

晶采光電科技股份有限公司 AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMDIDE DADT NO	A N. 400 40001 OTRACIAL COLL
AMPIRE PART NO.	AM-1024600L2TMQW-00H
APPROVED BY	AMI-1024600L21MQW-00H

- ☐ Approved For Specifications
- ☐ Approved For Specifications & Sample

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APPROVED BY	CHECKED BY	ORGANIZED BY

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2012/4/12	-	New Release	Rober
2012/4/13	16	Add the CN2 Interface	Rober
	23.24	Correct the OUTLINE DIMENSION	Rober
2012/7/2	25	Add the EDID table	Rober

1. FEATURES

The TFT is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 (17:10) inch diagonally measured active display area with WSVGA(1024 x 600 pixel) resolution.

- (1) 10.1 (17:10 diagonal) inch configuration
- (2) One channel LVDS interface
- (3) 262K color by 6 bit R.G.B signal input
- (4) RoHS Compliance
- (5) Halogen Free

Date: 2012/07/02

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Unit	Note
LCD size	10.1" (Diagonal)	inch	
Active area	222.72 (H) ×125.28 (V)	mm	
Number of pixels	1024(H) × 600(V)	pixels	
Pixel pitch	0.2715(H) × 0.2088(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262,144	colors	
Display mode	Normally white		
Dimensional outline	235.0 (Typ) ×145.8 (Typ) ×8.1(D)	mm	
Back-light	Single LED (Side-Light type)		
Weight	TBD	g	
Surface treatment	Anti-glare		

3. ABSOLUTE MAX. RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

ltem	Symbol	Symbol Values		UNIT	Note
nom.	Cymbol	Min.	Max.	Oltil	11010
Logic Supply Voltage	V _{DD}	-0.3	5.0	V	
Operating Temperature	Тора	-20	70	°C	
Storage Temperature	Тѕтс	-30	80	°C	

4. ELECTRICAL CHARACTERISTICS

4.1 TFT LCD Module

Item	Symbol		Values	UNIT	Noto		
item	Symbol	Min.	Тур.	Max.	UNII	Note	
Power voltage	VDD	3.0	3.3	3.6	V	Note1	
Current of power supply	IDD	-	0.3	-	Α	VDD=3.3V Black pattern	

Note 1: VDD-dip condition :

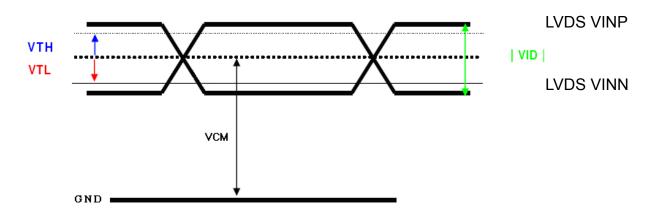
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when $2.7V \le VDD < 3.0V$, $td \le 10ms$.

VDD>3.0V $\,^{,}\,$ VDD-dip condition should be same as VDD-turn-con condition.

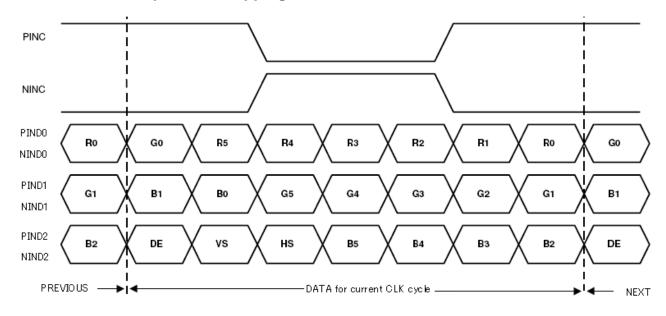
4.2 Switching Characteristics of LVDS Receiver

Item	Symbol	Min.	Тур.	Max.	Unit	Condition
Differential Input High Threshold	VTH			100	mV	VCM=1.2V
Differential Input Low Threshold	VTL	-100		1	mV	
Input current	IIN	-10		+10	uA	
Differential input Voltage	VID	0.2	-	0.6	V	
Common Mode Voltage Offset	VCM	$\frac{ VID }{2}$	1.25	$2.4 - \frac{ VID }{2}$	V	



