EXAMINED BY :	EMERGING DISPLAY	FILE NO . CAS-50380
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APPROVED BY:	TECHNOLOGIES CORPORATION	TOTAL PAGE : 10
		VERSION : 1

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :

EW50164FDW

FOR MESSRS :

WESCOR

CUSTOMER'S APPROVAL

DATE :

_____

BY :

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EMERGING DISPLAY TECHNOLOGIES CORPORATION	MODEL NO. EW50164FDW	VERSION 1
RECORDS OF REVISION	DOC. FIRST ISSUE NOV.06,2001	

DATE	REVISED PAGE NO.	SUMMARY

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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	167.1W * 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	FSTN , POSITIVE , TRANSFLECTIVE
(8)	DRIVING METHOD	1 / 240 DUTY MULTIPLEX DRIVE
(9)	BACKLIGHT	CCFL , WHITE

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	27.0	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.

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20 °C	70 °C	-30 °C	80 °C	NOTE (2),(3),(4)
HUMIDITY	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s^2 (0.25 G)	—	11.76 m/s^2 (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m/s^2 (3 G)	—	490.0 m/s^2 (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.
NOTE (4) : CCFL BACKLIGHT IS NOT AVAILABLE TO FUNCTION BELOW 0°C

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C VDD = 5.0 V

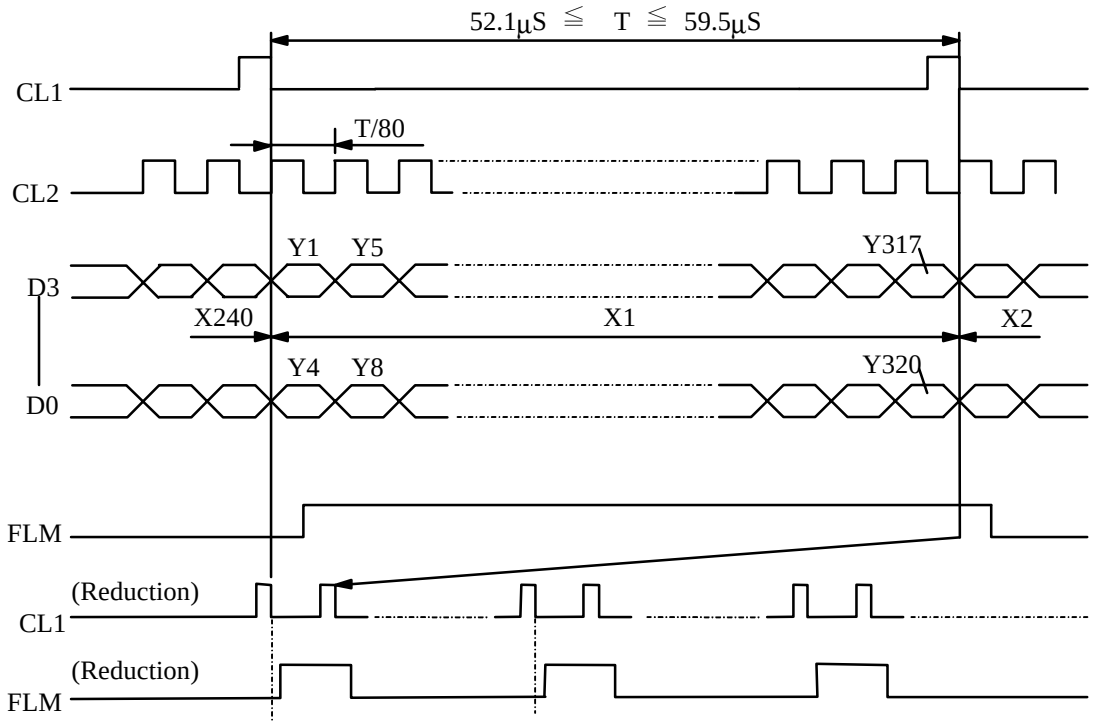
PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC		VDD – VSS	—	4.75	5.0	5.25	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE		VEE – VSS	—	-21.5	-22.0	-22.5	V
INPUT VOLTAGE NOTE (1)		VIH	H LEVEL	0.8*VDD	—	—	V
		VIL	L LEVEL	—	—	0.2*VDD	V
OUTPUT VOLTAGE NOTE (1)		VOH	H LEVEL	2.4	—	—	V
		VOL	L LEVEL	—	—	VSS+0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)		IDD	VDD – VSS = 5.0 V VDD – VO = 23.0 V	—	3.0	—	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)		IEE	VDD – VSS = 5.0 V VDD – VO = 23.0 V	—	2.8	—	mA
RECOMMENDED LCD DRIVING VOLTAGE		VDD – VO ∅ = 10°, θ = 0° DUTY =1/240	Ta =-20 °C	24.3	25.3	26.3	V
			Ta = 25 °C	22	23	24	V
			Ta = 70 °C	19.8	20.8	21.8	V
CLOCK OSCILLATION FREQUENCY		f FLM	—	70	75	80	Hz
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	—	300	—	Vrms
	FREQUENCY	f CCFL	—	—	35K	—	Hz
	CURRENT	IL	—	—	5	—	mArms
	LIFE TIME	L	IL = 5.0mA	45000	50000	—	Hrs

