

EXAMINED BY :  <i>Kevin Kuo</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10440
APPROVED BY:  <i>[Signature]</i>		ISSUE : OCT.07,2005
		TOTAL PAGE : 10
		VERSION : 1

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :  
  
32F51(LED TYPES)  
 (RoHS)  
  
 FOR MESSRS :  
  
 \_\_\_\_\_

CUSTOMER'S APPROVAL

DATE :  
\_\_\_\_\_

BY :  
\_\_\_\_\_

**EMERGING DISPLAY  
TECHNOLOGIES CORPORATION**

MODEL NO . 32F51(LED TYPES) (RoHS)	VERSION 1	PAGE 0-1
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<b>RECORDS OF REVISION</b>	DOC . FIRST ISSUE	OCT.07,2005
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DATE	REVISED PAGE NO.	SUMMARY

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	TIMING CHARACTERISTICS -----	4, 5
6.	OPTICAL CHARACTERISTICS -----	6
7.	OUTLINE DIMENSIONS -----	7
8.	BLOCK DIAGRAM -----	8
9.	DETAIL DRAWING OF DOT MATRIX -----	9
10.	INTERFACE SIGNALS -----	9
11.	POWER SUPPLY -----	10

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L

E W 32 F 51 F L Y

LCD type + LCD color	Code Value
STN + Yellow-Green	Y
STN + Gray	G
FSTN + White	F

Backlight	Code value
Yellow-Green	Y

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 B

1.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

1.3 MATERIAL SAFETY DESCRIPTION

ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS, INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING LEAD, MERCURY, CADMIUM, HEXAVALENT CHROMIUM, POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED DIPHENYL ETHERS (PBDE)

2. MECHANICAL SPECIFICATIONS

- |   |       |  |
|---|-------|--|
| (1) NUMBER OF DOTS                                | ----- | 320W * 240H DOTS   |
| (2) MODULE SIZE                                   | ----- | 134.5W * 117.0H * 14.5D(max.)mm<br>(NOT INCLUDED CONNECTOR LENGTH) |
| (3) EFFECTIVE AREA                                | ----- | 103.0W * 79.0H mm  |
| (4) ACTIVE AREA                                   | ----- | 95.98W * 71.98H mm   |
| (5) DOT SIZE                                      | ----- | 0.28W * 0.28H mm   |
| (6) DOT PITCH                                     | ----- | 0.3W * 0.3H mm   |
| (7) LCD TYPE *                                    |       |  |
| (8) DRIVING METHOD                                | ----- | 1 / 240 DUTY MULTIPLEX DRIVE                                       |
| (9) VIEWING DIRECTION                             | ----- | 6 O'CLOCK  |
| (10) BACKLIGHT                                    | ----- | LED , COLOR : YELLOW-GREEN   |
| (11) TEMPERATURE COMPENSATION CIRCUIT IS BUILT IN |       |  |

\* PLEASE REFER TO NUMBERING SYSTEM .

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD - VSS	0	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VDD - VEE	0	3.5	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
LED POWER VOLTAGE	VLED	—	2.7	V	
LED FORWARD CURRENT	IF	—	80	mA	

NOTE (1) : TEST METHOD AND CONDITIONS :  
AFTER CHARGING UP 200 pF CAPACITOR BY STATED VOLTAGE ,  
THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE  
MODULE .

#### 3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

I T E M	OPERATING		STORAGE		REMARK
	MIN .	MAX .	MIN .	MAX .	
AMBIENT TEMPERATURE	-20 °C	70 °C	-30 °C	80 °C	NOTE (1) , (3)
HUMIDITY	NOTE (2)		NOTE (2)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s <sup>2</sup> (0.25 G)	—	11.76 m/s <sup>2</sup> (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr . EACH
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490.0 m/s <sup>2</sup> (50 G)	1 Mseconds XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (2) : Ta ≤ 60°C , 90%RH MAX.(96hr MAX.)

Ta > 60°C ABSOLUTE HUMIDITY MUST BE

LOWER THAN THE HUMIDITY OF 90%RH AT 60°C.(96hr MAX.)

