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.	**AG-320240A4FIQW-TG1-B(M)®**
APPROVED BY	
DATE	

☐ **Preliminary Specification**
■ **Formal Specification**

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Approved by	Checked by	Organized by
Kokai	Mark	Lawlite

This Specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2025/01/17		New Release	Lawlite

1 FEATURES

(1) Display format : 320 × 240 dot-matrix, 1/240 duty.

(2) Construction : LCD, Bezel, Heat Seal, Zebra, Edge White LED back-light and PCB.

(3) Display type : FSTN , Positive , 6 o'clock view.

(4) Common and Segment Driver : RA0086AL3N

(5) Controller : RA8835AP3N-N

(6) White Edge LED back-light.

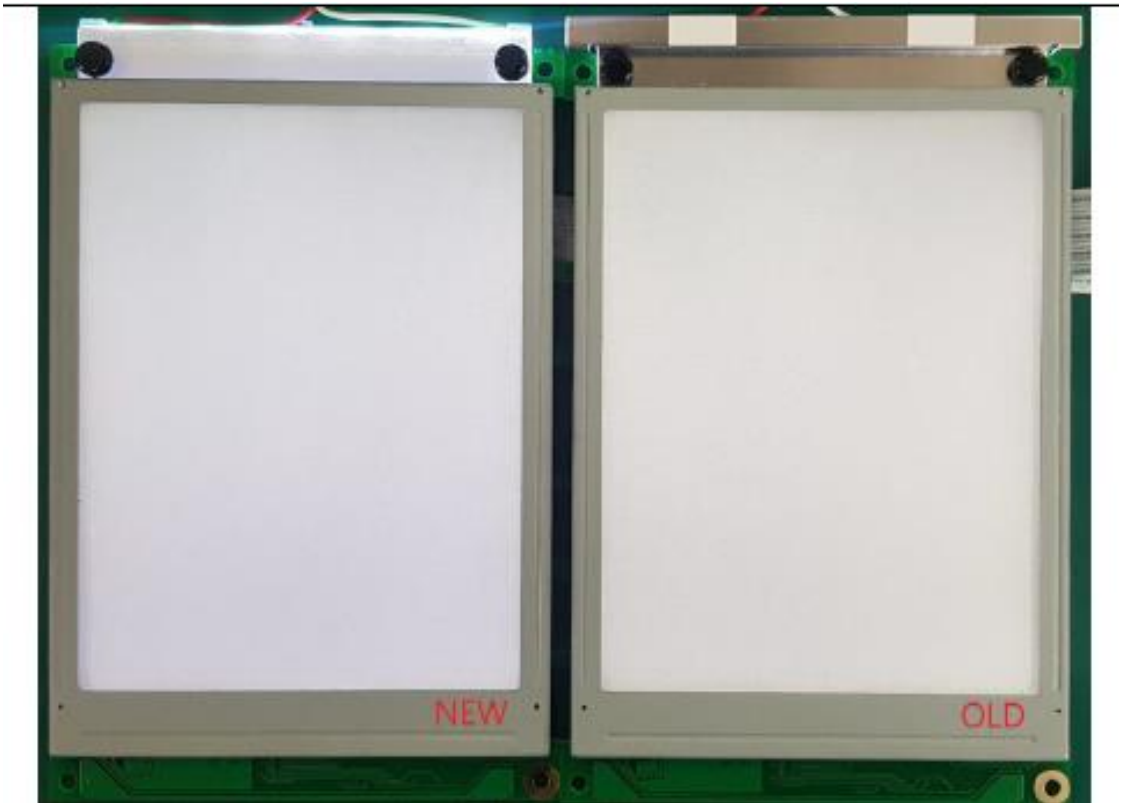
(7) Besides +5V for logic circuit, -20V is needed for LCD driving

(8) Extended temperature type.

(9) RoHS compliant.

(10) NEW RTP

(11) Change to the LED back-light design. The replacement will use new light-guide and new LED light bar. The optical and electronic features are compliant to the spec.



2 MECHANICAL DATA

Parameter	Stand Value	Unit
Dot size	0.345(W) × 0.345(H)	mm
Dot pitch	0.36(W) × 0.36(H)	mm
Viewing area	122.0(W) × 92.0(H)	mm
Module size (with LED)	165.0(W) × 109.0(H) × 14.5 max (T)	mm

3 ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Min	Max	Unit
Logic Circuit Supply Voltage		VDD-VSS	-0.3	7.0	V
LCD Driving Voltage		VDD-VO	-0.3	26.0	V
Input Voltage		VI	-0.3	VDD+0.3	V
Extended temp. type	Operating Temp.	TOP	-20	70	°C
	Storage Temp.	TSTG	-30	80	°C