NOTE (1): APPLIED TO TERMINALS FLM, CL1, CL2, D0~D3, $\overline{\text{DISPOFF}}$.

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

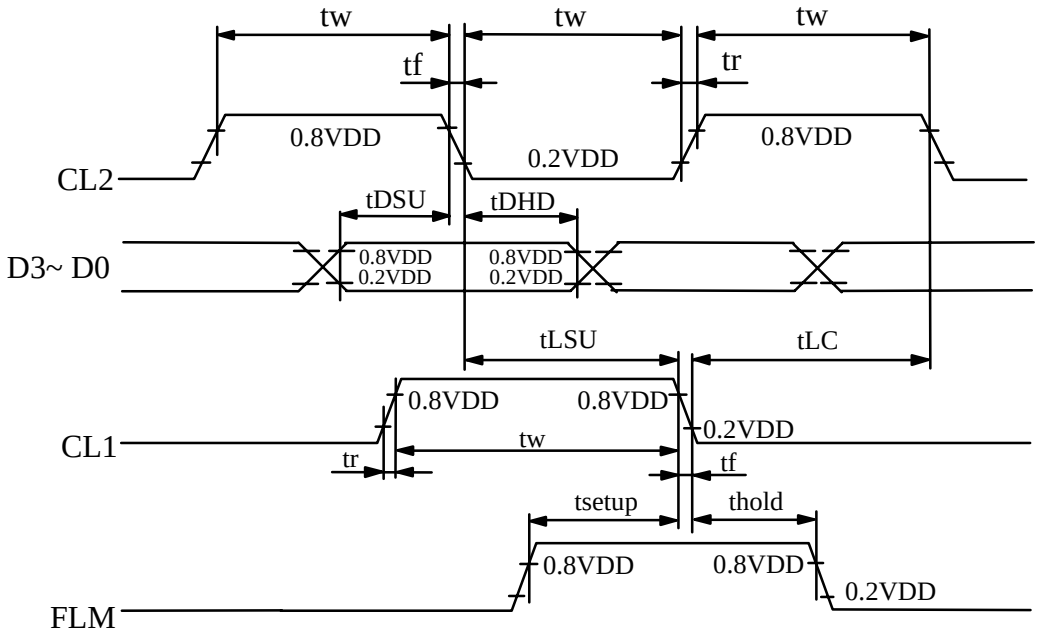
5. TIMING CHARACTERISTICS

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	t_{DSU}	20	—	—	ns
Data hold time	t_{DHD}	20	—	—	ns
CL1 setup time	t_{LSU}	80	—	—	ns
CL1 → CL2 time	t_{LC}	80	—	—	ns
FLM setup time	tsetup	100	—	—	ns
FLM hold time	thold	100	—	—	ns