NOTE (3) : Ta AT -30°C : WILL BE < 48hr

80°C : WILL BE < 168hr

EMERGING DISPLAY  
 TECHNOLOGIES CORPORATION

 MODEL NO.  
 32F51(LED TYPES) (RoHS)

 VERSION  
 1

 PAGE  
 3

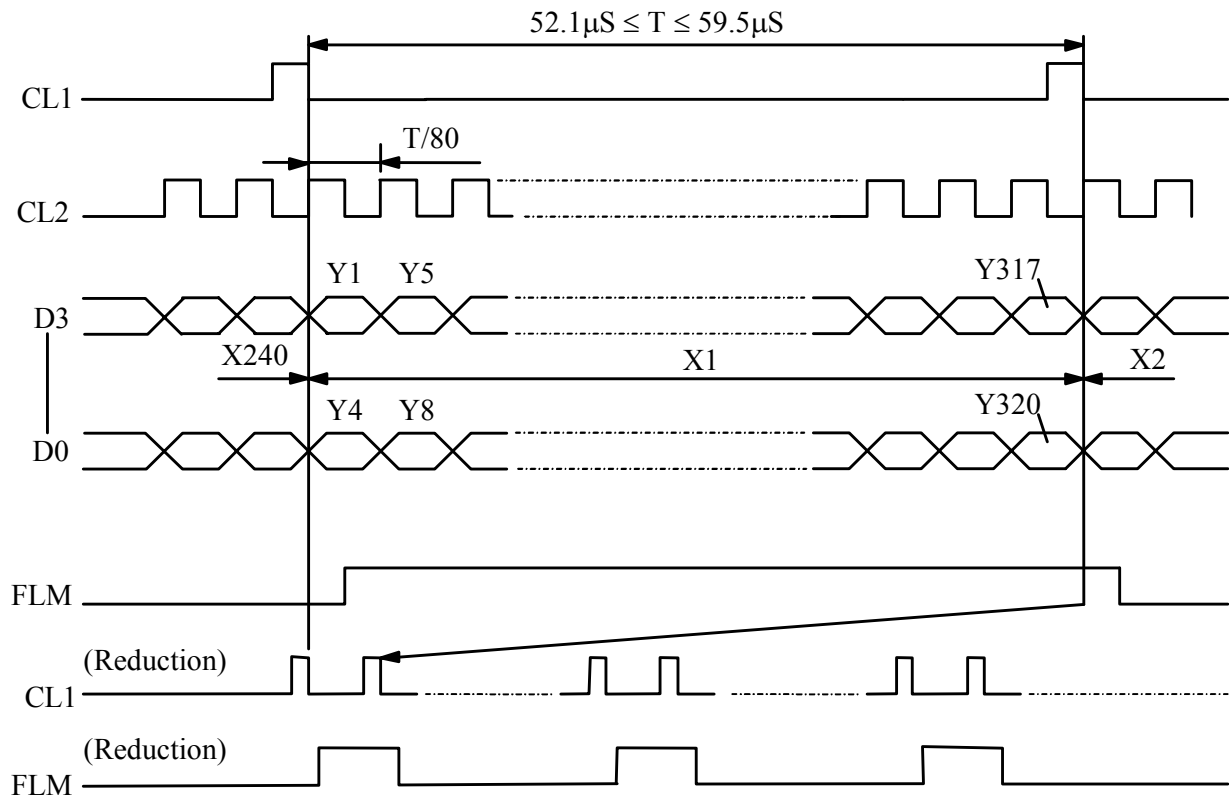
## 4. ELECTRICAL CHARACTERISTICS

 $T_a = 25\text{ }^\circ\text{C}$ 
 $V_{DD} = 5.0\text{ V}$ 

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	$V_{DD} - V_{SS}$	—	4.5	5.0	5.5	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	$V_{EE} - V_{SS}$	—	-26.5	-27.0	-27.5	V
INPUT VOLTAGE NOTE (1)	$V_{IH}$	H LEVEL	$0.8 \cdot V_{DD}$	—	—	V
	$V_{IL}$	L LEVEL	—	—	$0.2 \cdot V_{DD}$	V
POWER SUPPLY CURRENT FOR LOGIC	$I_{DD}$	$V_{DD} - V_{SS} = 5.0\text{ V}$ $V_{DD} - V_0 = 14.0\text{ V}$	—	4	8	mA
POWER SUPPLY CURRENT FOR LCD DRIVE	$I_{EE}$	$V_{DD} - V_{SS} = 5.0\text{ V}$ $V_{DD} - V_0 = 14.0\text{ V}$	—	5	10	mA
RECOMMENDED LCD DRIVING VOLTAGE	$V_{DD} - V_0$ $\theta_y = 10^\circ$ $\theta_x = 0^\circ$	$T_a = 25\text{ }^\circ\text{C}$	12.5	14	15.5	V
FLM FREQUENCY	f FLM	—	70	75	80	Hz
POWER SUPPLY FOR LED	VLED	—	21	24	27	V
	ILED	VLED = 24V	—	40	50	mA

