

EXAMINED BY:  <i>Jony Chen</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10094
APPROVED BY:  <i>David Chang</i>		ISSUE : FEB.16 ,2000
		TOTAL PAGE : 10
		VERSION : 3

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :

32F00(CCFL TYPES)

FOR MESSRS :

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CUSTOMER'S APPROVAL

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

EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO . 32F00(CCFL TYPES)	VERSION 3
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RECORDS OF REVISION	DOC . FIRST ISSUE APR,10,1998
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DATE	REVISED PAGE NO.	SUMMARY
AUG.31,1998	2	3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS. ① REVISING THE MAX.VALUE OF "POWER SUPPLY FOR LOGIC" : 6.0V max. → 7.0V max. ② REVISING THE MAX.VALUE OF "POWER SUPPLY FOR LCD DRIVING": 27.0V max. → 32.0V max.
	3	4. ELECTRICAL CHARACTERISTICS. REVISING THE ITEM OF "POWER SUPPLY VOLTAGE FOR LCD DRIVE" : ① VEE - VSS → VDD - VEE ② MIN. TYP. MAX.      MIN. TYP. MAX. -21.5 -22.0 -22.5 → 2.7 — 30.0
	10	11.1 POWER SUPPLY FOR LCM. REVISING THE NUMBER OF VEE : -22.0V → -23.0V
FEB,16,2000	1,2,3,6,9	THE ENTIRE PAGES REVISED.

NUMBERING SYSTEM

Polarizer Mode*	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C

Backlight Color	Code Value
White	W

E	W	32	F	00	B	C	W
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LCD type + LCD color	Code Value
STN + Gray	G
STN + Blue	B
FSTN + White	F
FSTN + Black	N

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 1 A

1.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- |                    |       |                              |
|--------------------|-------|------------------------------|
| (1) NUMBER OF DOTS | ----- | 320W * 240H DOTS             |
| (2) MODULE SIZE    | ----- | 139.0W * 120.0H * 13.2D mm   |
| (3) EFFECTIVE AREA | ----- | 103.0W * 79.0H mm            |
| (4) ACTIVE AREA    | ----- | 95.97W * 71.97H mm           |
| (5) DOT SIZE       | ----- | 0.27W * 0.27H mm             |
| (6) DOT PITCH      | ----- | 0.30W * 0.30 mm              |
| (7) LCD TYPE *     |       |                              |
| (8) DRIVING METHOD | ----- | 1 / 240 DUTY MULTIPLEX DRIVE |
| (9) BACKLIGHT      | ----- | CCFL                         |

\* 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	32.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)

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	-10 °C	60 °C	-20 °C	70 °C	NOTE (2) , (3)
HUMIDITY	—	85 % RH	—	85 % RH	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)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -20°C : 48HR MAX .  
70°C : 168HR MAX .

NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT  
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .

NOTE (4) : CCFL BACKLIGHT IS NOT AVAILABLE TO FUNCTION BELOW 0°C

4 . ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

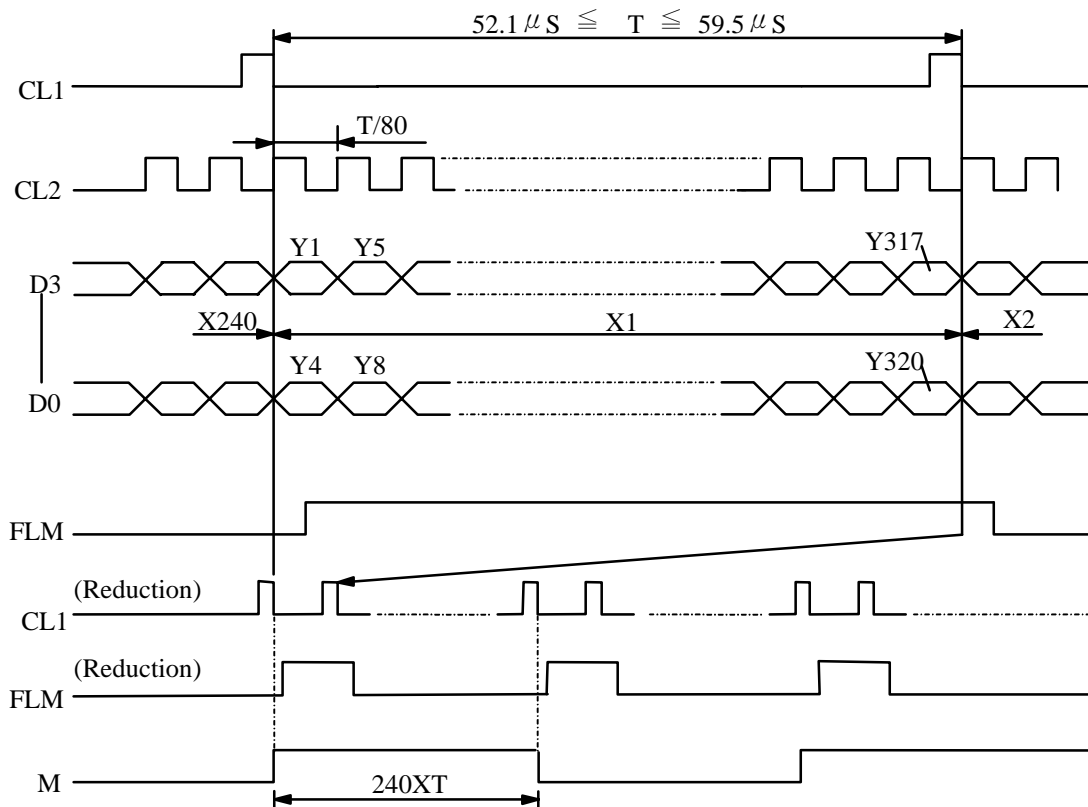
PARAMETER	SYMBOL	CONDITION	MIN .	TYP.	MAX .	UNIT	
POWER SUPPLY VOLTAGE FOR LOGIC	VDD - VSS	—	4.75	5.0	5.25	V	
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VDD - VEE	—	27	—	30.0	V	
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8*VDD	—	—	V	
	VIL	L LEVEL	—	—	0.2*VDD	V	
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD-VSS = 5.0 V VDD-VO = (23.5)V	—	6.0	—	mA	
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD-VSS = 5.0 V VDD-VO = (23.5)V	—	5.0	—	mA	
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD-VO ∅ = 10° θ = 0° DUTY = 1/240	Ta = -10 °C	—	26.6	—	V	
		Ta = 25 °C	—	23.5	—	V	
		Ta = 60 °C	—	18.4	—	V	
CLOCK OSCILLATION FREQUENCY	f FLM	—	70	75	80	HZ	
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	—	300	—	Vrms
	FREQUENCY	f CCFL	—	—	30K	—	HZ
	CURRENT	IL	—	—	5	—	mA
	LIFE TIME	L	IL = 5.0mA	15000	20000	—	Hrs

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

NOTE (2) : THE DISPLAY PATTERN IS ALL "ON" / "OFF" .

NOTE (3) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ± 1.0V BY EACH MODULE .