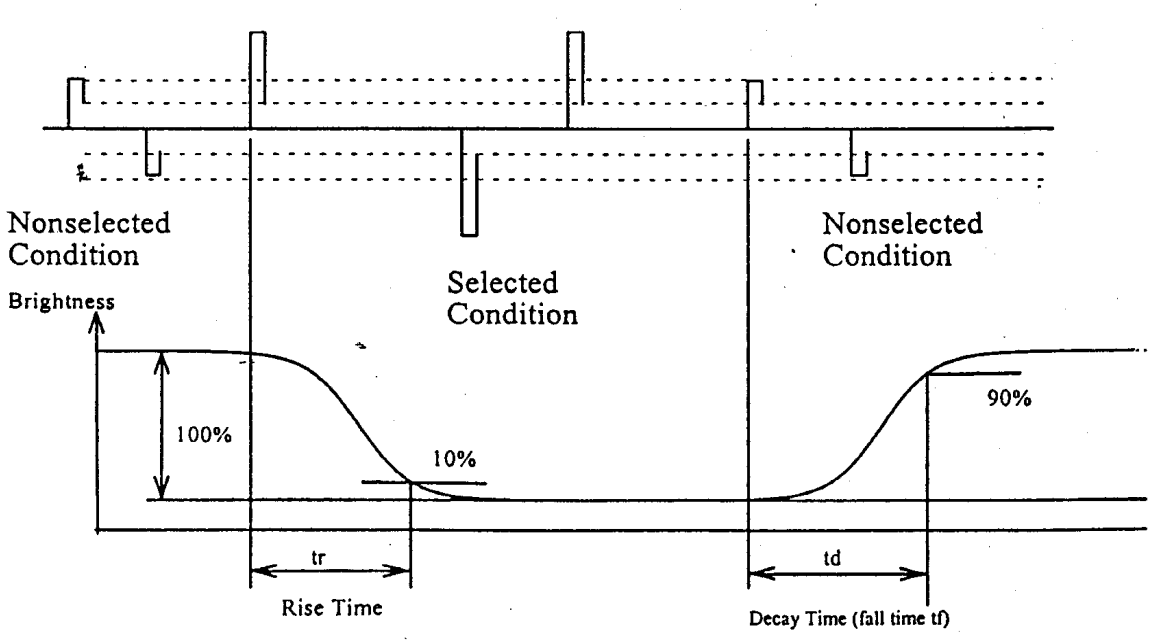
4 ELECTRO-OPTICAL CHARACTERISTICS

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
----- Electronic Characteristics -----							
Logic Circuit Supply Voltage	VDD-VSS	--	4.5	5.0	5.5	V	
LCD driving voltage	VDD-VO	25 °C	20.5	21.6	22.7	V	-
Input Voltage	VIH	--	0.8 VDD	--	VDD	V	
	VIL	--	VSS	--	0.2 VDD	V	
Logic Supply Current	IDD	VDD = 5V	--	5	--	mA	
----- Optical Characteristics -----							
Contrast	CR	FSTN type	--	3.3	--		Note 1
Rise Time	tr	25°C	--	135	250	ms	Note 2
Fall Time	tf	25°C	--	245	350	ms	
Viewing Angle Range	θ f	25°C & CR≥2	--	30	--	Deg.	Note 3
	θ b		--	29	--		
	θ l		--	28	--		
	θ r		--	27	--		
Frame Frequency	fF	25°C	--	70	--	Hz	

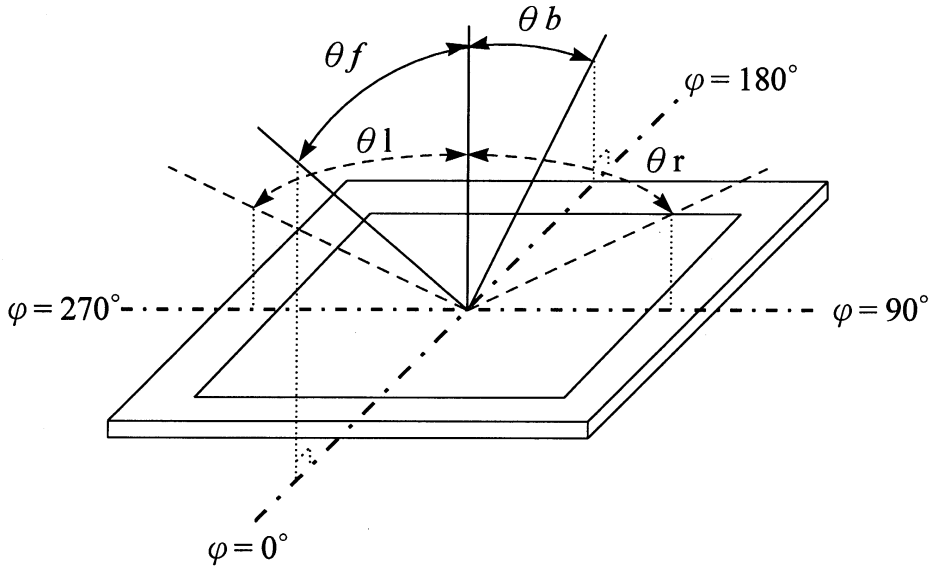
(NOTE 1) Contrast ratio :

CR = (Brightness in ON state) / (Brightness in OFF state)

(NOTE 2) Response time :



(NOTE 3) Viewing angle



4.1 LED Back-light Electrical Specification

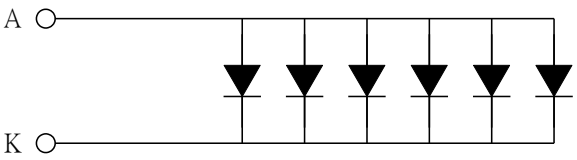
----- White LED Back-light Characteristics -----							
Parameter	**Symbol**	**Condition**	**Min**	**Typ**	**Max**	**Unit**	**Note**
Forward Current	IF	--	--	90	120	mA	Note 4
LCM Luminous intensity (Full White pattern)		IF=90mA	40	50	--	cd/m^2	Note 4
Forward Voltage	VF	IF=90mA	--	3.2	3.5	V	Note 5
LED C.I.E	X	IF=90mA	0.26	0.30	0.34		Note 6
	Y	IF=90mA	0.27	0.31	0.35		