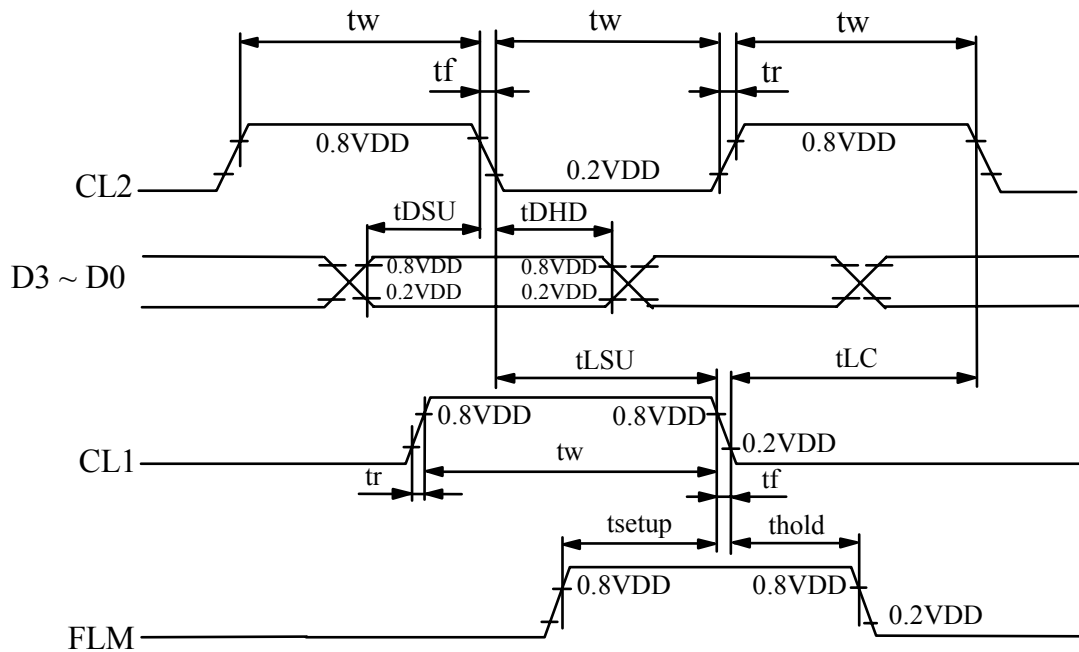
NOTE (1): APPLIED TO TERMINALS M FLM, CL1, CL2, D0 ~ D3.

5. TIMING CHARACTERISTICS  
5.1 INTERFACE TIMING



### 5.2 SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Frequency of maximum clock	fcp	—	—	8	MHz
CL1, CL2, pulse width	tw	45	—	—	ns
Rise, fall time	tr,tf	—	—	15	ns
Data setup time	tDSU	20	—	—	ns
Data hold time	tDHD	20	—	—	ns
CL1 setup time	tLSU	80	—	—	ns
CL1 → CL2 time	tLC	80	—	—	ns
FLM setup time	tsetup	100	—	—	ns
FLM hold time	thold	100	—	—	ns



EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.  
32F51(LED TYPES) (RoHS)

VERSION  
1

PAGE  
6

6. OPTICAL CHARACTERISTICS

		Ta = 25 °C		VDD = 5.0 V			VDD-V0 = 14.0V			
I T E M		SYMBOL		CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE		$\theta_{y-}$		K *	$\theta_{x}=0^{\circ}$	(26)	(31)	—	deg.	1
		$\theta_{y+}$				(29)	(34)	—		
		$\theta_{x-}$		K *	$\theta_{y}=0^{\circ}$	(19)	(24)	—		
		$\theta_{x+}$				(32)	(37)	—		
CONTRAST RATIO	STN	K		$\theta_{y}=10^{\circ}$		3	5	—	—	1
	FSTN			$\theta_{x}=0^{\circ}$		4	6	—	—	1
RESPONSE TIME		tr ( rise )	$\theta_{y}=10^{\circ}$ $\theta_{x}=0^{\circ}$	Ta = - 20 °C		—	9580	12454	ms	1
				Ta = 25 °C		—	280	364		
				Ta = 70 °C		—	105	137		
		tf ( fall )		Ta = - 20 °C		—	5410	7033		
				Ta = 25 °C		—	190	247		
				Ta = 70 °C		—	80	104		
BRIGHTNESS OF MODULE		L		—		1.8	2.3	—	cd / m <sup>2</sup>	2

