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ROGER YANG		VERSION : 2

CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :

32F10(CCFL TYPES)
(RoHS)
FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO .	VERSION	PAGE
32F10(CCFL TYPES) (RoHS)	2	0-1

RECORDS OF REVISION	DOC . FIRST ISSUE	OCT.06,2005
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DATE	REVISED PAGE NO.	SUMMARY																													
JAN.13,2006	3	4. ELECTRICAL CHARACTERISTICS POWER SUPPLY FOR CCFL : TYP. = 30K → 35K																													
	7	6. OPTICAL CHARACTERISTICS																													
		<table><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><tr><td rowspan="2">BRIGHTNESS OF MODULE</td><td rowspan="2">L</td><td rowspan="2">—</td><td>60</td><td>90</td><td>—</td><td rowspan="2">cd / m²</td><td>1 , 2</td></tr><tr><td>40</td><td>60</td><td>—</td><td>1 , 3</td></tr></table> →										I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE	BRIGHTNESS OF MODULE	L	—	60	90	—	cd / m ²	1 , 2	40	60	—	1 , 3
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	8	7. OUTLINE DIMENSIONS NOT SPECIFIED TOLERANCE IS ± 0.3 → NOT SPECIFIED TOLERANCE IS ± 0.5																													

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C

Backlight Color	Code Value
White	W

E W 3 2 F 1 0 B C W U

Viewing direction
NIL : 6 o'clock
U : 12 o'clock
R : 3 o'clock

LCD type + 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 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 ----- 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 *
- (8) DRIVING METHOD ----- 1 / 240 DUTY MULTIPLEX DRIVE
- (9) VIEWING DIRECTION *
- (10) 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	6 . 0	V	
POWER SUPPLY FOR LCD DRIVING	VDD – VEE	0	28 . 0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	1 0 0	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	- 1 0 °C	6 0 °C	- 2 0 °C	7 0 °C	NOTE (1),(3),(4)
HUMIDITY	NOTE (2)		NOTE (2)		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	—	2 9 . 4 m /s ² (3 G)	—	490 . 0 m /s ² (5 0 G)	10 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 -20°C : WILL BE < 48hr
70°C : WILL BE < 168hr

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	—	3.0	5.0	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD – V0 = 2 3 . 0 V	—	2.8	4.8	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD – V0 * * DUTY =1/240	Ta =-10 °C	22.5	23.5	24.5	V
		Ta = 25 °C	22	23	24	V
		Ta = 60 °C	21.2	22.2	23.2	V
FLM FREQUENCY	f FLM	—	70	75	80	Hz
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	300	—	Vrms
	FREQUENCY	f CCFL	—	35K	—	Hz
	CURRENT	IL	—	5	—	mA
	LIFE TIME	L	IL = 5.0mA	45000	50000	Hrs

**θy=10°, θx=0° WHEN VIEWING DIRECTION IS 6 O'CLOCK

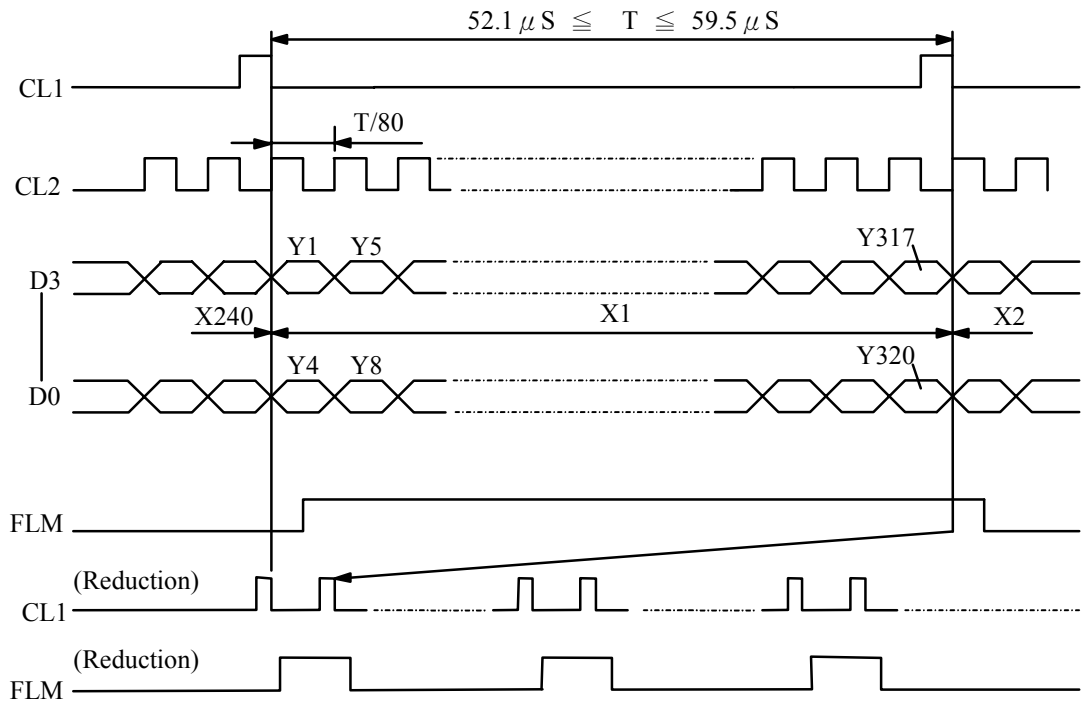
θy=0°, θx+=10° WHEN VIEWING DIRECTION IS 3 O'CLOCK