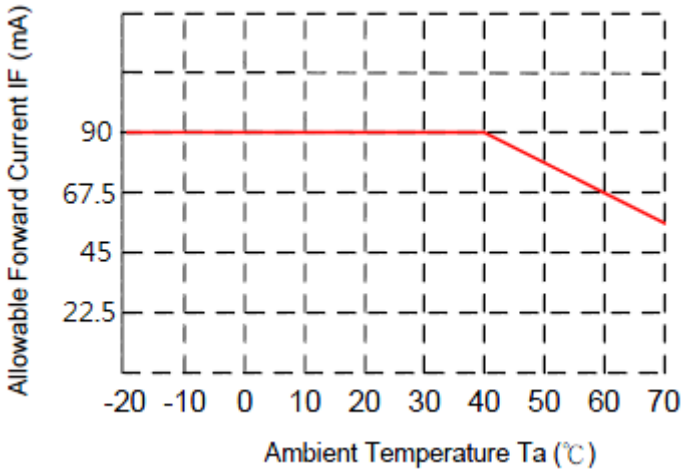
Note 4: Luminous intensity is decided by forward current of White LED.

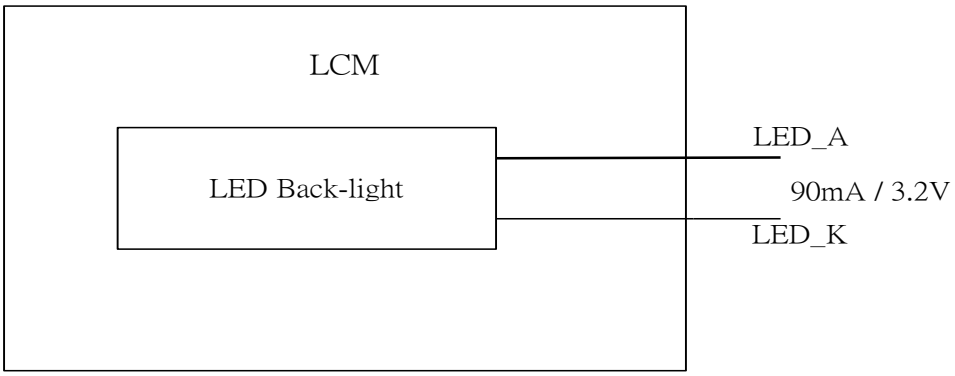
Note 5: White LEDs are with voltage tolerance.

Note 6: White LEDs are with color tolerance.

