixels white

CR = -

Luminance with all pixels black

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Note (3) Definition of Response Time : Sum of T_R and T_F



Note (4) Definition of optical measurement setup



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Note (6) : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction.

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3. Functional Block Diagram



Pixel Format



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3.1 Relationship between Displayed Color and Input

		MS	B					15	SB	MS	SB					15	SBI	MS	B					15	SB	Grav scale
	Display	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	GO	B7 I	B6	B5	B4	B3	B2	B1	B0	Level
	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Blue	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Н	Н	Н	Н	Н	Н	Н	Н	-
	Green	L	L	L	L	L	L	L	L	Н	Н	Н	Н	Н	Н	Н	н	L	L	L	L	L	L	L	L	-
Basic	Light Blue	L	L	L	L	L	L	L	L	Н	Н	Н	Н	Н	Н	Н	н	Н	Н	Н	Н	Н	Н	Н	Н	-
color	Red	н	Н	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	-
	Purple	Н	Н	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	Н	Н	Н	Н	Н	Н	Н	Н	-
	Yellow	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	-
	White	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	Н	-
	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	LO
		L	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Γ	L1
	Dark	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L2
Gray scale	\uparrow				:								:								:					L3…L251
of Red	\downarrow	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L252
	Light	н	Н	Н	Н	Н	Н	L	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L253
		н	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L254
	Red	Н	Н	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Red L255
	Black	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L0
		L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L1
	Dark	L	L	L	L	L	L	L	L	L	L	L	L	L	L	Н	L	L	L	L	L	L	L	L	L	L2
Gray scale	\uparrow				:								:								:					L3…L251
of Green	\downarrow	L	L	L	L	L	L	L	L	Н	Н	Н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L	L252
	Light			1	1	1	T	1	L	Н	Н	Н	Н	Н	Н	L	Н	L	L	L	L	L	L	L	L	L253
	Light	L	L	L	L			L .																		
	Light	L	L	L	L	L	L	L	L	Н	Н	Н	н	Н	Н	Н	L	L	L	L	L	L	L	L	L	L254
	Green		L L L	L	L	L	L	L	L	H H	H H	H H	H H	H H	H H	H H	L H	L L	L L		L	L	L	L	L	L254 Green L255
	Green Black	L L L	L L L	L L L	L L L	L L L	L	L	L L	H H L	H H L	H H L	H H L	H H L	H H L	H H L	L H L	L L L	L L	L L L	L L L	L L L	L L L	L L L	L L	L254 Green L255 L0
	Green Black		L L L L	L L L	L L L	L L L	L L L	L L L	L L L	H H L	H H L	H H L	H H L L	H H L	H H L	H H L	L H L	L L L	L L L	L L L	L L L	L L L	L L L	L L L	L L H	L254 Green L255 L0 L1
	Green Black Dark									H H L L	H H L L	H L L	H L L	H H L L	H L L	H L L	L H L L			L L L L	L L L	L L L	L L L	L L L H	L L H	L254 Green L255 L0 L1 L2
Gray scale	Green Black Dark									H L L	H L L	H L L	H L L :	H L L	H L L	H L L	L H L L			L L L		L L L		L L L H		L254 Green L255 L0 L1 L2 L3…L251
Gray scale of Blue	Green Black Dark ↓									H L L	H L L	H L L		H L L	H L L	H L L					L L L :		L L L H	L L H		L254 Green L255 L0 L1 L2 L3…L251 L252
Gray scale of Blue	Green Black Dark ↓ Light									H L L L	H L L L	H L L L	H L L L		H L L L	H L L L					L L L : H H		L L L H			L254 Green L255 L0 L1 L2 L3…L251 L252 L253
Gray scale of Blue	Green Black Dark ↑ ↓ Light																L H L L L L									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254
Gray scale of Blue	Green Black Dark ↑ ↓ Light Blue																									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255
Gray scale of Blue	Green Black Dark ↑ ↓ Light Blue Black									H L L L L							L H L L L L L L L L									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255 L0
Gray scale of Blue	Green Black Dark ↑ ↓ Light Blue Black																L H L L L L L L L H									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255 L0 L1
Gray scale of Blue	Green Black Dark ↑ ↓ Light Blue Black Dark									H L L L L L L																L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255 L0 L1 L2
Gray scale of Blue Gray scale	Green Black Dark ↑ ↓ Light Blue Black Dark ↑																									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255 L0 L1 L1 L2 L3…L251
Gray scale of Blue Gray scale of White & Black	Green Black Dark ↓ Light Blue Black Dark ↑ ↓																									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255 L0 L1 L2 L3…L251 L252
Gray scale of Blue Gray scale of White & Black	Green Black Dark ↑ ↓ Light Blue Black Dark ↓ Light																									L254 Green L255 L0 L1 L2 L3L251 L252 L253 L254 Blue L255 L0 L1 L2 L3L251 L252 L3L251
Gray scale of Blue Gray scale of White & Black	Green Black Dark ↑ ↓ Light Blue Black Dark ↑ ↓ Light																									L254 Green L255 L0 L1 L2 L3…L251 L252 L253 L254 Blue L255 L0 L1 L2 L3…L251 L252 L253 L253 L253