θy=10°, θx=0° WHEN VIEWING DIRECTION IS 12 O'CLOCK

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

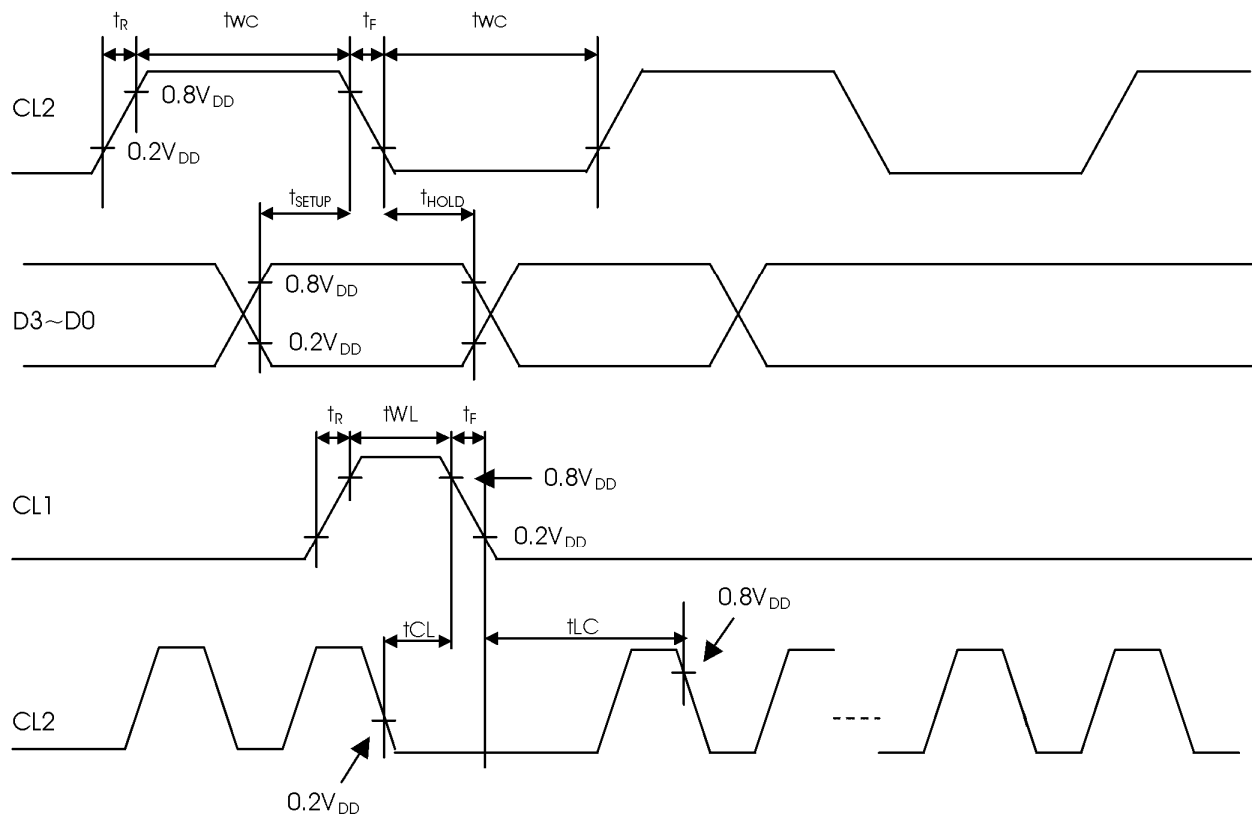
NOTE (2) : THE DISPLAY PATTERN IS ALL "OFF"/ "ON" .