5

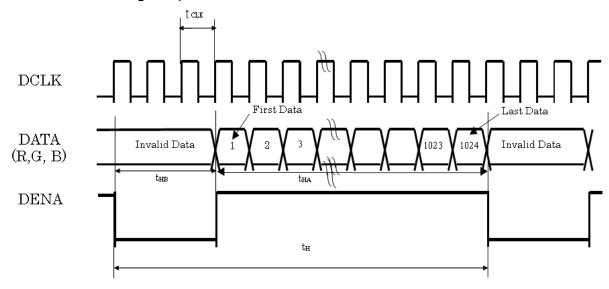
4.3 6-bit LVDS Input Data Mapping



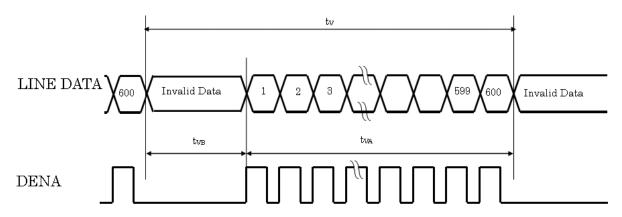
4.4 Timing characteristics of input signals

	Item					Тур.	Max.	Unit
LVDS input signal sequence		Frame F	Rate	tclk	41	51.2	57	MHz
			Horizontal total Timing	t _H	1214	1344	1364	tCLK
		Horizontal	Horizontal effective Timing	t _{HA}		1024		tCLK
LCD input signal sequence	DENA		Horizontal Blank Time	t _{HB}	190	320	340	tCLK
(input LVDS Transmitter)			Vertical total Time	t _V	615	365	645	t _H
		Vertical	Vertical effective Time	t_{VA}		600		t _H
			Vertical Blank Time	t _{VB}	15	35	45	t _H

Horizontal timing sequence

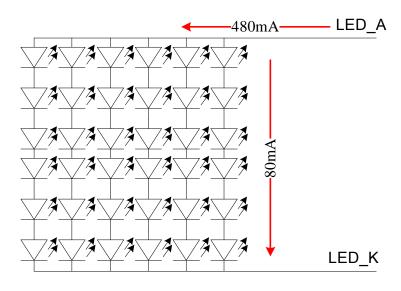


Vertical timing sequence



4.5 Backlight Driving Conditions

Item	Symbol		Values	Unit	Note	
item	Symbol	Min.	Тур.	Max.	Offic	Note
LED voltage	VAK		21	24.6	V	I _L =480mA Ta=25°ℂ
LED current	ΙL		480		mA	Note (1)
LED Life Time	-		50K		Hour	Note (2)



Note2 : Condition: Ta=25°C, continuous lighting

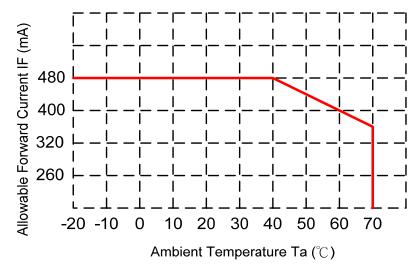
Life time is estimated data.

Definitions of failure:

Date: 2012/07/02

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

When LCM is operated over 40°C ambient temperature, the ILED should be follow :



5. OPTICAL SPECIFICATION

5.1 Optical specification

Itom Sumb		Condition		Values	i	11:4:4	Note	
Item	Symbol	Condition	Min.	Тур.	Max.	Unit	Note	
	θ L		60	70				
Viowing angle	θR	(CD>10)	60	70		dograa	Note1	
Viewing angle	heta U	(CR≧10)	60	70		degree	Note2	
	θD		40	50				
Response time	TR			5	7	msec	Note3	
Response time	TF			20	28	msec	Notes	
Contrast ratio	CR		400	500			Note2	
	WX	WX		0.26	0.31	0.36		
	WY		0.28	0.33	0.38			
	RX		0.54	0.59	0.64			
Oalan ahaaaa ti aita	RY	Normal $\theta = \Phi = 0^{\circ}$	0.28	0.33	0.38		Note1	
Color chromaticity	GX	$\theta = \Psi = 0$	0.29	0.34	0.39		Note4	
	GY		0.54	0.59	0.64			
	BX		0.11	0.16	0.21			
	BY		0.05	0.1	0.15			
Luminance	L		800	1000		cd/m ²	Note4	
Luminance uniformity	YU		70			%	Note5	

5.2 Measuring Condition

■ Measuring surrounding : dark room

■ Ambient temperature : 25±2°C

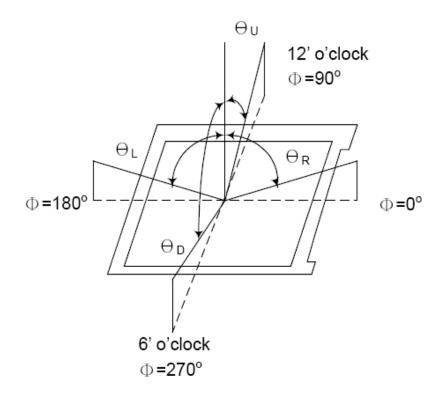
■ 15min. warm-up time

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5.2 Measuring Equipment

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7 of view : 1° / Height : 120mm.)

