

EXAMINED BY :  <i>[Signature]</i>	EMERGING DISPLAY  TECHNOLOGIES CORPORATION	FILE NO . CAS-50716
APPROVED BY:  <i>[Signature]</i>		ISSUE : NOV.13,2003
		TOTAL PAGE : 10
		VERSION : 7

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :

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FOR MESSRS :

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CUSTOMER'S APPROVAL

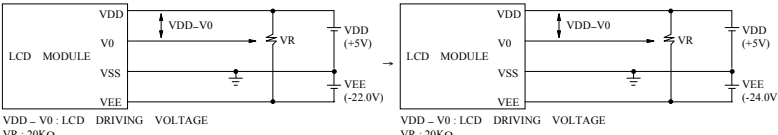
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RECORDS OF REVISION

DATE	REVISED PAGE NO.	SUMMARY																																																																																											
JUN.26,2003	2	<p>3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS</p> <table border="1"> <thead> <tr> <th>PARAMETER</th> <th>SYMBOL</th> <th>MIN.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY FOR LOGIC</td> <td>VDD - VSS</td> <td>0</td> <td>6.0</td> <td>V</td> <td></td> </tr> <tr> <td>POWER SUPPLY FOR LCD DRIVING</td> <td>VDD - VEE</td> <td>0</td> <td>27.0</td> <td>V</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">↓</p> <table border="1"> <thead> <tr> <th>PARAMETER</th> <th>SYMBOL</th> <th>MIN.</th> <th>MAX.</th> <th>UNIT</th> <th>REMARK</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY FOR LOGIC</td> <td>VDD - VSS</td> <td>0</td> <td>6.0</td> <td>V</td> <td></td> </tr> <tr> <td>POWER SUPPLY FOR LCD DRIVING</td> <td>VDD - VEE</td> <td>0</td> <td>30.0</td> <td>V</td> <td></td> </tr> </tbody> </table>	PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK	POWER SUPPLY FOR LOGIC	VDD - VSS	0	6.0	V		POWER SUPPLY FOR LCD DRIVING	VDD - VEE	0	27.0	V		PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK	POWER SUPPLY FOR LOGIC	VDD - VSS	0	6.0	V		POWER SUPPLY FOR LCD DRIVING	VDD - VEE	0	30.0	V																																																								
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	7	7. OUTLINE DIMENSION EFFECTIVE DISPALY AREA → EFFECTIVE DISPLAY AREA
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NOV.06,2003	3	4. ELECTRICAL CHARACTERISTICS <table border="1"> <thead> <tr> <th colspan="2">PARAMETER</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN .</th> <th>TYP .</th> <th>MAX .</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td rowspan="2">POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )</td> <td rowspan="2">IDD</td> <td rowspan="2">VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V</td> <td>—</td> <td>3.0</td> <td>4.5</td> <td>mA</td> </tr> <tr> <td>—</td> <td>3.0</td> <td>4.5</td> <td>mA</td> </tr> <tr> <td rowspan="2">POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )</td> <td rowspan="2">IEE</td> <td rowspan="2">VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V</td> <td>—</td> <td>2.8</td> <td>4.0</td> <td>mA</td> </tr> <tr> <td>—</td> <td>2.8</td> <td>4.0</td> <td>mA</td> </tr> <tr> <td rowspan="3">RECOMMENDED LCD DRIVING VOLTAGE</td> <td rowspan="3">NOTE( 3 )</td> <td rowspan="3">VDD - V0 ∅ = 10°, θ = 0° DUTY = 1/240</td> <td>Ta = 0 °C</td> <td>( 23 )</td> <td>( 23.5 )</td> <td>( 24 )</td> <td>V</td> </tr> <tr> <td>Ta = 25 °C</td> <td>22.0</td> <td>23.0</td> <td>24.0</td> <td>V</td> </tr> <tr> <td>Ta = 50 °C</td> <td>( 22 )</td> <td>( 22.5 )</td> <td>( 23 )</td> <td>V</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">PARAMETER</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN .</th> <th>TYP .</th> <th>MAX .</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td rowspan="2">POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )</td> <td rowspan="2">IDD</td> <td rowspan="2">VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V</td> <td>—</td> <td>10</td> <td>12</td> <td>mA</td> </tr> <tr> <td>—</td> <td>10</td> <td>12</td> <td>mA</td> </tr> <tr> <td rowspan="2">POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )</td> <td rowspan="2">IEE</td> <td rowspan="2">VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V</td> <td>—</td> <td>5</td> <td>7</td> <td>mA</td> </tr> <tr> <td>—</td> <td>5</td> <td>7</td> <td>mA</td> </tr> <tr> <td rowspan="3">RECOMMENDED LCD DRIVING VOLTAGE</td> <td rowspan="3">NOTE( 3 )</td> <td rowspan="3">VDD - V0 ∅ = 10°, θ = 0° DUTY = 1/240</td> <td>Ta = 0 °C</td> <td colspan="3">NOTE ( 3 )</td> <td>V</td> </tr> <tr> <td>Ta = 25 °C</td> <td colspan="3">NOTE ( 3 )</td> <td>V</td> </tr> <tr> <td>Ta = 50 °C</td> <td colspan="3">NOTE ( 3 )</td> <td>V</td> </tr> </tbody> </table> <p>CHANGE NOTE(3)</p>	PARAMETER		SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V	—	3.0	4.5	mA	—	3.0	4.5	mA	POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V	—	2.8	4.0	mA	—	2.8	4.0	mA	RECOMMENDED LCD DRIVING VOLTAGE	NOTE( 3 )	VDD - V0 ∅ = 10°, θ = 0° DUTY = 1/240	Ta = 0 °C	( 23 )	( 23.5 )	( 24 )	V	Ta = 25 °C	22.0	23.0	24.0	V	Ta = 50 °C	( 22 )	( 22.5 )	( 23 )	V	PARAMETER		SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V	—	10	12	mA	—	10	12	mA	POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD - VSS = 5 . 0 V VDD - VEE = 22 . 0 V	—	5	7	mA	—	5	7	mA	RECOMMENDED LCD DRIVING VOLTAGE	NOTE( 3 )	VDD - V0 ∅ = 10°, θ = 0° DUTY = 1/240	Ta = 0 °C	NOTE ( 3 )			V	Ta = 25 °C	NOTE ( 3 )			V	Ta = 50 °C	NOTE ( 3 )			V
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	6	6. OPTICAL CHARACTERISTICS ITEM : VIEWING AREA → VIEWING ANGLE
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	7	7. OUTLINE DIMENSIONS REVISED THE ENTIRE PAGE
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MODEL NO .	VERSION	PAGE
E W 5 0 3 6 7 N C W	7	0-3

