

EXAMINED BY :  <i>[Signature]</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-10265
APPROVED BY:  <i>[Signature]</i>		ISSUE : DEC.01,2003
		TOTAL PAGE : 10
		VERSION : 4

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :

32F10(LED TYPES)

FOR MESSRS :

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CUSTOMER'S APPROVAL

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

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

RECORDS OF REVISION	DOC . FIRST ISSUE	SEP.21,2001
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DATE	REVISED PAGE NO.	SUMMARY																																																																		
APR.23,2003	6	<p>6. OPTICAL CHARACTERISTICS</p> <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN .</th> <th>TYP .</th> <th>MAX .</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">BRIGHTNESS OF BACKLIGHT</td> <td rowspan="2">B</td> <td rowspan="2">VLED - VLSS = 5.0 V</td> <td>(7)</td> <td>—</td> <td>—</td> <td rowspan="2">cd / m<sup>2</sup></td> <td>1, 2</td> </tr> <tr> <td>(5)</td> <td>—</td> <td>—</td> <td>1, 3</td> </tr> </tbody> </table> <p style="text-align: center;">↓</p> <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN .</th> <th>TYP .</th> <th>MAX .</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">BRIGHTNESS OF MODULE</td> <td rowspan="2">B</td> <td rowspan="2">VLED - VLSS = 5.0 V</td> <td>10</td> <td>13</td> <td>—</td> <td rowspan="2">cd / m<sup>2</sup></td> <td>1, 2</td> </tr> <tr> <td>6.5</td> <td>8.5</td> <td>—</td> <td>1, 3</td> </tr> </tbody> </table>	I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	NOTE	BRIGHTNESS OF BACKLIGHT	B	VLED - VLSS = 5.0 V	(7)	—	—	cd / m <sup>2</sup>	1, 2	(5)	—	—	1, 3	I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	NOTE	BRIGHTNESS OF MODULE	B	VLED - VLSS = 5.0 V	10	13	—	cd / m <sup>2</sup>	1, 2	6.5	8.5	—	1, 3																										
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NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

Backlight Color	Code Value
White	W

E	W	3	2	F	1	0	B	M	W	R
---	---	---	---	---	---	---	---	---	---	---

Viewing direction
NIL : 6 o'clock
R : 3 o'clock

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 :

EU - 002A

1.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- |                    |       |                                |
|--------------------|-------|--------------------------------|
| (1) NUMBER OF DOTS | ----- | 320W * 240H DOTS               |
| (2) MODULE SIZE    | ----- | 160W * 109.0H * 11.0D(max.) mm |
| (3) EFFECTIVE AREA | ----- | 120.0W * 90.0H mm              |
| (4) ACTIVE AREA    | ----- | 115.17W * 86.37H mm            |
| (5) DOT SIZE       | ----- | 0.33W * 0.33H mm               |
| (6) DOT PITCH      | ----- | 0.36W * 0.36H mm               |
| (7) LCD TYPE *     |       |                                |
| (8) DRIVING METHOD | ----- | 1 / 240 DUTY MULTIPLEX DRIVE   |
| (9) BACKLIGHT      | ----- | LED , WHITE                    |

\* PLEASE REFER TO NUMBERING SYSTEM .

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

Ta=25°C VSS=0V

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD - VSS	0	6.0	V	
POWER SUPPLY FOR LCD DRIVING	VDD - VEE	0	28.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
POWER SUPPLY FOR LED	VLED - VLSS	—	6	V	

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 (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 -30 °C : 48HR MAX .  
80 °C : 168HR MAX .

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

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	VEE - VSS	—	-21.5	-22.0	-22.5	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8*VDD	—	—	V
	VIL	L LEVEL	—	—	0.2*VDD	V
OUTPUT VOLTAGE NOTE (1)	VOH	H LEVEL	2.4	—	—	V
	VOL	L LEVEL	—	—	VSS+0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD - VSS = 5.0 V	—	3	5.0	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD - VO = 23.0 V	—	2.8	4.8	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD - VO ∅ = 10°, θ = ** DUTY = 1/240	Ta = -20 °C	25.4	26.4	27.4	V
		Ta = 25 °C	22	23	24	V
		Ta = 70 °C	19.7	20.7	21.7	V
CLOCK OSCILLATION FREQUENCY	f FLM	—	70	75	80	HZ
LED FORWARD VOLTAGE	VLED - VLSS	—	—	5.0	—	V
LED FORWARD VOLTAGE	IF	VLED-VLSS=5.0V	—	140	—	mA