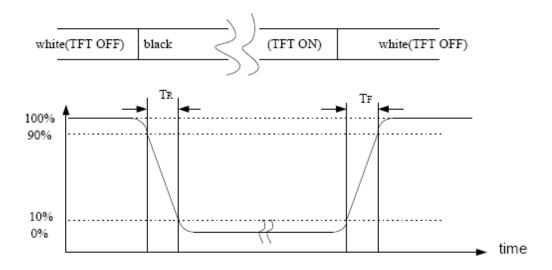
Note 1 : Definition of viewing angle range



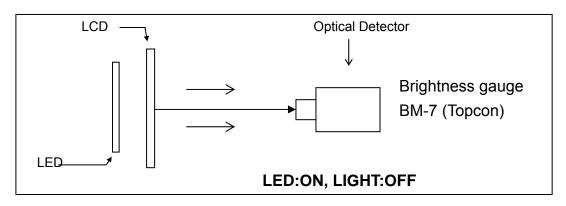
Note 2 : Definition of Contrast Ratio (CR) : measured at the center point of panel

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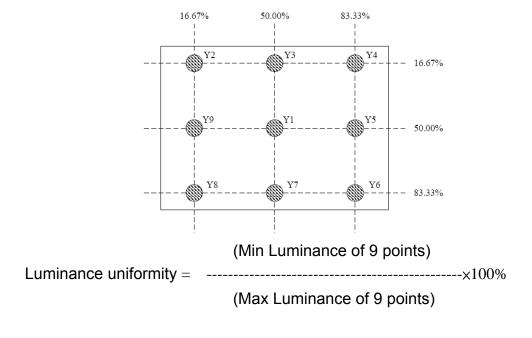
Note 3 : Definition of Response time : Sum of T_R and T



Note 4: Definition of optical measurement setup

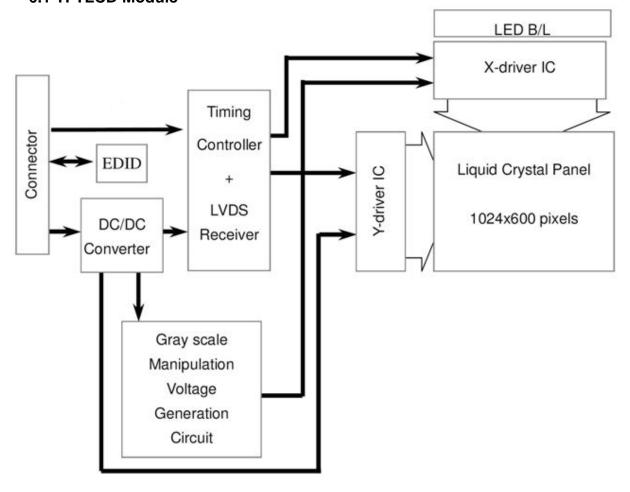


Note 5: Definition of brightness uniformity

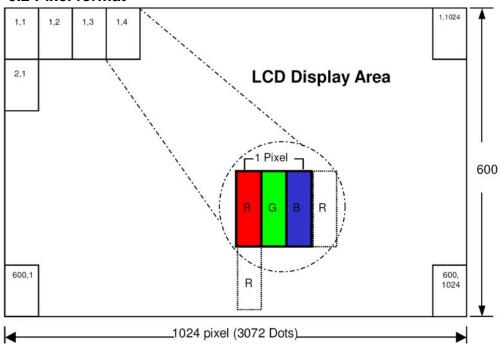


- Note 6 : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction
- Note 7 : Condition: Ta=25 $^{\circ}$ C, Life time is estimated data. Definitions of failure:
 - i. LCM brightness becomes half of the minimum value.
 - ii. LED doesn't light normally.