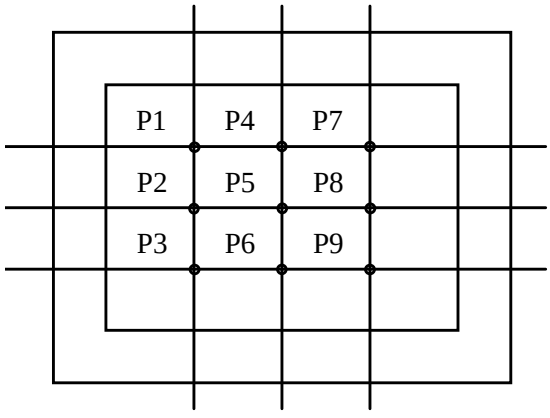
6. OPTICAL CHARACTERISTICS

Ta = 25 °C VDD = 5.0 V

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	∅2 – ∅1	K ≥ 2.0		—	40	—	deg.	1
CONTRAST RATIO	K	∅ = 10°		—	10	—	—	1
RESPONSE TIME	tr (rise)	∅=10° θ = 0°	Ta = -20 °C	—	7700	—	ms	1
			Ta = 25 °C	—	228	—		
			Ta = 70 °C	—	95	—		
	tf (fall)		Ta = -20 °C	—	4200	—		
			Ta = 25 °C	—	191	—		
			Ta = 70 °C	—	85	—		
BRIGHTNESS OF BACKLIGHT	B	—		400	—	—	cd / m²	
RISE TIME OF BACKLIGHT	TC	—		—	5	—	MINUTE	
BRIGHTNESS UNIFORMITY	—	—		—	—	20	%	2 , 3

NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU–002A)

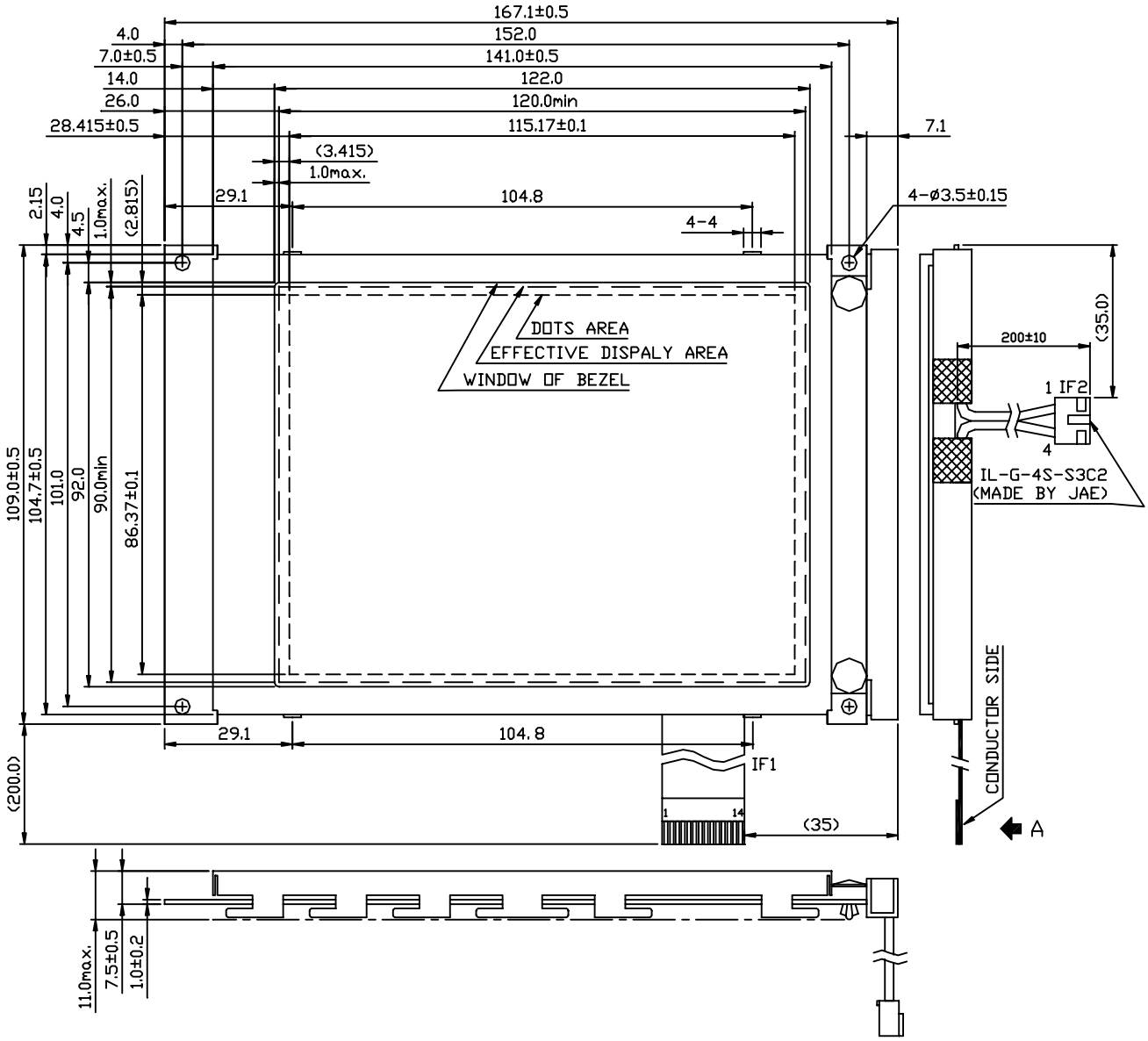
NOTE (2) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE .

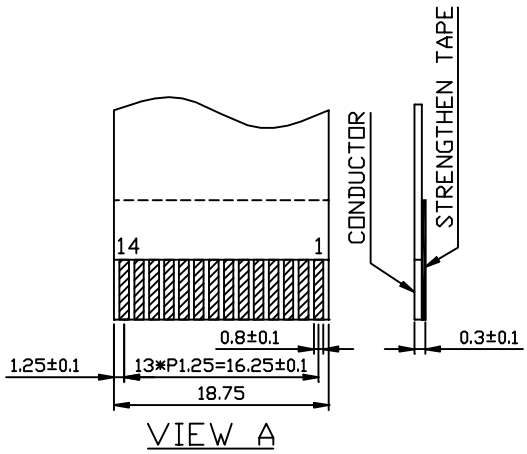


NOTE (3) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

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

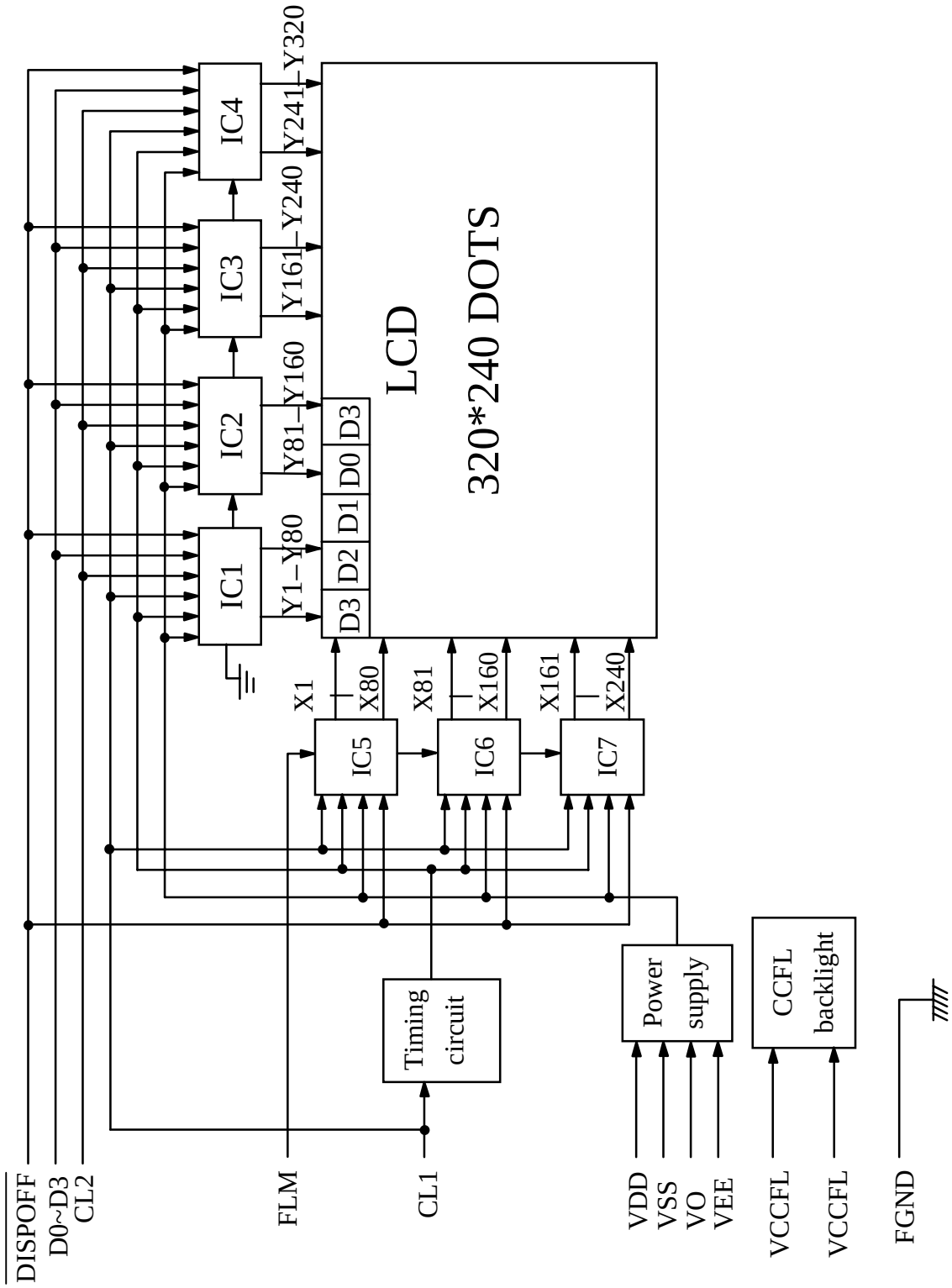
7. OUTLINE DIMENSION



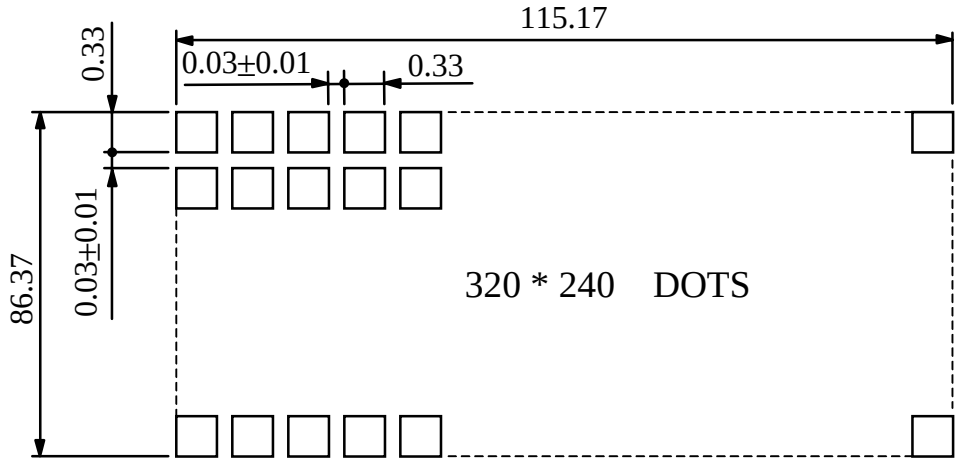


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.3

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