RECORDS OF REVISION	DOC . FIRST ISSUE	JUN.19,2003
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DATE	REVISED PAGE NO.	SUMMARY																				
NOV.13,2003	9	10. INTERFACE SIGNALS <table border="1"> <thead> <tr> <th>PIN NO</th> <th>SYMBOL</th> <th>LEVEL</th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>VO</td> <td>—</td> <td>OPERATING GROUND</td> </tr> <tr> <td colspan="4" style="text-align: center;">↓</td> </tr> <tr> <th>PIN NO</th> <th>SYMBOL</th> <th>LEVEL</th> <th>FUNCTION</th> </tr> <tr> <td>1</td> <td>VO</td> <td>—</td> <td>CONTROL FOR LCD DRIVE VOLTAGE</td> </tr> </tbody> </table>	PIN NO	SYMBOL	LEVEL	FUNCTION	1	VO	—	OPERATING GROUND	↓				PIN NO	SYMBOL	LEVEL	FUNCTION	1	VO	—	CONTROL FOR LCD DRIVE VOLTAGE
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↓																						
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5.	TIMING CHARACTERISTICS -----	4, 5
6.	OPTICAL CHARACTERISTICS -----	6
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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF DOTS ----- 320W \* 240H DOTS
- (2) MODULE SIZE ----- 157.8W \* 121.6H \* 11.5D(max.) mm  
( EXCEPT FFC CABLE )
- (3) EFFECTIVE AREA ----- 121.0W \* 91.6H 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 ----- FSTN,NEGATIVE,BLACK/WHITE  
TRANSMISSIVE,GLARE POLARIZER
- (8) DRIVING METHOD ----- 1 / 240 DUTY MULTIPLEX DRIVE
- (9) BACKLIGHT ----- CCFL

### 3. ABSOLUTE MAXIMUM RATINGS

#### 3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS .

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD - VSS	0	6.0	V	
POWER SUPPLY FOR LCD DRIVING	VDD - VEE	0	30.0	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	0 °C	50 °C	-20 °C	70 °C	NOTE (2),(3),(4)
HUMIDITY	—	90 % RH	—	90 % RH	WITHOUT CONDENSATION NOTE (5)
VIBRATION	—	9.8 m/s <sup>2</sup> (1 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 .  
60 °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

NOTE (5) : WHEN TEMPERATURE RISES TO 40 DEGREE C , HUMIDITY WILL BE  
AT 90 PERCENT.