6. BLOCK DIAGRAM 6.1 TFTLCD Module



6.2 Pixel format



7.INTERFACE

7.1 Electrical Interface Connection

CN1(Input signal): CSTAR DS100-430-H23 (equivalent JAE FI-XB30SSRL-HF16)

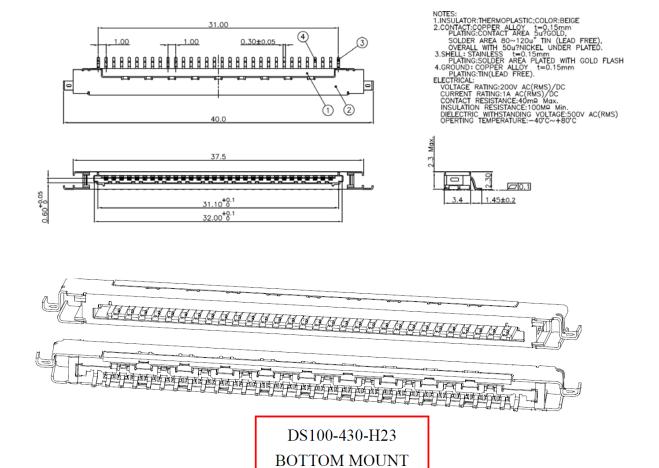
Pin No.	Symbol	Description	Note
1	GND	Ground	
2	VDD	3.3V Power	
3	VDD	3.3V Power	
4	V_EDID	3.3V Power for EDID	
5	NC	No connection	
6	CLK_EDID	EDID Clock Input	
7	DATA_EDID	EDID Data Input	
8	RXIN0-	LVDS Signal - channel0-	
9	RXIN0+	LVDS Signal+ channel0+	
10	GND	Ground	
11	RXIN1-	Data Input channel1-	
12	RXIN1+	Data Input channel1+	
13	GND	Ground	
14	RXIN2-	Data Input channel2-	
15	RXIN2+	Data Input channel2+	
16	GND	Ground	
17	RXCLKIN-	Data Input CLK-	
18	RXCLKIN+	Data Input CLK+	
19	GND	Ground	
20	NC	No connection	
21	NC	No connection	
22	GND	Ground	
23	GND	Ground	
24	NC	No connection	

25	NC	No connection
26	NC	No connection
27	NC	No connection
28	NC	No connection
29	NC	No connection
30	NC	No connection

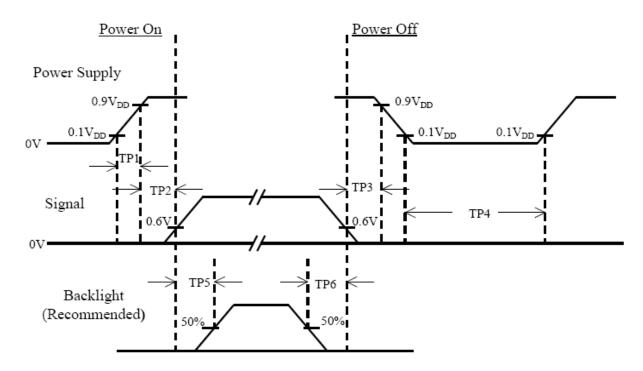
CN2(LED backlight): BHSR-02VS-1 (JST or equivalent)

Pin No.	Symbol	Description	Note
1	А	Anode for LED backlight (+21V, 480mA)	
2	K	Cathode for LED backlight	

(3) LVDS Connector: CSTAR DS100-430-H23



8. Power On/Off Sequence



Item	Min.	Тур.	Max.	Unit	Remark
TP1	0.5		10	msec	
TP2	0		50	msec	
TP3	0		50	msec	
TP4	500			msec	
TP5	200			msec	
TP6	200			msec	

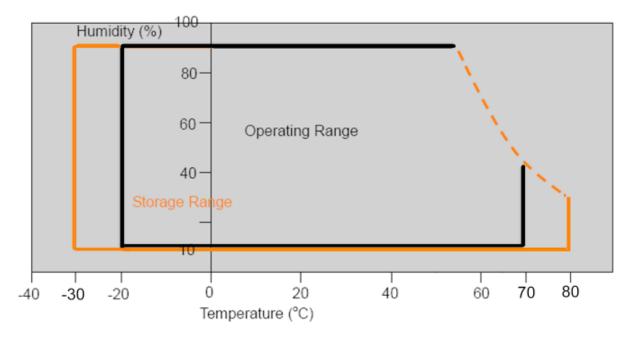
Note:

- (1) The supply voltage of the external system for the module input should be the same as the definition of VDD.
- (2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.
- (3) In case of VDD = off level, please keep the level of input signal on the low or keep a high impedance.
- (4) TP4 should be measured after the module has been fully discharged between power off and on period.
- (5) Interface signal shall not be kept at high impedance when the power is on.