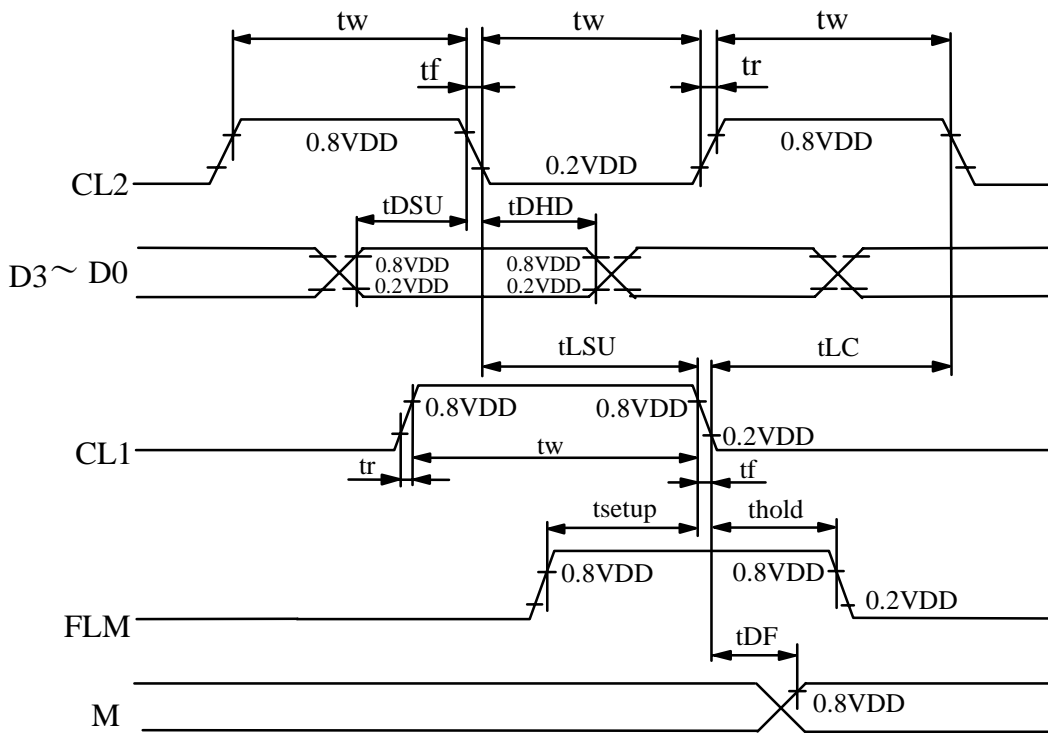
5. TIMING CHARACTERISTICS  
5.1 INTERFACE TIMING





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
M delay time	tDF	—	—	300	ns



6. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

I T E M		SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING AREA	STN	∅ 2 - ∅ 1	K ≥ 2.0	—	40	—	deg.	1
	FSTN			—	50	—	deg.	1
CONTRAST RATIO	STN	K	∅ = 10° θ = 0°	—	10	—	—	1
	FSTN			—	20	—	—	1
RESPONSE TIME	tr ( rise )	∅=10° θ = 0°	Ta = -10 °C	—	2149	—	ms	1
			Ta = 25 °C	—	228	—		
			Ta = 60 °C	—	124	—		
	tf ( fall )		Ta = -10 °C	—	1709	—		
			Ta = 25 °C	—	191	—		
			Ta = 60 °C	—	96	—		
BRIGHTNESS OF BACKLIGHT	B	—	120	—	—	cd / m <sup>2</sup>	2, 3	
			680	—	—		2, 4	
RISE TIME OF BACKLIGHT	TC	—	—	5	—	MINUTE		
BRIGHTNESS UNIFORMITY	—	—	—	—	—	20	%	5, 6

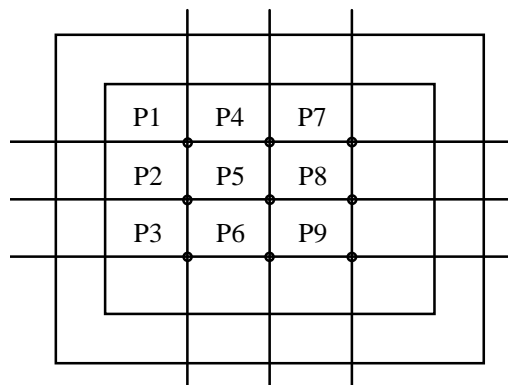
NOTE (1) : PLEASE REFER TO :  
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 001A)

NOTE (2) : MEASUREMENT AFTER 10 MINUTES OF CCFL OPERATING.