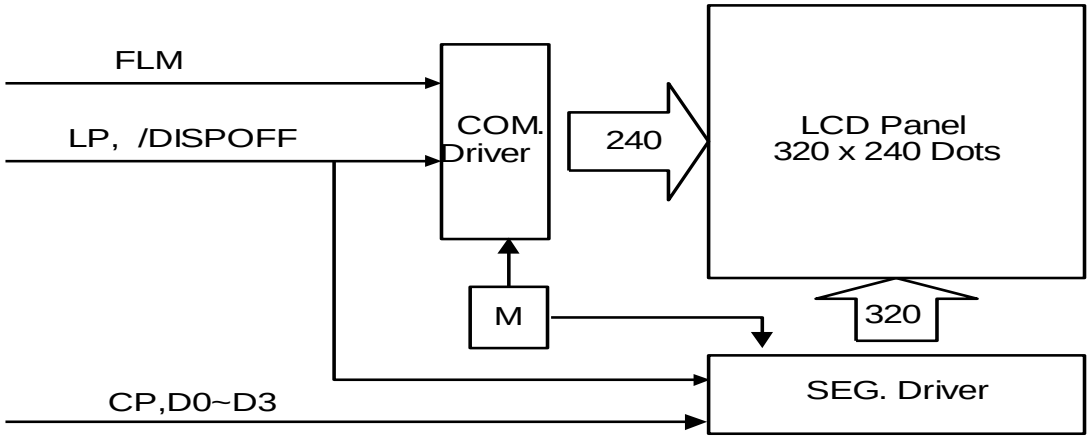
* LED Dice number = 6

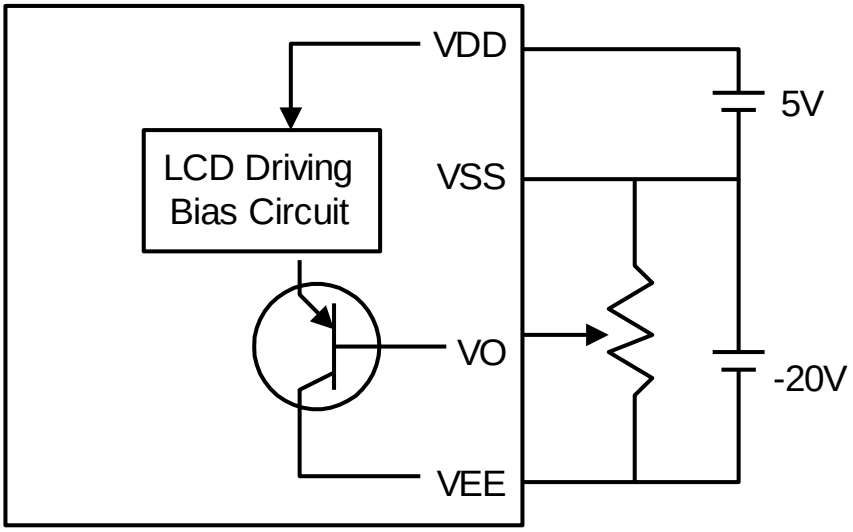






5 BLOCK DIAGRAM & POWER SUPPLY





6 PIN CONNECTIONS

NO.	SIGNAL	LEVEL	FUNCTION
1	/RESET	H/L	Reset Signal
2	/RD	H/L	80 Series: Read Signal 68 Series: Enable Signal(E)
3	/WR	H/L	80 Series: Write Signal 68 Series: R/W Signal
4	/CS	H/L	Chip Select Signal
5	A0	H/L	Data Type Selection
6 ~ 13	DB0~DB7	H/L	Data Input(8 bits)
14	VDD	-	Power Supply for Logic(+5.0V)
15	VSS	-	Power Supply(Ground : 0V)
16	VEE	-	Negative voltage input (-20V)
17	VO	-	Contrast Adjustment Input
18*	SK / X1	-	Serial Clock Touch Panel Left Signal in X Axis
19*	DO / X2	-	Data Output Touch Panel Right Signal in X Axis
20*	DI / Y1	-	Data In Touch Panel Upper Signal in Y Axis
21*	CS / Y2	-	T/P controller Chip Select. Active Low Touch Panel Lower Signal in X Axis
22*	INT	-	Interrupt
23~24	NC	-	No connection

* 18~22 : SK, DO, DI, CS, INT for Touch Panel controller TSC2046

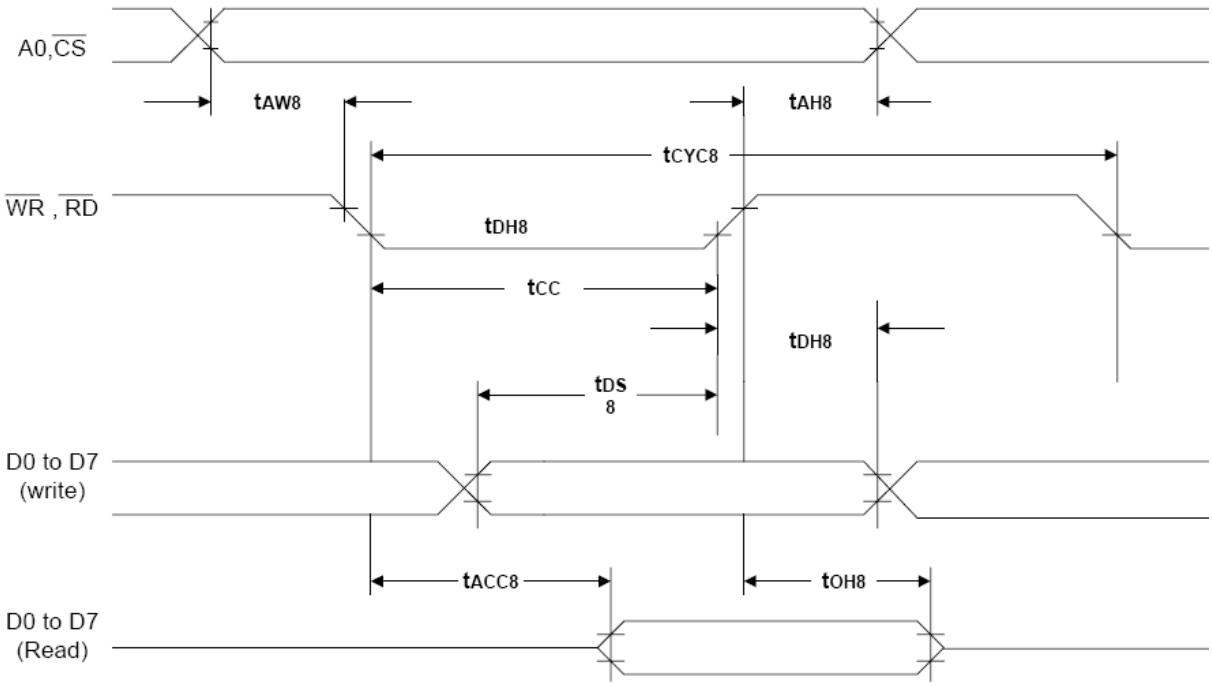
/ X1, X2, Y1, Y2 for Touch Panel (without TSC2046)

LED connector

No.	Symbol	Function
1	A	LED input Anode
2	NC	No Connection
3	NC	No Connection
4	K	LED input Cathode

7 TIMING CHARACTERISTICS

7.1 8080 Family Interface Timing



Ta = –20 to 75°C

Signal	Symbol	Parameter	V_{DD} = 4.5 to 5.5V		Unit	Condition
			Min.	Max.		
A0, $\overline{CS}$	t_{AH8}	Address hold time	10	—	ns	CL = 100pF
	t_{AW8}	Address setup time	0	—	ns	
$\overline{WR}$, $\overline{RD}$	t_{CYC8}	System cycle time	note.	—	ns	
	t_{CC}	Strobe pulse width	120	—	ns	
D0 to D7	t_{DS8}	Data setup time	120	—	ns	
	t_{DH8}	Data hold time	5	—	ns	
	t_{ACC8}	$\overline{RD}$ access time	—	50	ns	
	t_{OH8}	Output disable time	10	50	ns	