9. RELIABILITY TEST CONDITIONS

Item	Test Conditions	Note
High Temperature Storage	Ta = 80°C 240 hrs	
Low Temperature Storage	Ta = -30°C 240 hrs	
High Temperature Operation	Ts = 70°C 240 hrs	
Low Temperature Operation	Ta = -20°C 240 hrs	
Thermal Shock	-30°C /30 min ~ +80°C /30 min 100 cycles	

Storage / Operating temperature



Note .Max wet bulb temp.=39_oC

Date: 2012/07/02

10.INCOMING INSEPCTION STANDARDS

10.1. Scope

Specifications contain

- 10.1.1 Display Quality Evaluation
- 10.1.2 Mechanics Specification

10.2. Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E LEVEL II.

- 10.2.1 Lot size: Quantity per shipment as one lot (different model as different lot).
- 10.2.2 Sampling type: Normal inspection, single sampling.
- 10.2.3 Sampling level: Level II.
- 10.2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65 Minor defect: AQL=1.0

10.3. Panel Inspection Condition

10.3.1 Environment:

Room Temperature: 25±5°C.

Humidity: 65±5% RH.

Illumination: 300 ~ 700 Lux.

10.3.2 Inspection Distance:

35-40 cm

10.3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

10.3.4 Inspection time:

Perceptibility Test Time: 20 seconds max.

10.4. Display Quality

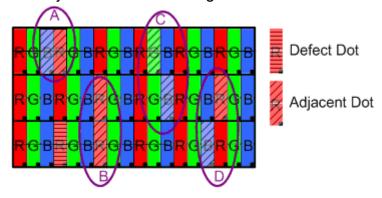
10.4.1 Function Related:

The function defects of line defect, abnormal display, and no display are considered Major defects.

10.4.2 Bright/Dark Dots:

Defect Type / Specification	G0 Grade	A Grade
Bright Dots	0	N≤3
Dark Dots	0	N≤4
Total Bright and Dark Dots	0	N≤6

[Note 1]
Judge defect dot and adjacent dot as following.



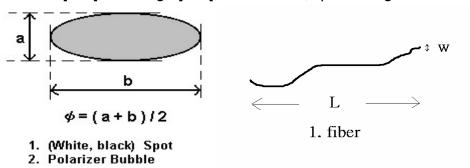
- (1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
- (2) The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
- (3) Allow above (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.
- (4) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.
- (5) There should be no distinct non-uniformity visible through 3% ND Filter within 2 sec inspection times.

10.4.3 Visual Inspection specifications:

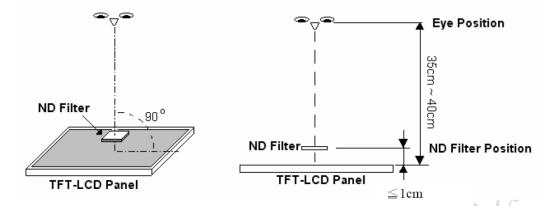
Defect Type	Specification	Count(N)
Dot Shape	D 0.25mm	Ignored
(Particle、Scratch and Bubbles in	0.25mm < D 0.5mm	N≤3
display area)	D > 0.5mm	N=0
Line Shape	W 0.07mm	Ignored

(Particles、Scratch、Lint and	0.07mm <w< th=""><th>0.1mm,L</th><th>5mm</th><th>N≤3</th></w<>	0.1mm,L	5mm	N≤3
Bubbles in display area)	W > 0.1mm ,	L > 5mm		N=0

[Note 2] W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter



[Note 3] Bright dot is defined through 3% transmission ND Filter as following.



11. HANDLING & CAUTIONS

11.1 Cautions when taking out the module

Pick the pouch only, when taking out module from a shipping package.

11.2 Cautions for handling the module

- 11.2.1 As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.
- 11.2.2 As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.
- 11.2.3 As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.
- 11.2.4 Do not pull the interface connector in or out while the LCD module is operating.
- 11.2.5 Put the module display side down on a flat horizontal plane.
- 11.2.6 Handle connectors and cables with care.