NOTE (3) : POLARIZER MODE : TRANSFLECTIVE

NOTE (4) : POLARIZER MODE : TRANSMISSIVE

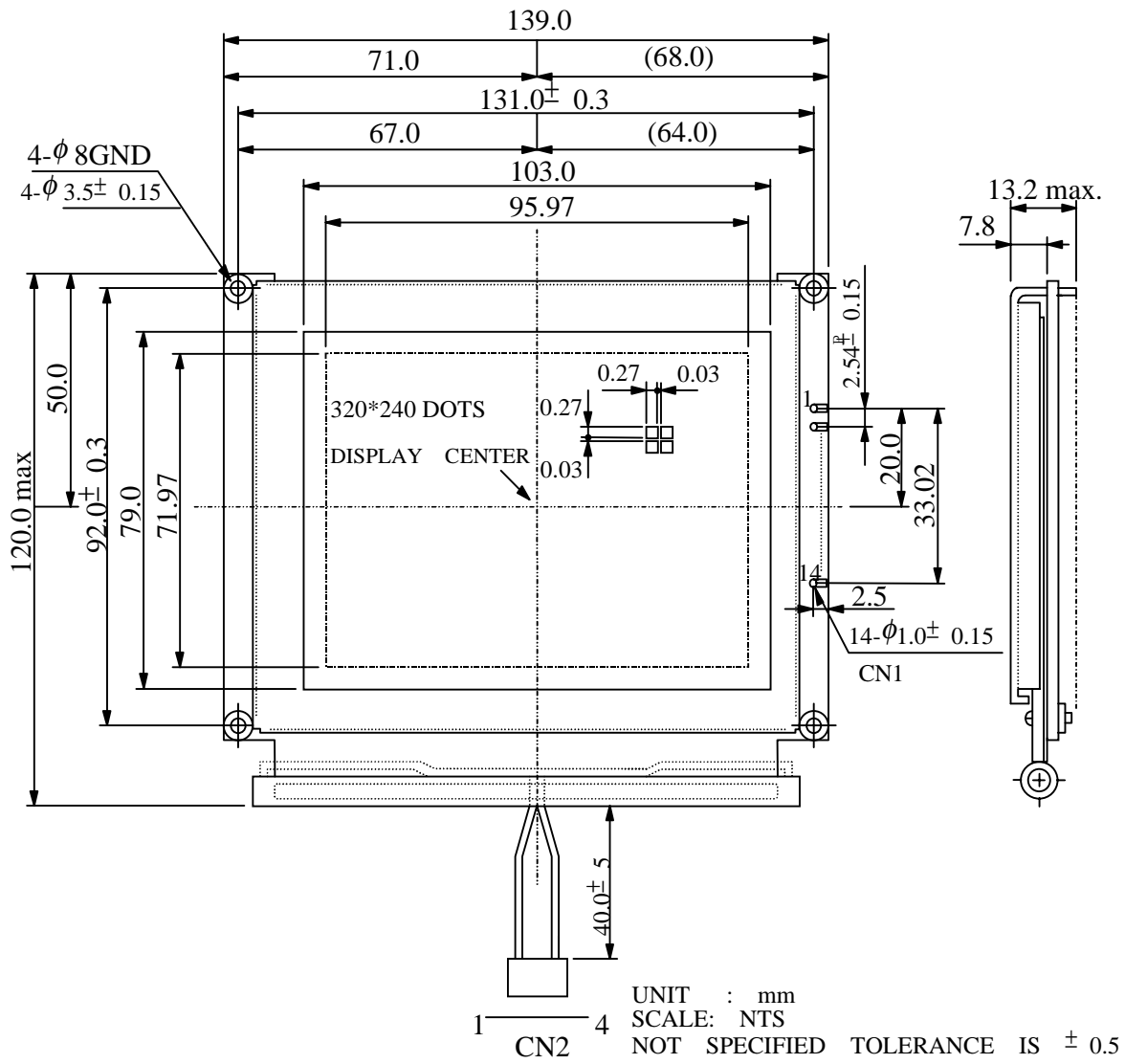
NOTE (5) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.  
DEFINITION OF THE BRIGHTNESS TOLERANCE .