IF1：

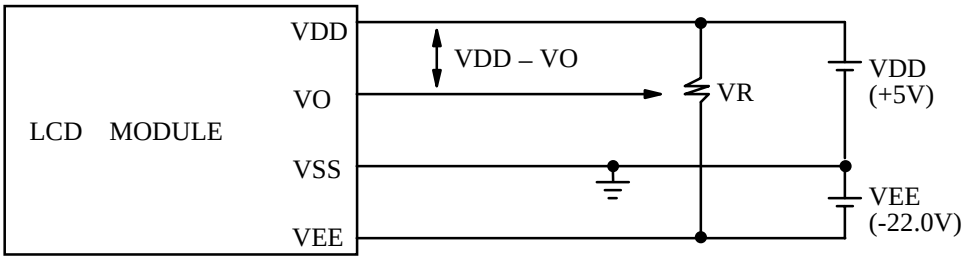
PIN NO	SYMBOL	LEVEL	FUNCTION
1	D0	H / L	DISPLAY DATA
2	D1	H / L	
3	D2	H / L	
4	D3	H / L	
5	$\overline{\text{DISPOFF}}$	H / L	H：DISPLAY ON , L：DISPLAY OFF
6	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
7	NC	—	NO CONNECTION
8	CL1	H → L	DISPLAY DATA LATCH
9	CL2	H → L	DISPLAY DATA 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