11.3 Cautions for the operation

- 11.3.1 When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.
- 11.3.2 Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

11 .4 Cautions for the atmosphere

- 11.4.1 Dewdrop atmosphere should be avoided.
- 11.4.2 Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

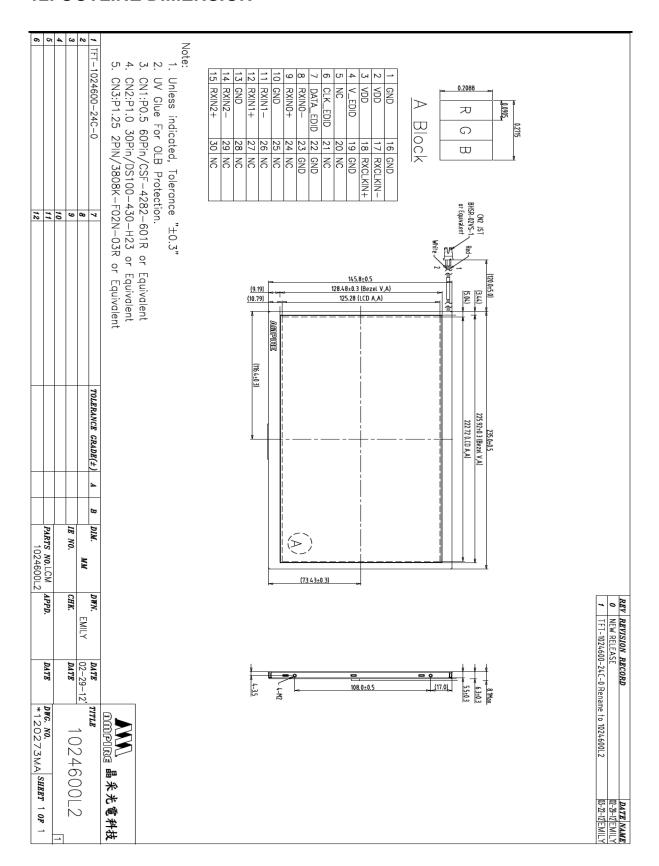
11.5 Cautions for the module characteristics

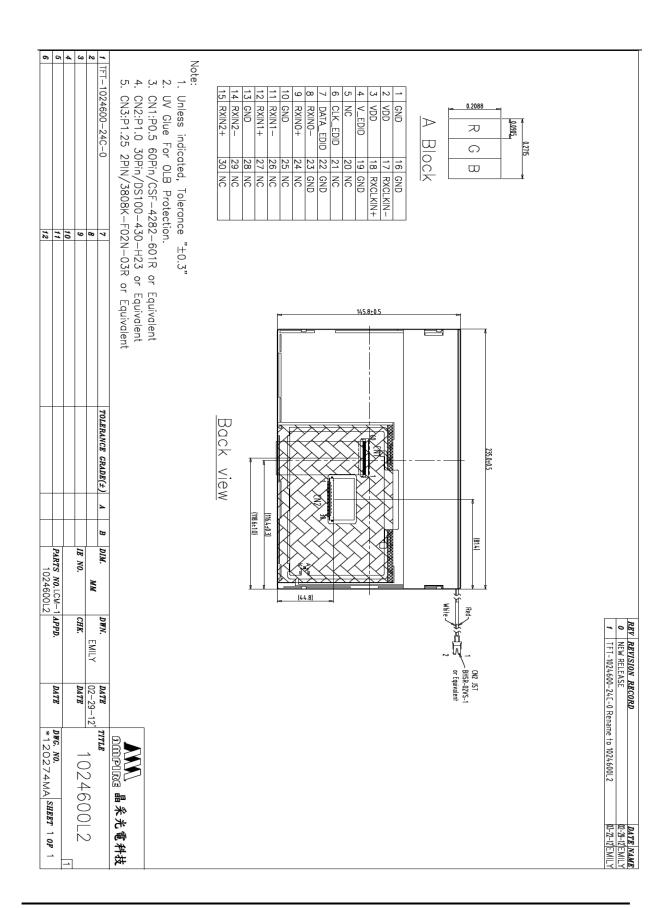
- 11.5.1 Do not apply fixed pattern data signal to the LCD module at product aging.
- 11.5.2 Applying fixed pattern for a long time may cause image sticking.