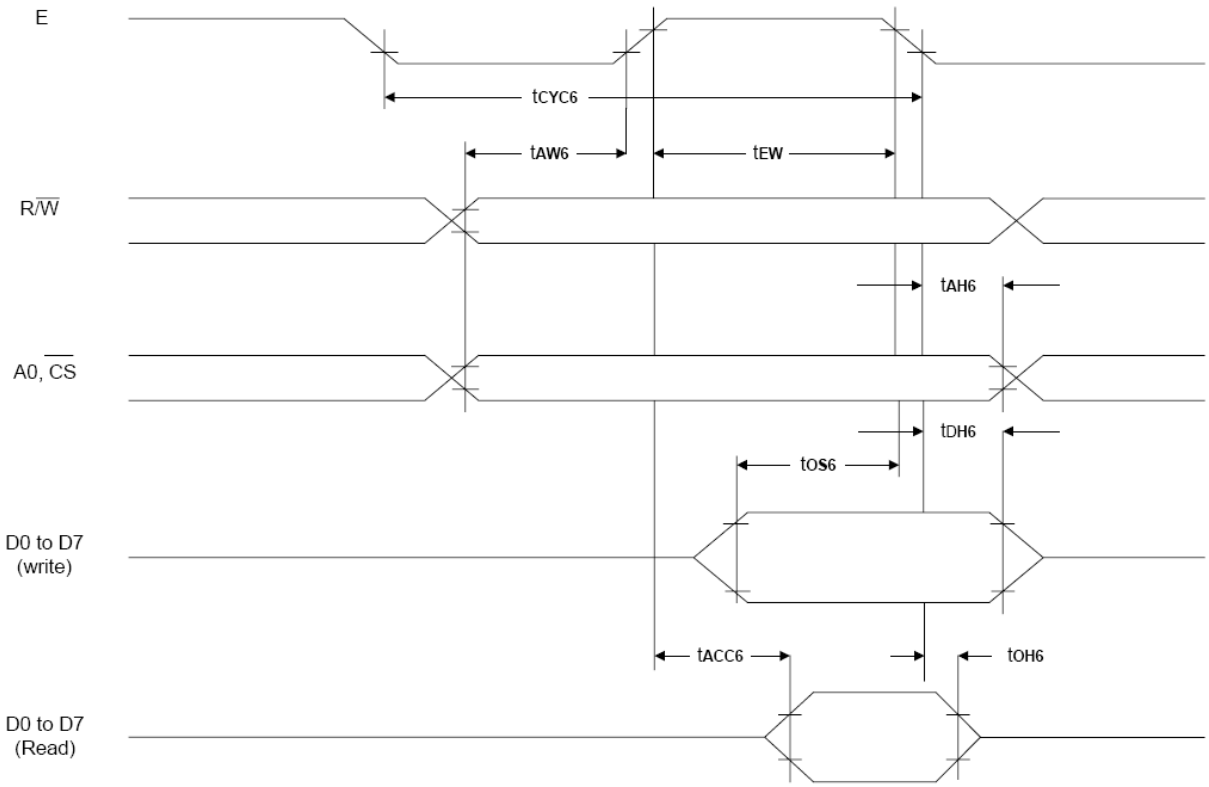
Note: For memory control and system control commands:

$t_{CYC8} = 2t_C + t_{CC} + t_{CEA} + 75 > t_{ACV} + 245$

For all other commands:

$t_{CYC8} = 4t_C + t_{CC} + 30$

7.2 6800 Family Interface Timing



Ta = –20 to 75°C

Signal	Symbol	Parameter	V_{DD} = 4.5 to 5.5V		Unit	Condition
			Min.	Max.		
A0, $\overline{CS}$, R/(/W)	t_{CYC6}	System cycle time	note.	—	ns	CL = 100 pF
	t_{AW6}	Address setup time	0	—	ns	
	t_{AH6}	Address hold time	0	—	ns	
D0 to D7	t_{DS6}	Data setup time	100	—	ns	
	t_{DH6}	Data hold time	0	—	ns	
	t_{OH6}	Output disable time	10	50	ns	
	t_{ACC6}	Access time	—	85	ns	
E	t_{EW}	Enable pulse width	120	—	ns	

Note: For memory control and system control commands:

$t_{CYC6} = 2t_C + t_{EW} + t_{CEA} + 75 > t_{ACV} + 245$

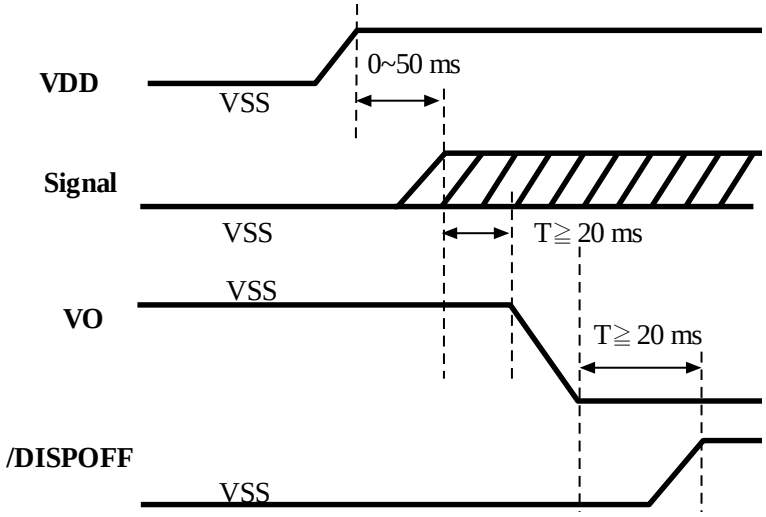
For all other commands:

$t_{CYC6} = 4t_C + t_{EW} + 30$

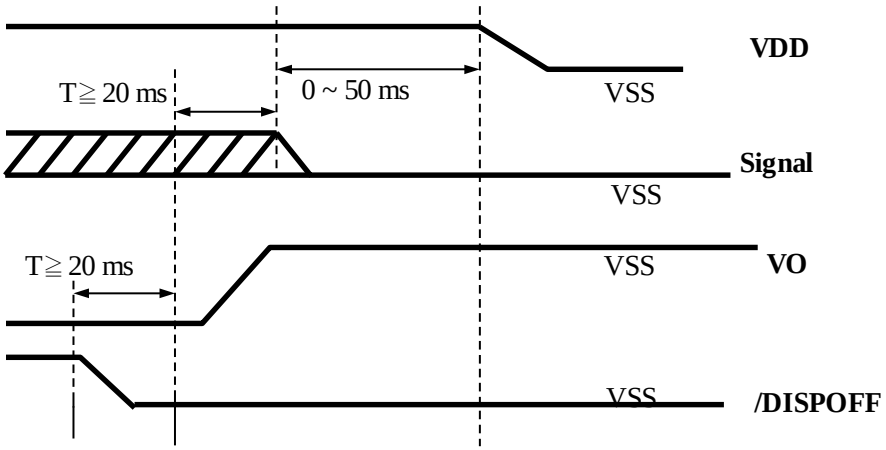
7.3 Power ON/OFF Sequence

Please maintain the blow sequence when turning on and off the power supply of the module. If /DISPOFF is supplied to the module while internal alter signal for LCD driving (M) is unstable, DC component will be supplied to the LCD panel. This may cause damage the LCD module.

POWER ON SEQUENCE



POWER OFF SEQUENCE



8 QUALITY AND RELIABILITY

8.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

8.2 SAMPLING PLAN

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

8.3 ACCEPTABLE QUALITY LEVEL

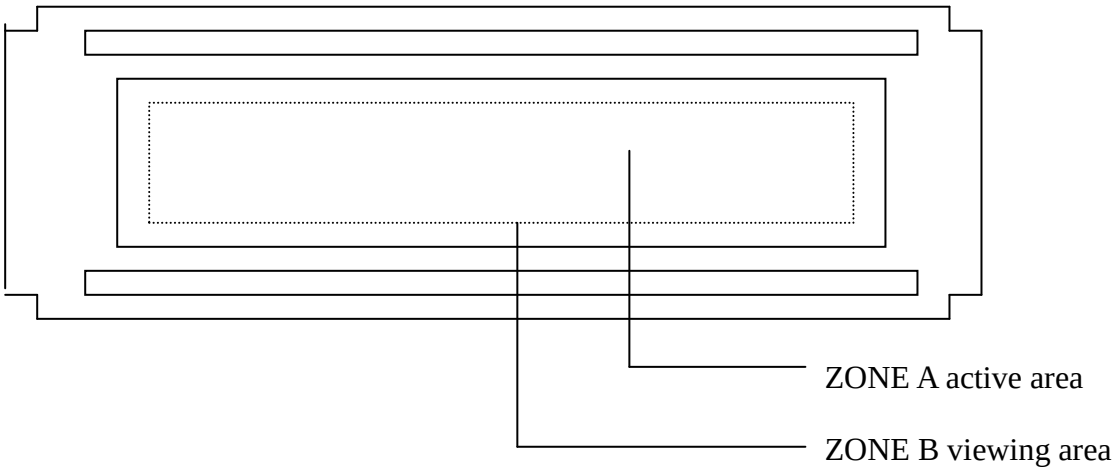
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant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

8.4 APPEARANCE

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

8.5 INSPECTION QUALITY CRITERIA

Item	Description of defects			Class of Defects	Acceptable level (%)
Function	Short circuit or Pattern cut			Major	0.65
Dimension	Deviation from drawings			Major	1.5
Black spots	Ave . dia . D	area A	area B	Minor	2.5
	D≤0.2	Disregard			
	0.2<D≤0.3	3	4		
	0.3<D≤0.4	2	3		
	0.4<D	0	1		
Black lines	Width W, Length L	A	B	Minor	2.5
	W≤0.03	disregard			
	0.03<W≤0.05	3	4		
	0.05<W≤0.07 , L≤3.0	1	1		
	See line criteria				
Bubbles in polarizer	Average diameter D 0.2 < D < 0.5 mm for N = 4 , D > 0.5 for N = 1			Minor	2.5
Color uniformity	Rainbow color or Newton ring.			Minor	2.5
Glass Scratches	Obvious visible damage.			Minor	2.5
Contrast ratio	See note 1			Minor	2.5
Response time	See note 2			Minor	2.5
Viewing angle	See note 3			Minor	2.5



8.6 RELIABILITY

Test Item	Test Conditions		Note
	Normal Temp. type	Extended Temp. type	
High Temperature Operation	50±3°C , t=96 hrs	70±3°C , t=96 hrs	
Low Temperature Operation	0±3°C , t=96 hrs	-20±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-20±3°C , t=96 hrs	-30±3°C , t=96 hrs	1,2
Temperature Cycle	-20°C ~ 25°C ~ 70°C 30 min. 5 min. 30 min. (1 cycle) Total 5 cycle	-30°C ~ 25°C ~ 80°C 30 min. 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℃ , 45-65%RH).