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4. ABSOLUTE MAXIMUM RATINGS

4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Note
	V _{dvdd} V _{dvdd_lvds}	-0.3	5	V	
Bower cupply voltage	V _{AVDD}	-0.5	15	V	
Fower supply voltage	V_{GH}	-0.3	42	V	
	V _{GL}	-20	0.3	V	
	V _{GH} - V _{GL}	-0.3	40	V	
Logic Signal Input Level	V _{dvdd} V _{dvdd_lvds}	-0.3	5	V	

4.2 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T _{opa}	-20	70	°C	
Storage Temperature	T _{stg}	-30	80	°C	

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5. ELECTRICAL CHARACTERISTICS

ltem	Symbol	Min.	Тур.	Max.	Unit	Note
	V _{DVDD} V _{DVDD_LVDS}	3	3.3	3.6	۷	
	VGH		25		V	Note (1)
Supply Voltage	VGL		-10		V	Note (2)
	AVDD		12.1		V	
	VCOM	5.18	5.48	5.78	V	Note (3)
Input signal	ViH	0.8 VDD		VDD	V	
voltage	ViL	0		0.2VDD	V	
	IDD	TBD	TBD	TBD	mA	VDD =3.3V/ Note (4)
	lavdd	TBD	TBD	TBD	mA	AVDD=12.1V/ Note (4)
Current of	lvgh	TBD	TBD	TBD	mA	VGH=25V/ Note (4)
poner ouppry	lvgl	TBD	TBD	TBD	mA	VGL=-10V/ Note (4)
	lvcom	TBD	TBD	TBD	mA	VCOM=5.275V/ Note (4)

5.1 TFT LCD Module

Note :

(1) : VGH is TFT Gate operating Voltage.

(2) : VGL is TFT Gate operating Voltage.

(3) : VCOM must be adjusted to optimize display quality _ Flicker Pattern \circ

(4) : @ White Pattern & 60Hz ${\scriptstyle \circ}$

5.2 Switching Characteristics for LVDS Receiver

Item	Symbol	Min.	Тур.	Max.	Unit	Conditions
Differential Input High Threshold	Vth			100	mV	\/1_2\/
Differential Input Low Threshold	Vtl	-100			mV	v _{CM} =1.2v
Input Current	I _{IN}	-10		10	uA	
Differential input Voltage	$ V_{ID} $	0.1		0.6	V	
Common Mode Voltage Offset	V _{CM}	0.7	1.2	1.6	V	

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5.3 Bit LVDS input

5.3.1 6Bit LVDS input



5.3.2 8Bit LVDS input



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5.4 Interface Timing (DE mode)

DE mode										
Parameter	Symbol		Value		Unit					
Faidhleter	Symbol	Min.	Тур.	Max.						
DCLK frequency @Frame rate=60hz	fclk	52	65	71	Mhz					
Horizontal display area	thd		DCLK							
HSYNC period time	th	1114	1344	1400	DCLK					
HSYNC blanking	thb+thfp	90	320	376	DCLK					
Vertical display area	tvd		768		Н					
VSYNC period time	tv	778	806	845	Н					
VSYNC blanking	tvb+tvfp	10	38	77	Н					

Timing Diagram of Interface Signal (DE mode)

(1). Vertical input timing



(2). Horizontal input timing



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5.5 Power On / Off Sequence



Item	Min.	Тур.	Max.	Unit
T1	0			ms
T2	50			ms
Т3	5			ms
T4	10			ms
T5	20			ms
Т6	50			ms
T7	20			ms
T8	10			ms
Т9	20			ms
T10	10			ms
T11	20			ms