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC		VDD - VSS	—	4.5	5.0	5.5	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE		VEE - VSS	—	-23	-24	-25	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 VDD - VEE = 2.0 V	—	10	12	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)		IEE	VDD - VSS = 5.0 V VDD - VEE = 2.0 V	—	5	7	mA
RECOMMENDED LCD DRIVING VOLTAGE	NOTE(3)	VDD - V0 ∅ = 10°, θ = 0° DUTY = 1/240	Ta = 0 °C	NOTE (3)			V
			Ta = 25 °C				V
			Ta = 50 °C				V
CLOCK OSCILLATION FREQUENCY		f FLM	—	65	70	75	HZ
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	—	300	—	Vrms
	FREQUENCY	f CCFL	—	—	30K	—	HZ
	CURRENT	IL	—	—	5	—	mA
	LIFE TIME	L	IL = 5.0mA	25000	50000	—	Hrs

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

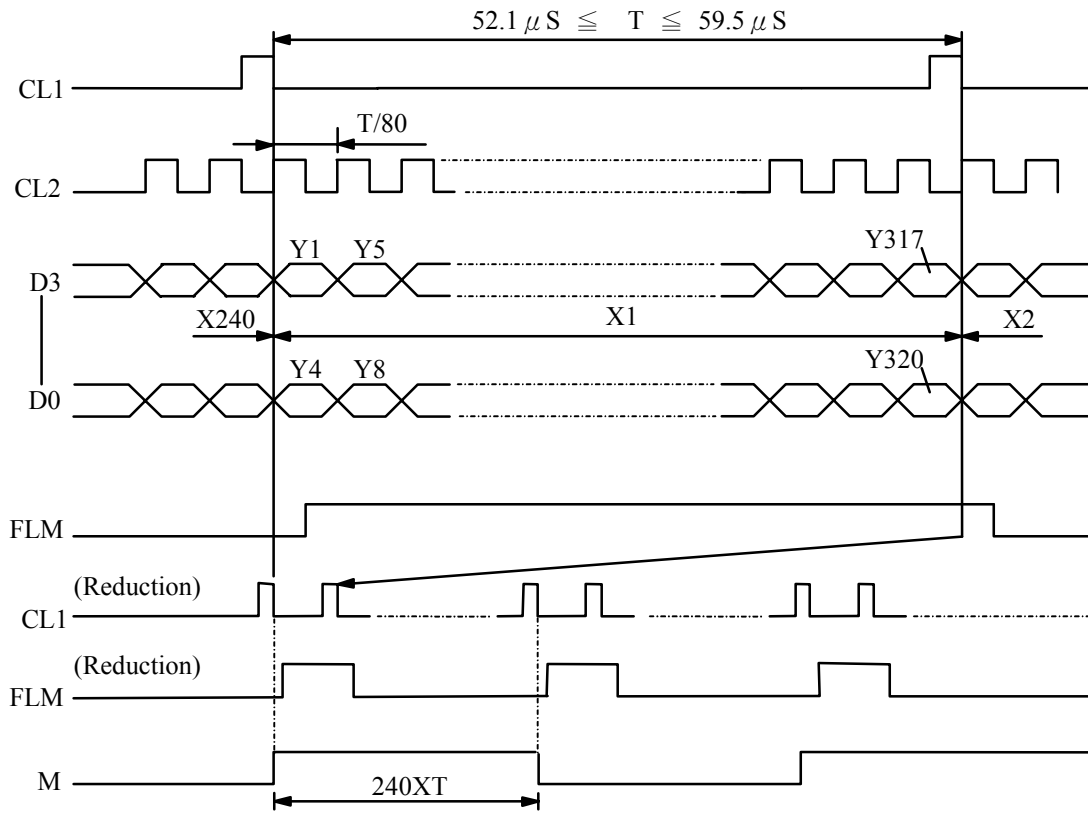
NOTE (2): THE DISPLAY PATTERN IS ALL "OFF"/"ON".