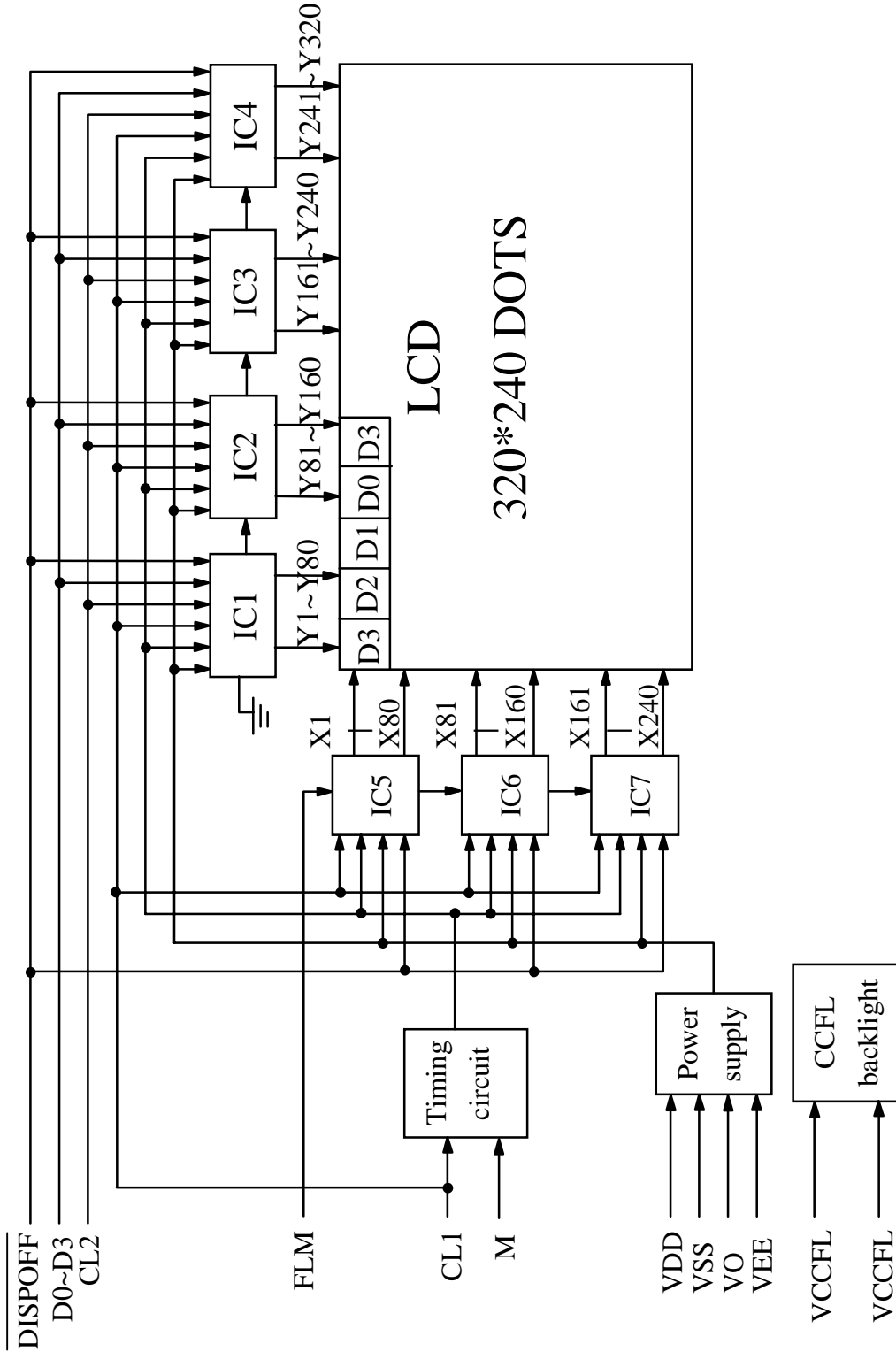
NOTE (6) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

$$\sum X = \left[ \frac{(\text{MAXIMUM BRIGHTNESS OR MINIMUM BRIGHTNESS}) - \text{AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