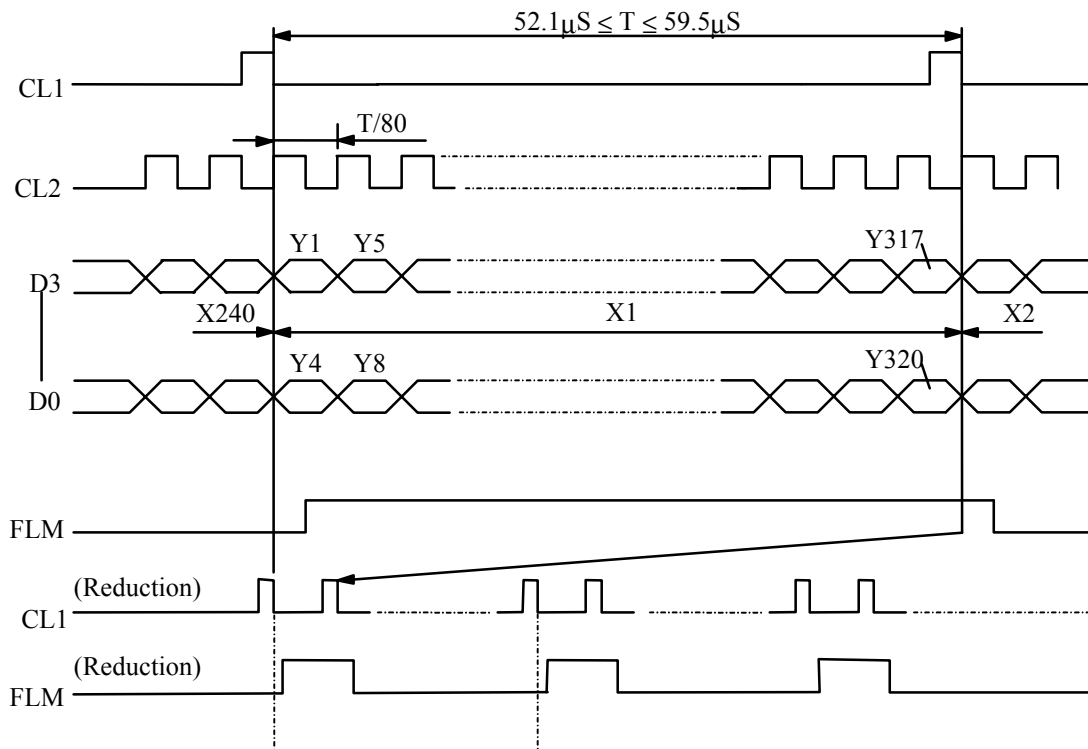
\*\* θ = 0° WHEN VIEWING DIRECTION IS 6 O'CLOCK

θ = 90° WHEN VIEWING DIRECTION IS 3 O'CLOCK

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

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

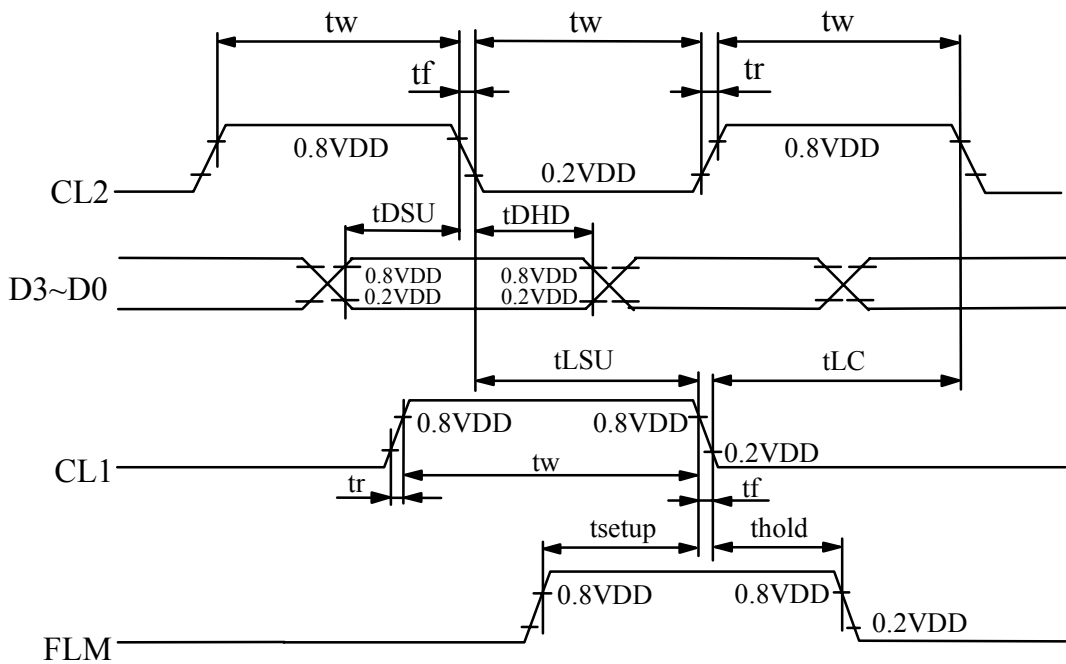
5. TIMING CHARACTERISTICS  
5.1 INTERFACE TIMING