11.6 Other cautions

- 11.6.1 Do not disassemble and/or re-assemble LCD module.
- 11.6.2 Do not re-adjust variable resistor or switch etc.
- 11.6.3 When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.
- 11.6.4 AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

12. OUTLINE DIMENSION





13. EDID TABLE

EDID Table of 1024600L

Byte#	Byte#	EDID Table of 1024600L	Value	Value	Value
(Decimal)	(HEX)	Field Name & Comments	(HEX)	(BIN)	(DEC)
0	00	Header	00	00000000	0
1	01	Header	FF	11111111	255
2	02	Header	FF	11111111	255
3	03	Header	FF	11111111	255
4	04	Header	FF	11111111	255
5	05	Header	FF	11111111	255
6	06	Header	FF	11111111	255
7	07	Header	00	00000000	0
8	08	ISA Manufacture Code LSB(3 character ID = AM	05	00000000	5
9	09	Compressed ASCII	B0	10110000	176
10	03 0A	Product Code "1001"	60	0110000	96
11	0B	Hex, LSB first	12	00010010	18
12	OC OC	LCD module Serial No-Preferred but Optional	58	01011000	88
13	0D	LCD module Serial No-Preferred but Optional	A2	10100010	162
14	0E	LCD module Serial No-Preferred but Optional	0F	00001111	15
15	0F	LCD module Serial No-Preferred but Optional	00	00000000	0
16	10	Week of manufacture=25	19	00011001	25
17	11	Year of manufacture=2012	16	00011001	22
18	12	EDID Structure Version#=1	01	00010110	1
19	13	EDID Structure version#=1 EDID revision#=3	03	0000001	3
20	14		80	10000001	128
21	15	Video input definition=Digital input, CRGB Max H image size=22cm	16	00010110	22
22	16	Max V image size=22Cm Max V image size=13cm	0D	00010110	13
23	17	Display Gamma=2.2	78		120
24	18	Feature support(DPMS)=Active off, RGB color	OA	01111000 00001010	10
25	19	Red/green low bits(10000110)	86	100001010	134
26 27	1A 1B	Blue/white low bits(00100110)	26 97	00100110	38 151
28	1C	Red x, Red x=0.592 Red y, Red y=0.340	97 57	10010111 01010111	87
29	1D	Green x, Green x=0.341	57 57	01010111	87
30	1E	Green y, Green y=0.592	97	10010111	151
31	1F		28	00101011	40
32	20	Blue x, Blue x=0.156 Blue y, Blue y=0.127	20	00101000	32
33	21	White x, White x=0.321	52	01010000	82
34	22	White y, White y=0.33	52 	01010010	84
35	23	Established timing 1	00	00000000	0
36			00	00000000	0
37	24 25	Established timing 2 Manufacturer's timings	00	00000000	0
38	26	Standard timing#1 was not used	01	00000000	1
39	27	Standard timing#1 was not used	01	00000001	1
40	28	Standard timing#2 was not used	01	00000001	1
41	29	Standard tilling#2 was not used	01	00000001	1
42	29 2A	Standard timing#3 was not used	01	00000001	1
43	2B	Standard tilling#5 was not used	01	00000001	1
44	2C	Standard timing#4 was not used	01	00000001	
45	2C 2D	Standard tilling## was not used	01	0000001	1
46	2E	Standard timing#5 was not used	01	00000001	1
47	2F	Standard tilling#3 was not used	01	00000001	1
48	30	Standard timing#6 was not used	01	00000001	1
49	31	Standard tilling#0 was not used	01	00000001	1
50	32	Standard timing#7 was not used	01	00000001	1
51	33	Standard tilling#/ was not used	01	00000001	1
52	34	Standard timing#8 was not used	01	00000001	1
53	35	Standard tilling#6 was not used	01	0000001	1
53 54	36	Detailed timing/monitor(descriptor#1)	00	00000001	0
55	37	1024×600@60Hz: Pixel Clock=51.2MHz	14	00010100	20
56	38	Horizontal active= 1024 pixels (L8b)	00	00000000	0
57	39	Horizontal active= 1024 pixels (L8b) Horizontal blanking= 320 pixels (L8b)	40	01000000	64
5/	22	Horizontal bianking= 320 pixels (Lob)	TU	01000000	04