NOTE (3): TEMPERATURE COMPENSATION

J9	J10	TEMPERATURE	MIN.	TYP.	MAX.	UNIT
L	L	Ta = 0°C	24.0	24.5	25.0	V
		Ta = 25°C	22.8	23.3	23.8	V
		Ta = 50°C	22.1	22.6	23.1	V
L	H	Ta = 0°C	24.8	25.3	25.8	V
		Ta = 25°C	23.2	23.7	24.2	V
		Ta = 50°C	21.7	22.2	22.7	V
H	L	Ta = 0°C	23.6	24.1	24.6	V
		Ta = 25°C	23.1	23.6	24.1	V
		Ta = 50°C	22.6	23.1	23.6	V
H	H	Ta = 0°C	24.3	24.8	25.3	V
		Ta = 25°C	24.3	24.8	25.3	V
		Ta = 50°C	24.3	24.8	25.3	V

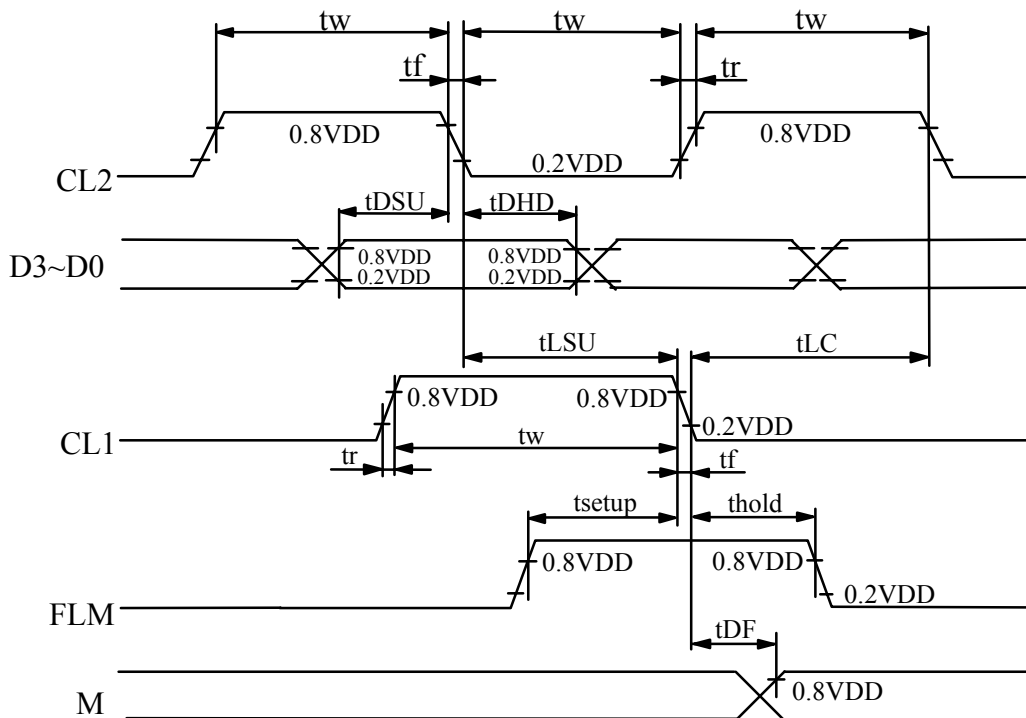


5. TIMING CHARACTERISTICS  
5.1 INTERFACE TIMING



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

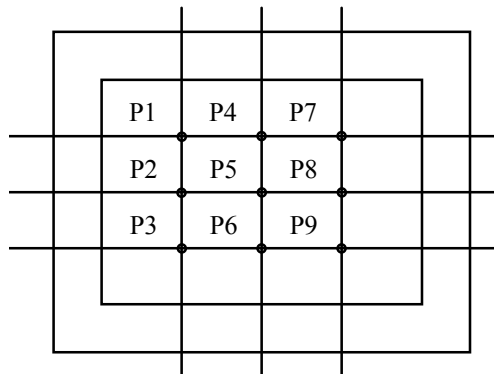


6. OPTICAL CHARACTERISTICS

Ta = 25 °C                      VDD = 5.0 V

I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE	
VIEWING ANGLE	∅2 -∅1	K ≥ 2.0	—	50	—	deg .	1	
CONTRAST RATIO	K	∅ = 10°, θ = 0°	—	20	—	—	1	
RESPONSE TIME	tr ( rise )	∅=10° θ = 0°	Ta = 0 °C	—	( 1500 )	—	ms	1
			Ta = 25 °C	—	228	—		
			Ta = 50 °C	—	( 200 )	—		
	tf ( fall )		Ta = 0 °C	—	( 800 )	—		
			Ta = 25 °C	—	191	—		
			Ta = 50 °C	—	( 200 )	—		
BRIGHTNESS OF MODULE	B	—	165	180	—	cd / m <sup>2</sup>	2	
BRIGHTNESS OF BACKLIGHT	B	—	1100	1200	—	cd / m <sup>2</sup>	2	
RISE TIME OF BACKLIGHT	TC	—	—	5	—	MINUTE		
BRIGHTNESS UNIFORMITY	—	—	—	—	20	%	3 , 4	

- NOTE (1) : PLEASE REFER TO :  
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 001A)
- NOTE (2) : POLARIZER MODE : TRANSMISSIVE
- NOTE (3) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.  
DEFINITION OF THE BRIGHTNESS TOLERANCE .