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



6. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

I T E M		SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING ANGLE	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 = **	Ta = -20 °C	—	3816	—	ms	1
			Ta = 25 °C	—	310	—		
			Ta = 70 °C	—	96	—		
	tf ( fall )		Ta = -20 °C	—	2411	—		
			Ta = 25 °C	—	158	—		
			Ta = 70 °C	—	89	—		
BRIGHTNESS OF MODULE	L	VLED - VLSS = 5.0 V	10	13	—	cd / m <sup>2</sup>	1, 2	
			6.5	8.5	—		1, 3	
CHROMATICITY COORDINATES	X	IF = 140 mA	0.26	0.315	0.33	—	—	
	Y		0.29	0.305	0.32			

\*\* θ = 0 ° WHEN VIEWING DIRECTION IS 6 O'CLOCK .

θ = 90 ° WHEN VIEWING DIRECTION IS 3 O'CLOCK .

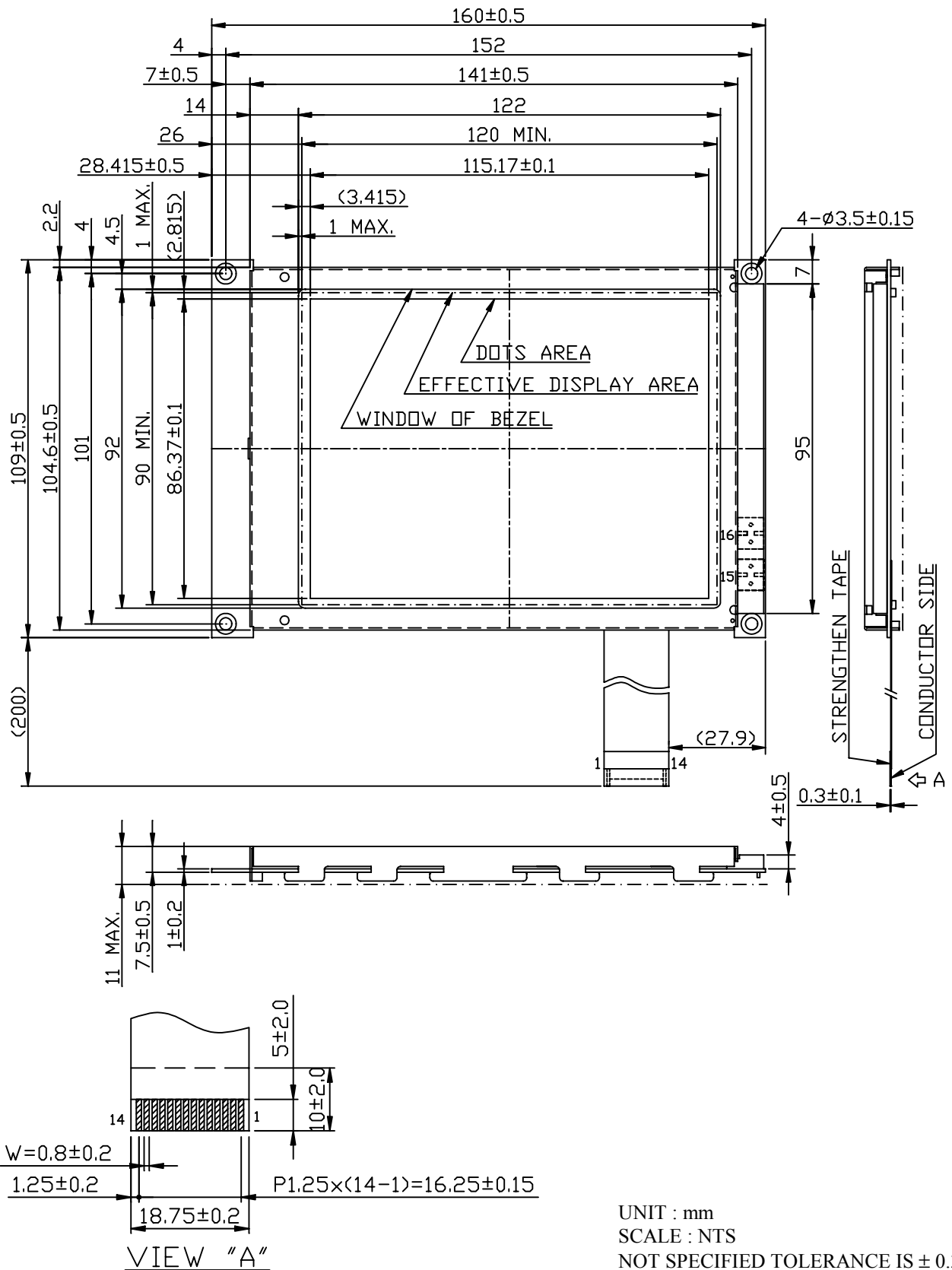
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 002A)