Note 3 : The module shouldn't be tested more than one condition, and all the test conditions are independent.

Note 4 : All the reliability tests should be done without protective film on the module.

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.

9 HANDLING PRECAUTIONS

(1) A LCD module is a fragile item and should not be subjected to strong mechanical shocks.

(2) Avoid applying pressure to the module surface. This will distort the glass and cause a change in color.

(3) Under no circumstances should the position of the bezel tabs or their shape be modified.

(4) Do not modify the display PCB in either shape or positioning of components.

(5) Do not modify or move location of the zebra or heat seal connectors.

(6) The device should only be soldered to during interfacing. Modification to other areas of the board should not be carried out.

(7) In the event of LCD breakage and resultant leakage of fluid do not inhale, ingest or make contact with the skin. If contact is made rinse immediately.

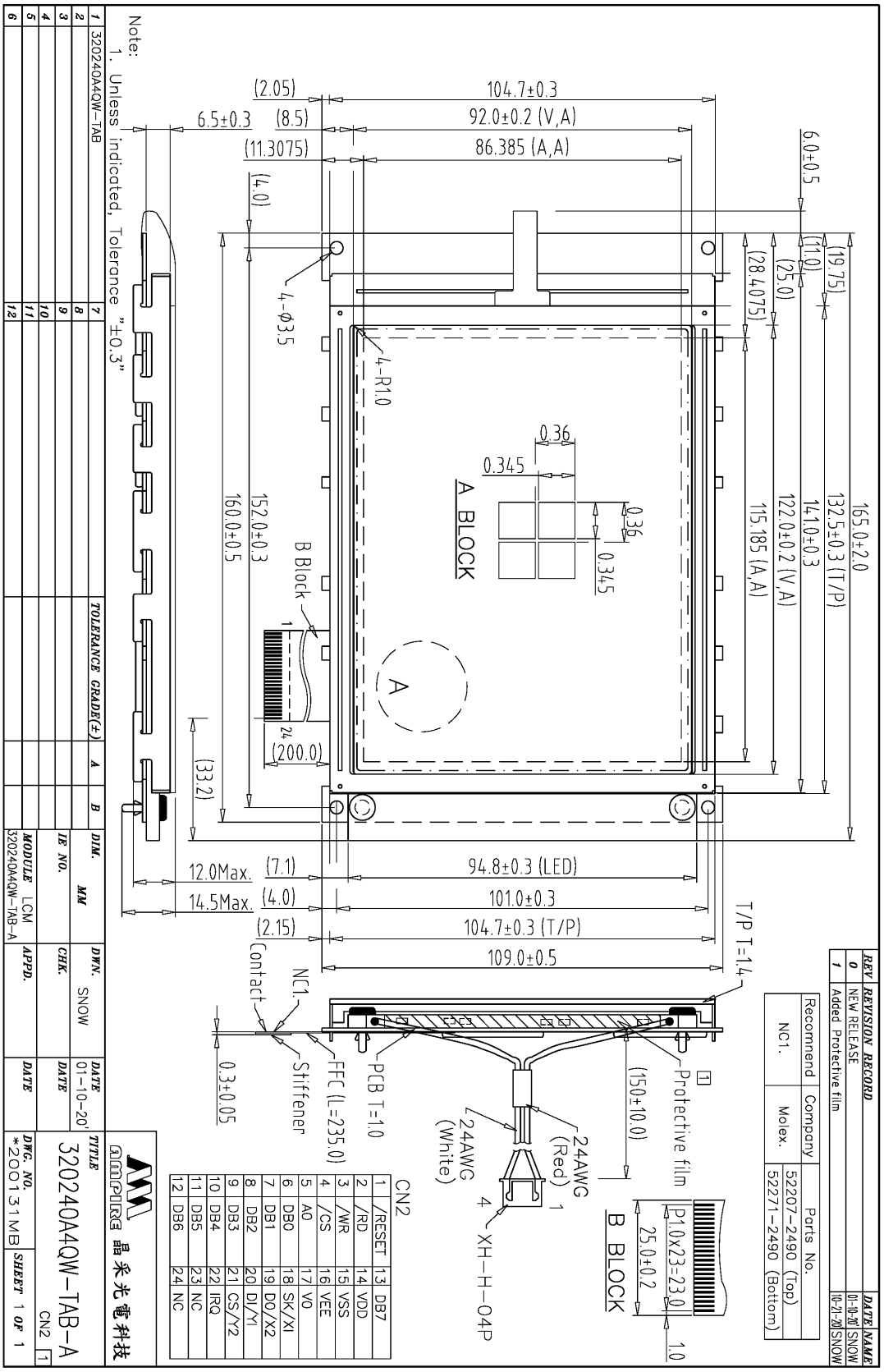
(8) When cleaning the module use a soft damp cloth with a mild solvent, such as Isopropyl or Ethyl alcohol. The use of water, ketone or aromatic is not permitted.