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Parameter	Symbol	Min	Тур	Max	Units	Condition
LED Current	ΙL		480		mA	Ta=25 ℃
LED Voltage	VL		12.9	13.6	Volt	Ta=25 ℃
						Ta=25 ℃
LED Life-Time	N/A	30,000			Hour	I _F =60mA
						Note (2)

5.6 Backlight Unit

- Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.
- Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=480mA. The LED lifetime could be decreased if operating IL is larger than 480mA. The constant current driving method is suggested.
- Note (3) LED Light Bar Circuit

When LCM is operated over 40 $^\circ\!\mathrm{C}$ ambient temperature, the IL should be follow :



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6. INTERFACE PIN CONNECTION

FPC Pin Assignment:

FPC connector is used for electronics interface. The recommended model is

CN1 (Input signal): 089K60-000100-G2-R (STARCONN)

Pin NO.	Symbol	Description	Note
1	AGND	Analog ground	
2	AVDD	Analog power	
3	DVDD	Digital power	
4	GND	Digital ground	
5	VCOM	Not connect	
6	DVDD	Digital power	
7	GND	Digital ground	
8	V14	Not connect	
9	V13	Not connect	
10	V12	Not connect	
11	V11	Not connect	
12	V10	Not connect	
13	V9	Not connect	
14	V8	Not connect	
15	GND	Digital ground	
16	DVDD_LVDS	LVDS power	
17	GND	Digital ground	
18	PIND3	Positive LVDS differential data input	
19	NIND3	Negative LVDS differential data input	
20	GND	Digital ground	
21	PINC	Positive LVDS differential clock input	
22	NINC	Negative LVDS differential clock input	
23	GND	Digital ground	
24	PIND2	Positive LVDS differential data input	
25	NIND2	Negative LVDS differential data input	
26	GND	Digital ground	
27	PIND1	Positive LVDS differential data input	
28	NIND1	Negative LVDS differential data input	
29	GND	Digital ground	
30	PIND0	Positive LVDS differential data input	

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Pin NO.	Symbol	Description	Note
31	NIND0	Negative LVDS differential data input	
32	GND	Digital ground	
33	GND_LVDS	LVDS ground	
34	GRB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ,C=0.1uF)	
35	STBYB	Standby mode,normally pull high STBYB= 1, normal operation STBYB=0 ,timing control, source driver will turn off, all output are high-Z	
36	SHLR	Left or right display control	Note 1
37	DVDD	Digital power	
38	UPDN	Up / down display control	Note 1
39	AGND	Analog ground	
40	AVDD	Analog power	
41	VCOM	Not connect	
42	DITH	Dithering function enable control.Normally pull low DITHER= "1",Enable internal dithering function DITHER= "0",Disable internal dithering function	
43	GND	Digital ground	
44	DVDD	Digital Power	
45	GND	Digital ground	
46	V7	Not connect	
47	V6	Not connect	
48	V5	Not connect	
49	V4	Not connect	
50	V3	Not connect	
51	V2	Not connect	
52	V1	Not connect	
53	GND	Digital ground	
54	DVDD	Digital power	

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Pin NO.	Symbol	Description	Note
55	SELB	6bit/8bit mode select, SELB = "0", LVDS input data is 8bits SELB = "1": LVDS input data is 6bits	Note 2
56	VGH	Positive power for TFT	
57	DVDD	Digital power for Gate IC	
58	VGL	Negative power for TFT	
59	GND	Digital ground for Gate IC	
60	NC	Not connect	

Note 1 : UPDN and SHLR control function

UPDN	SHLR	Data shifting	
0	1	Normally display	
0	0	Inverse Left and Right	Left Right
1	1	Inverse Up and Down	
1	0	Inverse Left and Right Inverse Up and Down	Down

Note 2 : If LVDS input data is 6 bits, SELB must be set to High If LVDS input data is 8 bits, SELB must be set to Low DITH and SELB control function

DITH	SELB	Data shifting
() 1	Colors (262K)
(0	Colors (262K)
1	1	Colors (262K)
1	0	Colors (16.2M)

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7. RELIABILITY TEST CRITERIA

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).

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8. USE PRECAUTIONS

8.1 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.
- 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.

8.2 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.

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8.3 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.

8.4 Operating precautions

- 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.

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8.5 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) 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.
- 3) AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.

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9. OUTLINEDIMENSION



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