K\* =STN : K≥1.5 ,FSTN : K≥2.0

NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU – 002B)

NOTE (2) : POLARIZER MODE : TRANSFLECTIVE

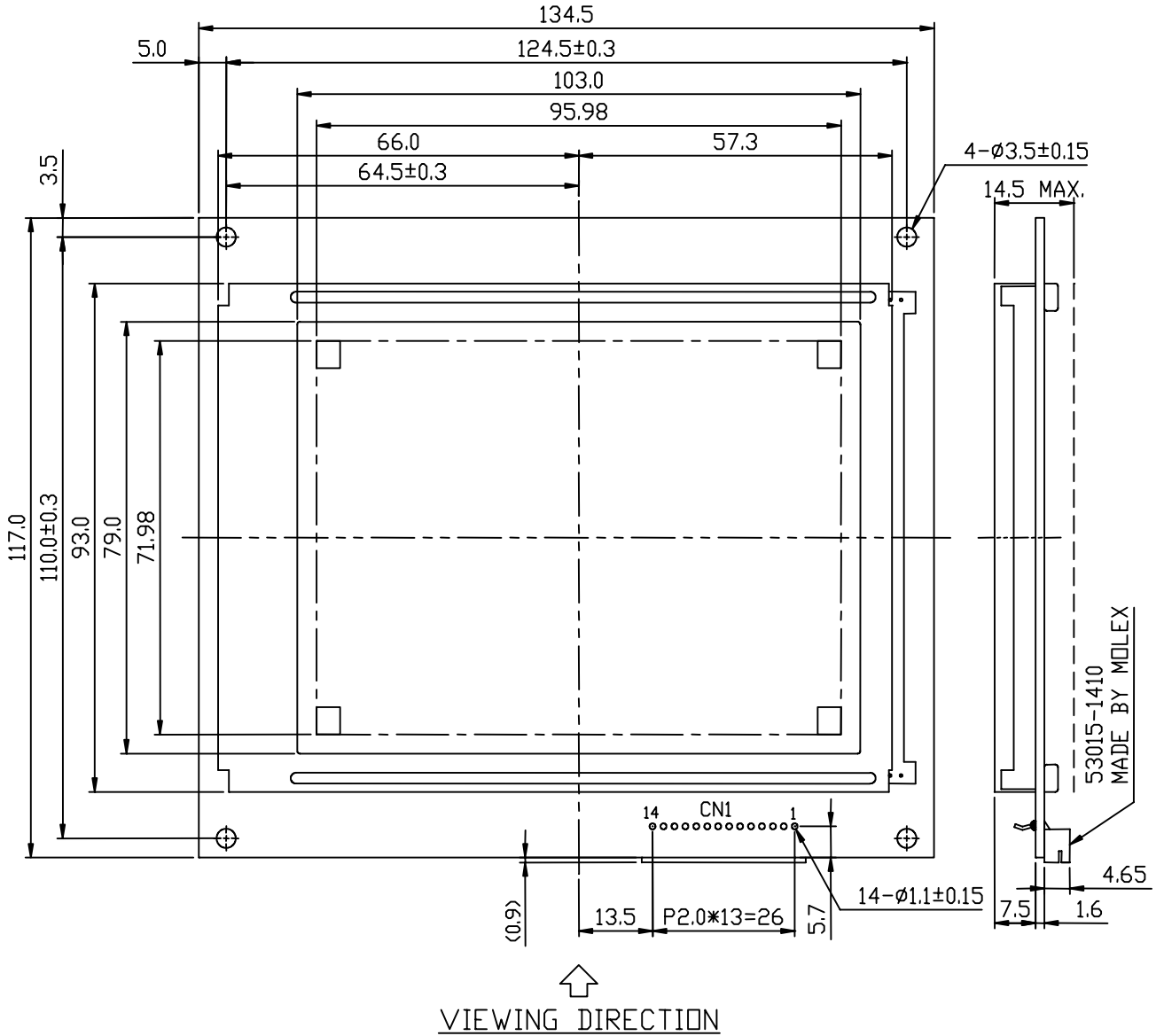
EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO.  
32F51(LED TYPES) (RoHS)