58	3A	HA(U4b): HB(U4b)	41	01000001	65
59	3B	Vertical active= 600 lines (L8b)	58	01011000	88
60	3C	Vertical blanking= 35 lines (L8b)	23	00100011	35
61	3D	HA(U4b): HB(U4b)	20	00100000	32
62	3E	H sync. Offset=53 pixels	35	00110101	53
63	3F	H sync. Width=35 pixels	23	00100011	35
64	40	V sync. Offset=4 lines	45	01000101	69
65	41	V sync. Width=5 lines	00	00000000	0
66	42	H image size= 220 mm (L8b)	DC	11011100	220
67	43	V image size= 129 mm (L8b)	81	10000001	129
68	44	Horizontal Image (U4b): Vertical Image (U4b)	00	00000000	0
69	45	No Horizontal Border=0	00	00000000	0
70	46	No Vertical Border=0	00	00000000	0
/0	40		00	00000000	U
71	47	Non-interlaced, Normal display, No stereo,	19	00011001	25
70	10	Digital separate sync, H/V pol Negatives	- 44	01000100	
72	48	Detailed timing/monitor(descriptor#2)	44	01000100	68
73	49	1024×600 @65Hz: Pixel Clock= 57MHz	16	00010110	22
74	4 A	Horizontal active= 1024 pixels (L8b)	00	00000000	0
75	4B	Horizontal blanking= 340 pixels (L8b)	54	01010100	84
76	4C	HA(U4b): HB(U4b)	41	01000001	65
77	4D	Vertical active= 600 lines (L8b)	58	01011000	88
78	4E	Vertical blanking= 45 lines (L8b)	2D	00101101	45
79	4F	HA(U4b): HB(U4b)	20	00100000	32
80	50	H sync. Offset=93 pixels	5D	01011101	93
		· · · · · · · · · · · · · · · · · · ·			
81	51	H sync. Width=35 pixels	23	00100011	35
82	52	V sync. Offset=17 lines	15	00010101	21
83	53	V sync. Width=5 lines	04	00000100	4
8 4	54	H image size= 220 mm (L8b)	DC	11011100	220
85	55	V image size= 129 mm (L8b)	81	10000001	129
86	56	Horizontal Image (U4b): Vertical Image (U4b)	00	00000000	0
87	57	No Horizontal Border=0	00	00000000	0
88	58	No Vertical Border=0	00	00000000	0
89	59	EDID Module revision	00	00000000	0
90	5A	Flag	00	00000000	0
91	5B	Flag	00	00000000	0
92	5C	Flag	00	00000000	0
93	5D	Dummy Descriptor	FE	11111110	254
94	5E		00		0
		Flag		00000000	
95	5F	PC Maker P/N 1st Character =M	00	00000000	0
96	60	PC Maker P/N 2nd Character =3	00	00000000	0
97	61	PC Maker P/N 3rd Character =4	00	00000000	0
98	62	PC Maker P/N 4th Character =9	00	00000000	0
99	63	PC Maker P/N 5th Character =5	00	00000000	0
100	64	LCD Supplier EEDID Revision # = 1.0	00	00000000	0
101	65	Manufacture P/N = 1	00	00000000	0
102	66	Manufacture P/N = 5	00	00000000	0
103	67	Manufacture P/N = P	00	00000000	0
104	68	Manufacture P/N = X	00	00000000	0
105	69	Manufacture P/N = 1	00	00000000	0
106	6A	Manufacture P/N = 4	00	00000000	0
		Manufacture P/N(If<13 char, then terminate			
107	6B	with ASCII code, set remaining=20h)	00	00000000	0
108	6C		00	00000000	0
		Flag			
109	6D	Flag	00	00000000	0
110	6E	Flag	00	00000000	0
111	6F	Data Type Tag	FE	11111110	254
112	70	Flag	00	00000000	0
113	71	SMBUS Value = 20 nit	00	00000000	0
114	72	SMBUS Value = 28 nit	00	00000000	0
115	73	SMBUS Value = 40 nit	00	00000000	0
116	74	SMBUS Value = 56 nit	00	00000000	0
110	/ '	5. 1555 Value - 50 IIIC		0000000	Ū

117	75	SMBUS Value = 79 nit	00	00000000	0
118	76	SMBUS Value = 111 nit	00	00000000	0
119	77	SMBUS Value = 156 nit	00	00000000	0
120	78	SMBUS Value = max nit	00	00000000	0
121	79	Number of LVDS channels=1	01	00000001	1
122	7A	Panel Self Test (00-Not Present, 01-Present)	00	00000000	0
123	123 7B	(If<13 char, then terminate with ASCII code	00	00000000	0
125		0Ah, set remaining char=20h)			
124	7C	(If<13 char, then terminate with ASCII code	00	00000000	0
121	/C	0Ah, set remaining char=20h)	00	0000000	U
125	7D	(If<13 char, then terminate with ASCII code	00	00000000	0
123 //	0Ah, set remaining char=20h)	00	00000000	U	
126	7E	Extension Flag = 00	00	00000000	0
127	7F	Checksum	2E	00101110	46