(9) Prior to initial power up input signals should not be applied.

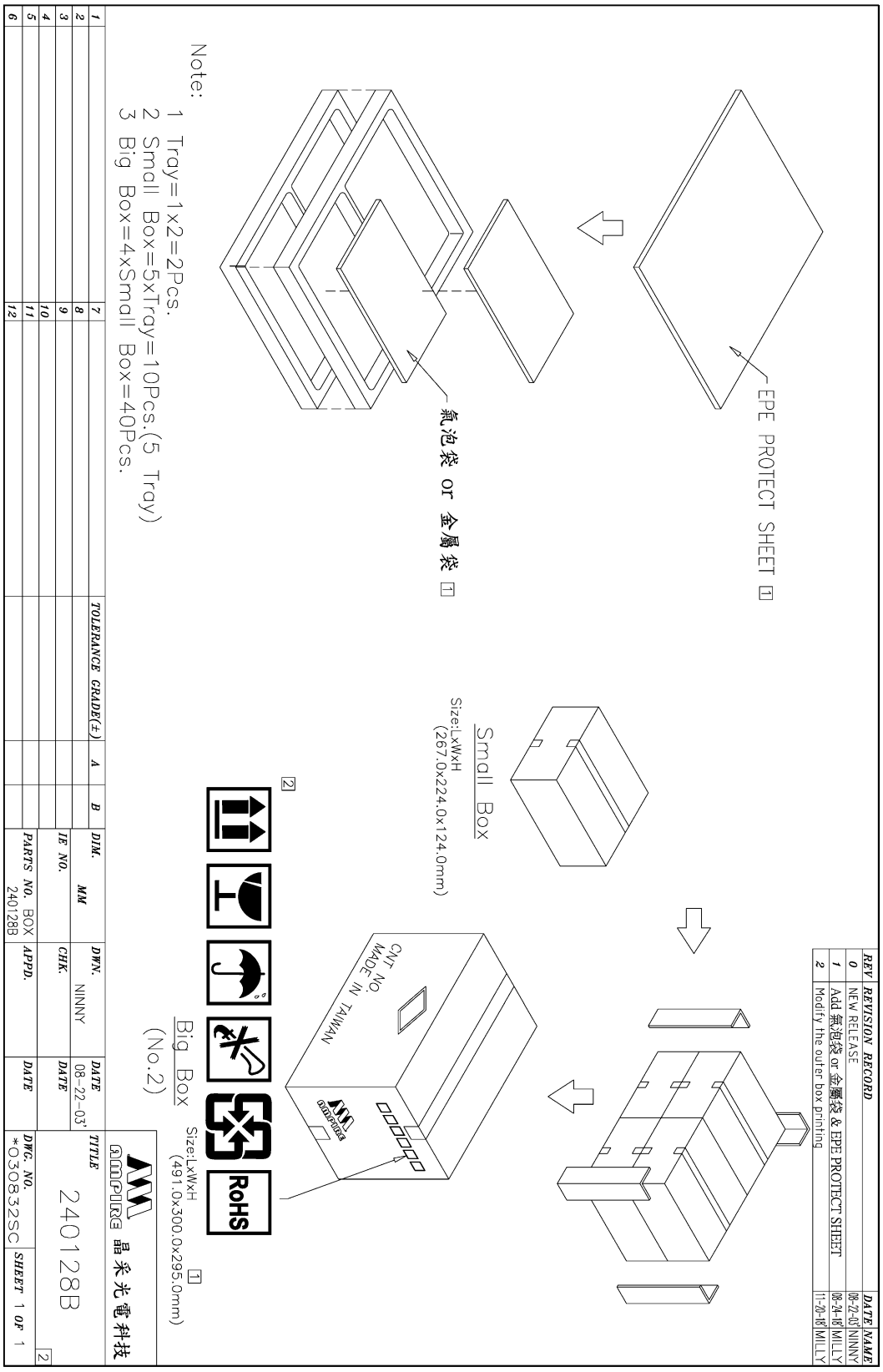
(10) Protect the module against static electricity and observe appropriate anti-static precautions.

(11) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

10 OUTLINE DIMENSION



11 Package


REV. REVISION RECORD DATE NAME
0 NEW RELEASE 08-22-03 NINNY
1 Add 氣泡袋 or 金屬袋 & EPE PROTECT SHEET 08-24-18 MILLY
2 Modify the outer box printing 11-26-18 MILLY
EPE PROTECT SHEET 1
氣泡袋 or 金屬袋 1
Small Box
Size:LxWxH
(267.0x224.0x124.0mm)
Big Box
(No.2)
Size:LxWxH
(491.0x300.0x295.0mm) 1
CNJ_
MADE IN
TAIWAN
RoHS
2
Note:
1 Tray=1x2=2Pcs.
2 Small Box=5xTray=10Pcs.(5 Tray)
3 Big Box=4xSmall Box=40Pcs.
TOLERANCE GRADE(±) A B
DIM. MM
IE NO.
PARTS NO. BOX 240128B
DWN. NINNY
CHK.
APPD.
DATE 08-22-03
DATE
DATE
TITLE
240128B
DWG. NO. *030832SC
SHEET 1 OF 1
2