VERSION  
1

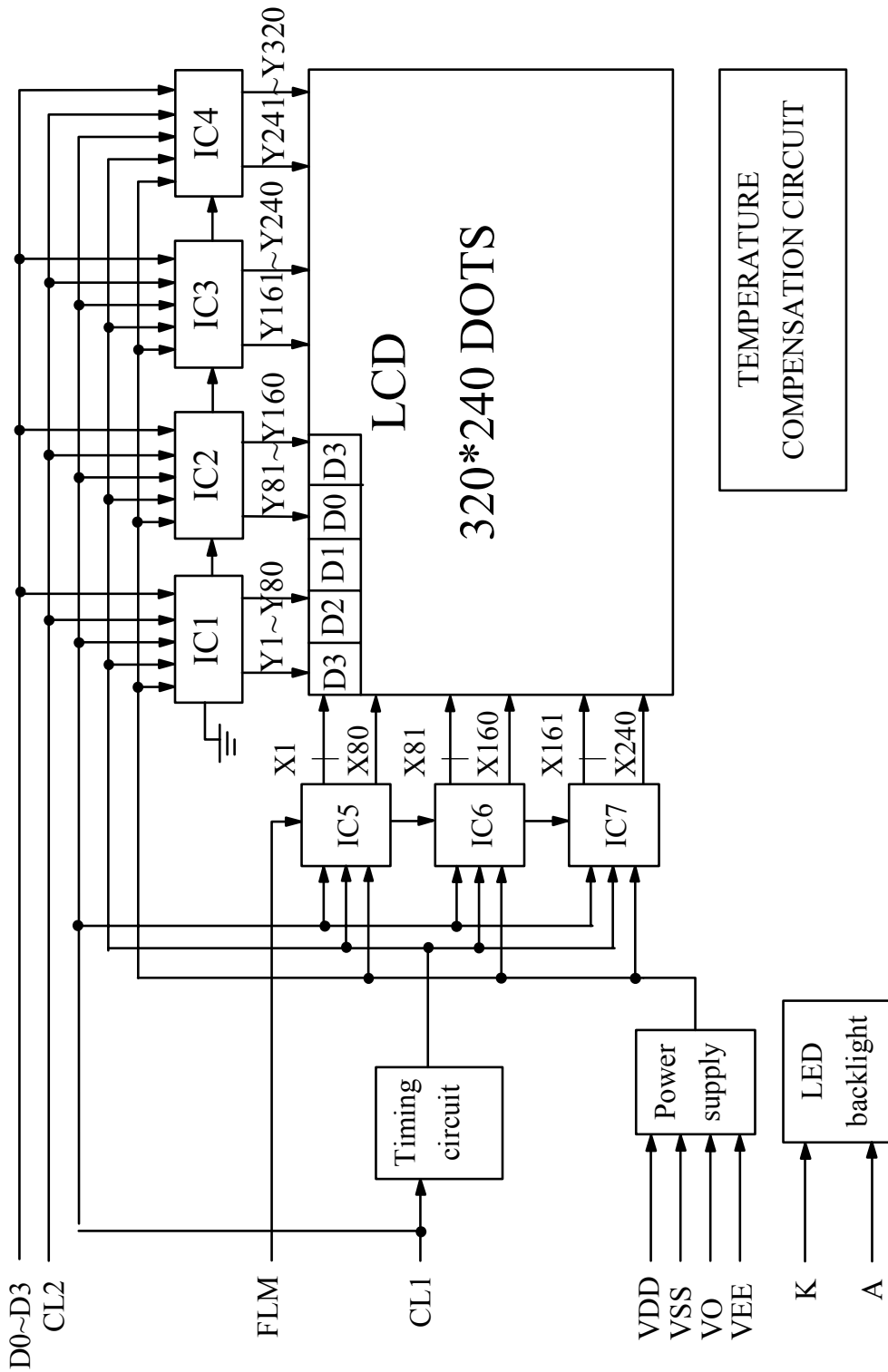
PAGE  
7

7. OUTLINE DIMENSIONS

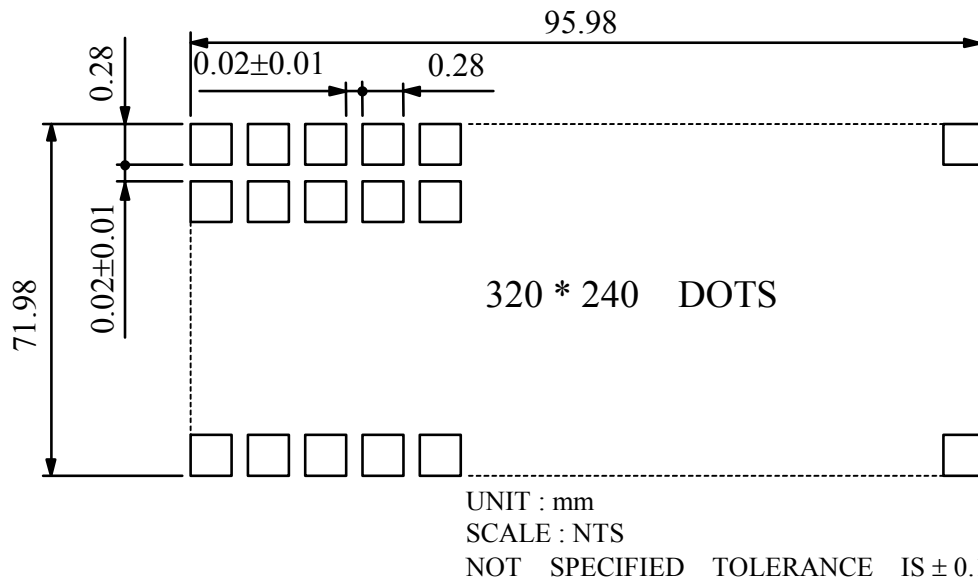


UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ± 0.5

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX

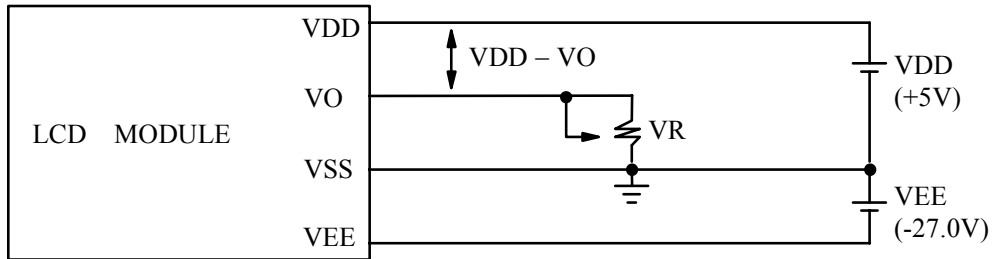


10. INTERFACE SIGNALS

PIN NO	SYMBOL	LEVEL	FUNCTION
1	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
2	VEE	—	POWER SUPPLY FOR LCD DRIVING ( -27V )
3	D3	H / L	DISPLAY DATA
4	D2	H / L	
5	D1	H / L	
6	D0	H / L	
7	VSS	—	GROUND