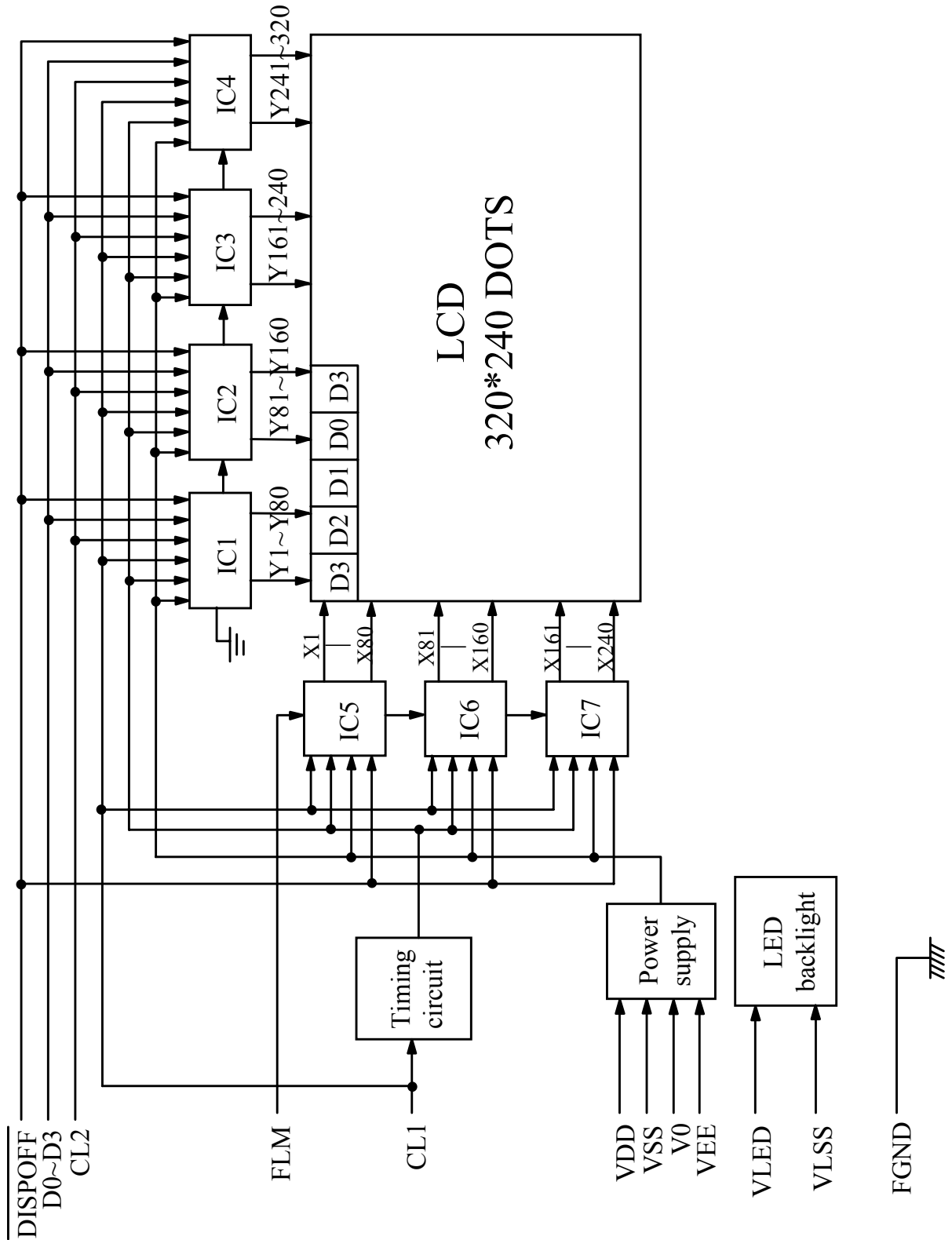
NOTE (2) : POLARIZER MODE : TRANSMISSIVE