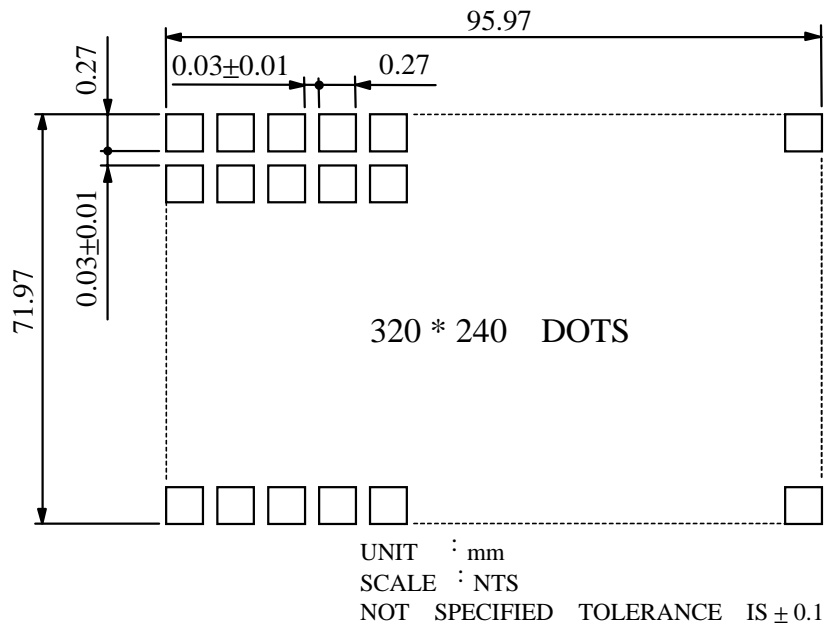
7. OUTLINE DIMENSION



8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



10. INTERFACE SIGNALS

IF1 :

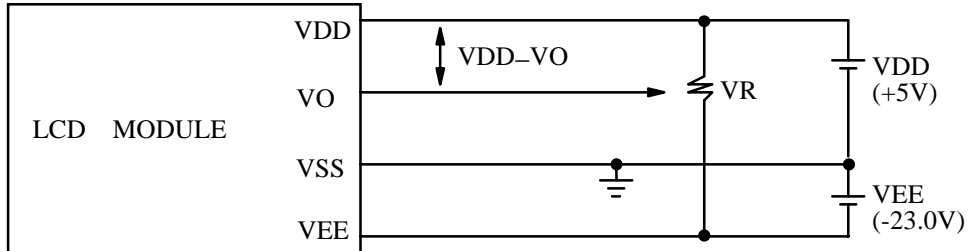
PIN NO	SYMBOL	LEVEL	FUNCTION
1	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
2	CL1	H → L	DISPLAY DATA LATCH
3	CL2	H → L	DISPLAY DATA SHIFT
4	M	H / L	CONTROL SIGNAL FOR AC DRIVING
5	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
6	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
7	VSS	—	GROUND
8	VEE	—	POWER SUPPLY FOR LCD DRIVING
9	D0	H / L	DISPLAY DATA
10	D1	H / L	
11	D2	H / L	
12	D3	H / L	
13	DISPOFF	H / L	H : DISPLAY ON , L : DISPLAY OFF
14	NC	—	NO CONNECTION

IF2 :

INTERFACE	PIN	SINGAL	VEVEL	FUNCTION
CCFL	1	VCCFL	—	POWER SUPPLY FOR CCFL DRIVING
	2~3	NC	—	NO CONNECTION
	4	VCCFL	—	POWER SUPPLY FOR CCFL DRIVING

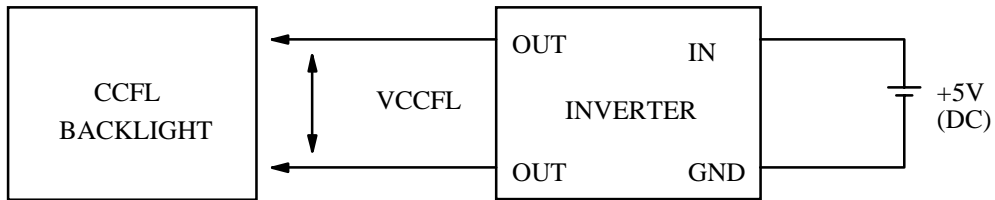
1.1. POWER SUPPLY

1.1.1 POWER SUPPLY FOR LCM



VDD-VO : LCD DRIVING VOLTAGE  
VR : 20KΩ

1.1.2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM02A

1.1.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