8	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
9	CL2	H → L	DISPLAY DATA SHIFT
10	CL1	H → L	DISPLAY DATA LATCH
11	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
12	K	—	POWER SUPPLY FOR LED BACKLIGHT ( GND )
13	A	—	POWER SUPPLY FOR LED BACKLIGHT ( +24V )
14	NC	—	NO CONNECTION

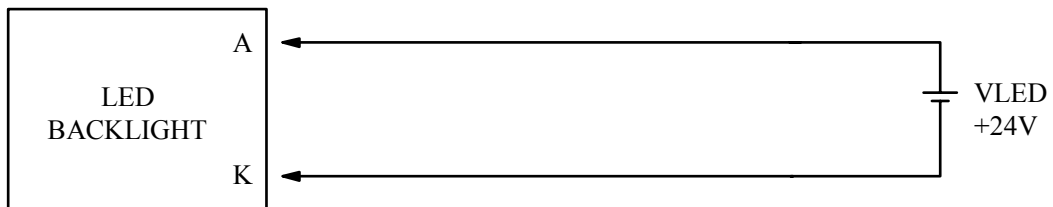
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD - VO : LCD DRIVING VOLTAGE  
VR : 30KΩ ~ 50KΩ

1 1 . 2 POWER SUPPLY FOR LED BACK - LIGHT



1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