NOTE (3) : POLARIZER MODE : TRANSFLECTIVE

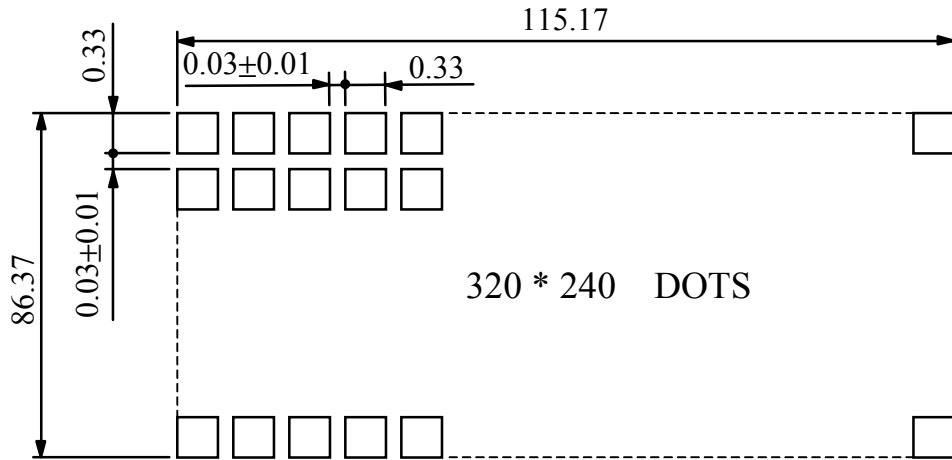
7. OUTLINE DIMENSIONS



8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ± 0.1

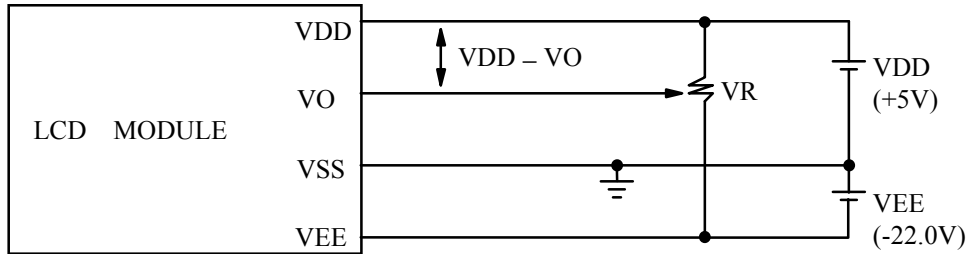
10. INTERFACE SIGNALS

IF1 :

PIN NO	SYMBOL	LEVEL	FUNCTION
1	D0	H / L	DISPLAY DATA
2	D1	H / L	
3	D2	H / L	
4	D3	H / L	
5	$\overline{\text{DISPOFF}}$	H / L	H : DISPLAY ON , L : DISPLAY OFF
6	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
7	NC	—	NO CONNECTION
8	CL1	H → L	DISPLAY DATA LATCH
9	CL2	H → L	DISPLAY DATA SHIFT
10	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
11	VSS	—	GROUND
12	VEE	—	POWER SUPPLY FOR LCD DRIVING
13	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
14	FGND	—	FRONT PANEL GROUND
15	VLED	—	POWER SUPPLY FOR LED BACKLIGHT ( A )
16	VLSS	—	POWER SUPPLY FOR LED BACKLIGHT ( K )

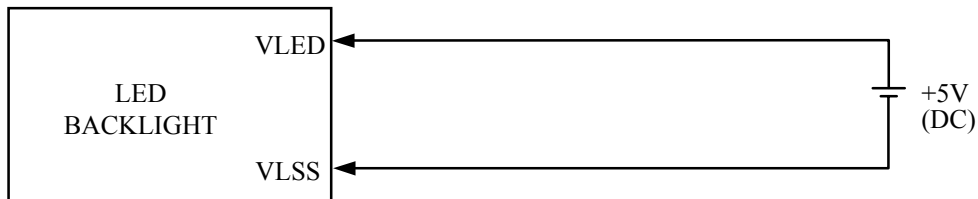
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD - VO : LCD DRIVING VOLTAGE  
VR: 20KΩ

1 1 . 2 POWER SUPPLY FOR LED BACK - LIGHT



1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