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

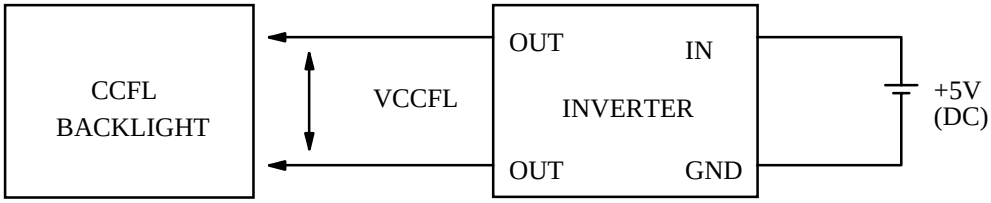
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



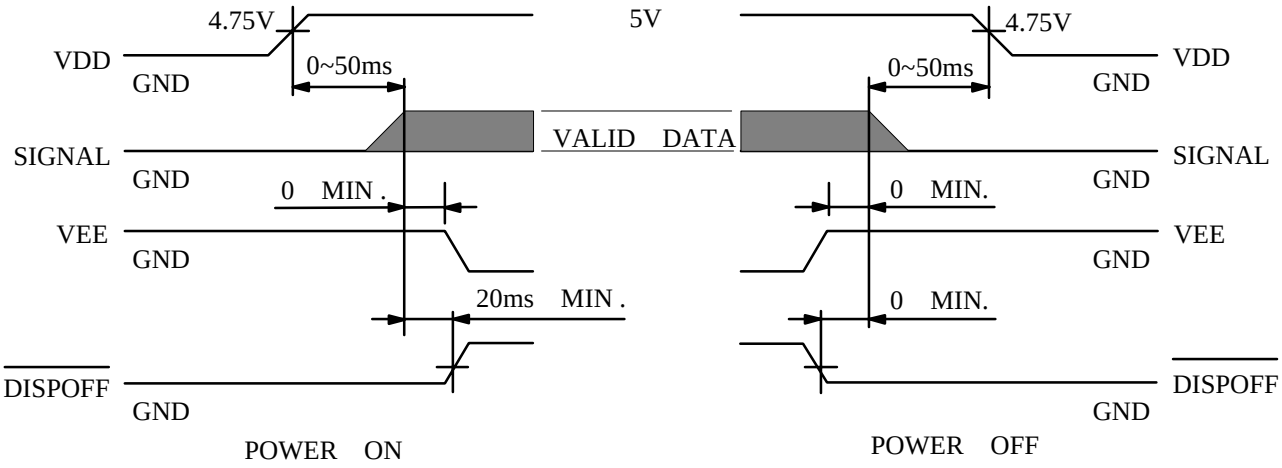
VDD – VO : LCD DRIVING VOLTAGE
VR: 20KΩ

11.2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM02A

11.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL



POWER ON POWER OFF