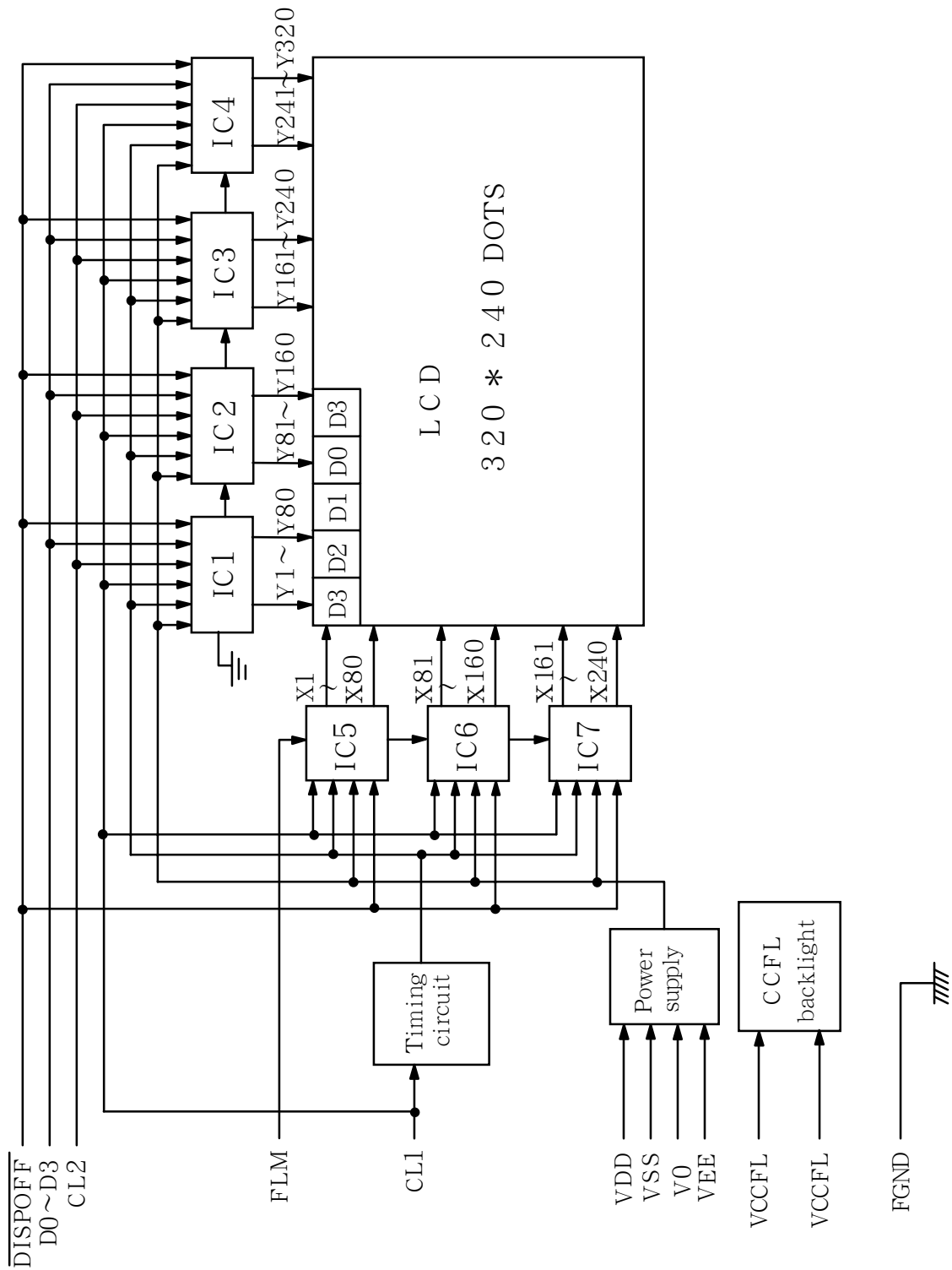


NOTE (4) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

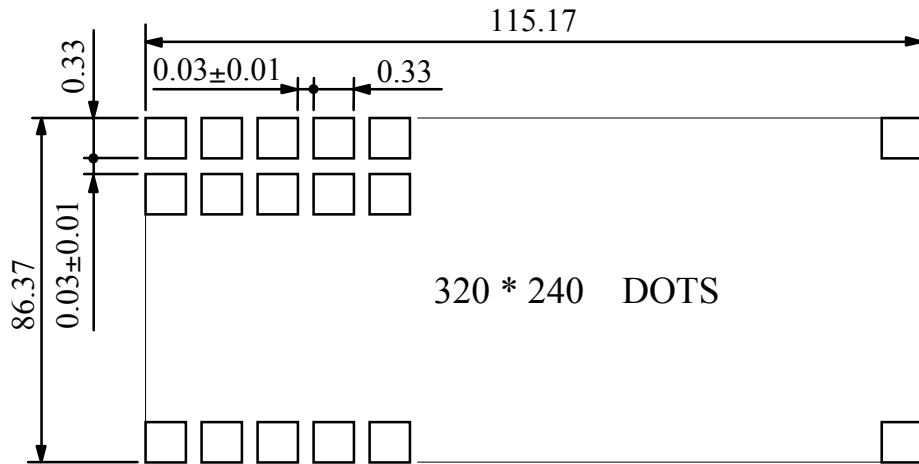
$$\sum X = \left[ \frac{(\text{MAXIMUN BRIGHTNESS OR MINIMUN BRIGHTESS}) - \text{AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$



8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

IF1 :

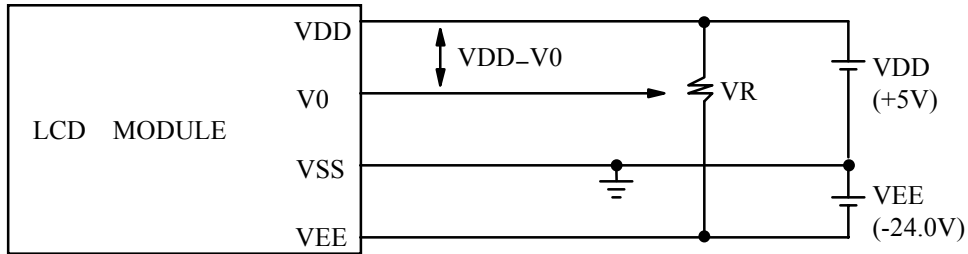
PIN NO	SYMBOL	LEVEL	FUNCTION
1	VO	—	CONTROL FOR LCD DRIVE VOLTAGE
2	VEE	—	POWER SUPPLY FOR LCD DRIVING
3	D3	H / L	DISPLAY DATA
4	D2	H / L	
5	D1	H / L	
6	D0	H / L	
7	NC	—	NO CONNECTION
8	VSS	—	GROUND
9	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
10	CL2	H → L	DISPLAY DATA SHIFT
11	CL1	H → L	DISPLAY DATA LATCH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

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

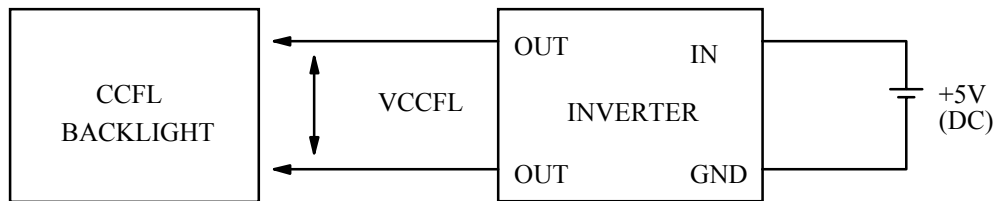
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD - V0 : LCD DRIVING VOLTAGE  
VR : 20K $\Omega$

1 1 . 2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM02A1

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