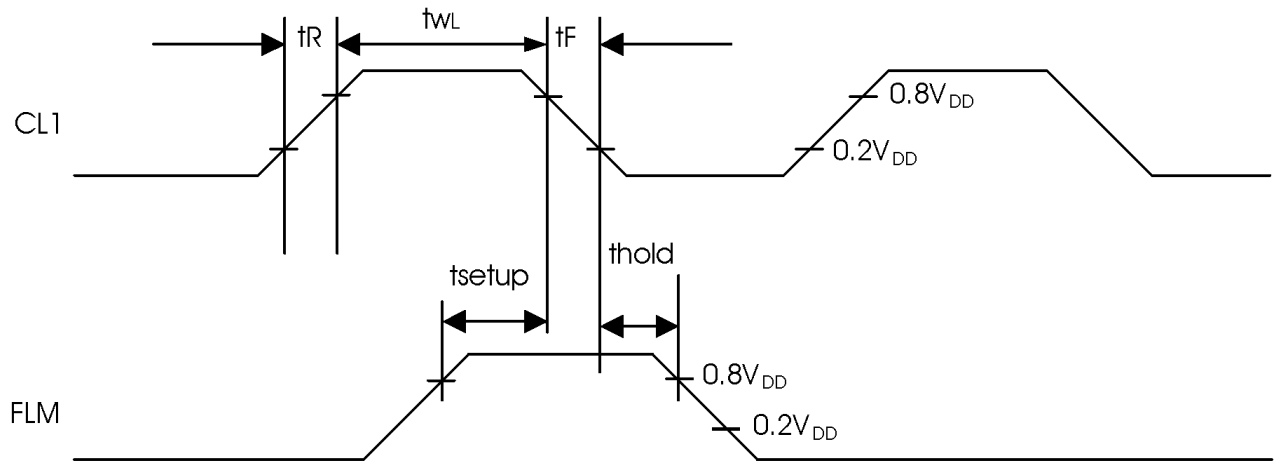
5. TIMING CHARACTERISTICS
5.1 INTERFACE TIMING



5.2 SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
CL1	f_{cp1}	—	—	1.0	MHz
CL2	f_{cp2}	—	—	6.0	MHz
CL1 pulse width	t_{WL}	63	—	—	ns
CL2 pulse width	t_{WC}	50	—	—	ns
CL1 and CL2 rise time	t_R	—	—	*	ns
CL1 and CL2 fall time	t_F	—	—	*	ns
Data setup time	t_{SETUP}	30	—	—	ns
Data hold time	t_{HOLD}	30	—	—	ns
CL2→CL1	t_{CL}	80	—	—	ns
CL1→CL2	t_{LC}	110	—	—	ns
Setup time	t_{setup}	100	—	—	ns
Hold time	t_{hold}	100	—	—	ns





* THE CL1 AND CL2 RISE TIME(t_R) AND THE CL1 AND CL2 FALL TIME(t_F) MUST SATISFY EQUATIONS (1) AND (2) BELOW AT THE SAME TIME

$$(1) t_R, t_F < \frac{1}{2f_{cp2}} - t_{wc}$$

$$(2) t_R, t_F < 50ns$$

6. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

I T E M		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE		θy+	K *	θx=0°	(35)	(40)	—	d e g .	1
		θy-			(35)	(40)	—		
		θx+		θy=0°	(30)	(35)	—		
		θx-			(40)	(45)	—		
CONTRAST RATIO	STN	K	**		1.5	3	—	—	1
	FSTN				5	10	—	—	1
RESPONSE TIME		tr (rise)	* *	Ta = -10 °C	—	2149	2794	ms	1
				Ta = 25 °C	—	228	296		
				Ta = 60 °C	—	124	161		
		tf (fall)		Ta = -10 °C	—	1709	2222		
				Ta = 25 °C	—	191	248		
				Ta = 60 °C	—	96	125		
BRIGHTNESS OF MODULE		L	—		75	102	—	cd / m ²	1 , 2
					50	68	—		1 , 3
RISE TIME OF BACKLIGHT		TC	—		—	5	—	MINUTE	
BRIGHTNESS UNIFORMITY		—	—		80	85	—	%	4 , 5

K* : STN K≥1.5, FSTN K≥2.0

** $\theta_y=-10^\circ$, $\theta_x=0^\circ$ WHEN VIEWING DIRECTION IS 6 O'CLOCK

$\theta_y=0^\circ$, $\theta_x+=10^\circ$ WHEN VIEWING DIRECTION IS 3 O'CLOCK

$\theta_y+=10^\circ$, $\theta_x=0^\circ$ WHEN VIEWING DIRECTION IS 12 O'CLOCK

NOTE (1) : PLEASE REFER TO :

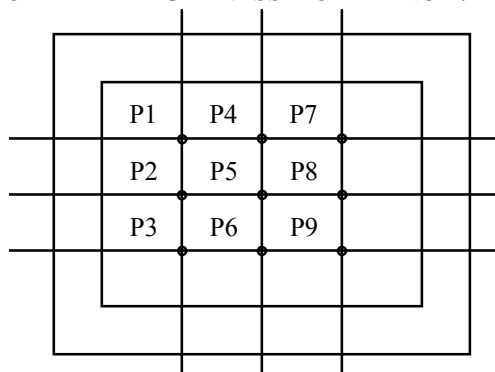
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU – 002B)

NOTE (2) : POLARIZER MODE : TRANSMISSIVE

NOTE (3) : POPLARIZER MODE : TRANSFLECTIVE

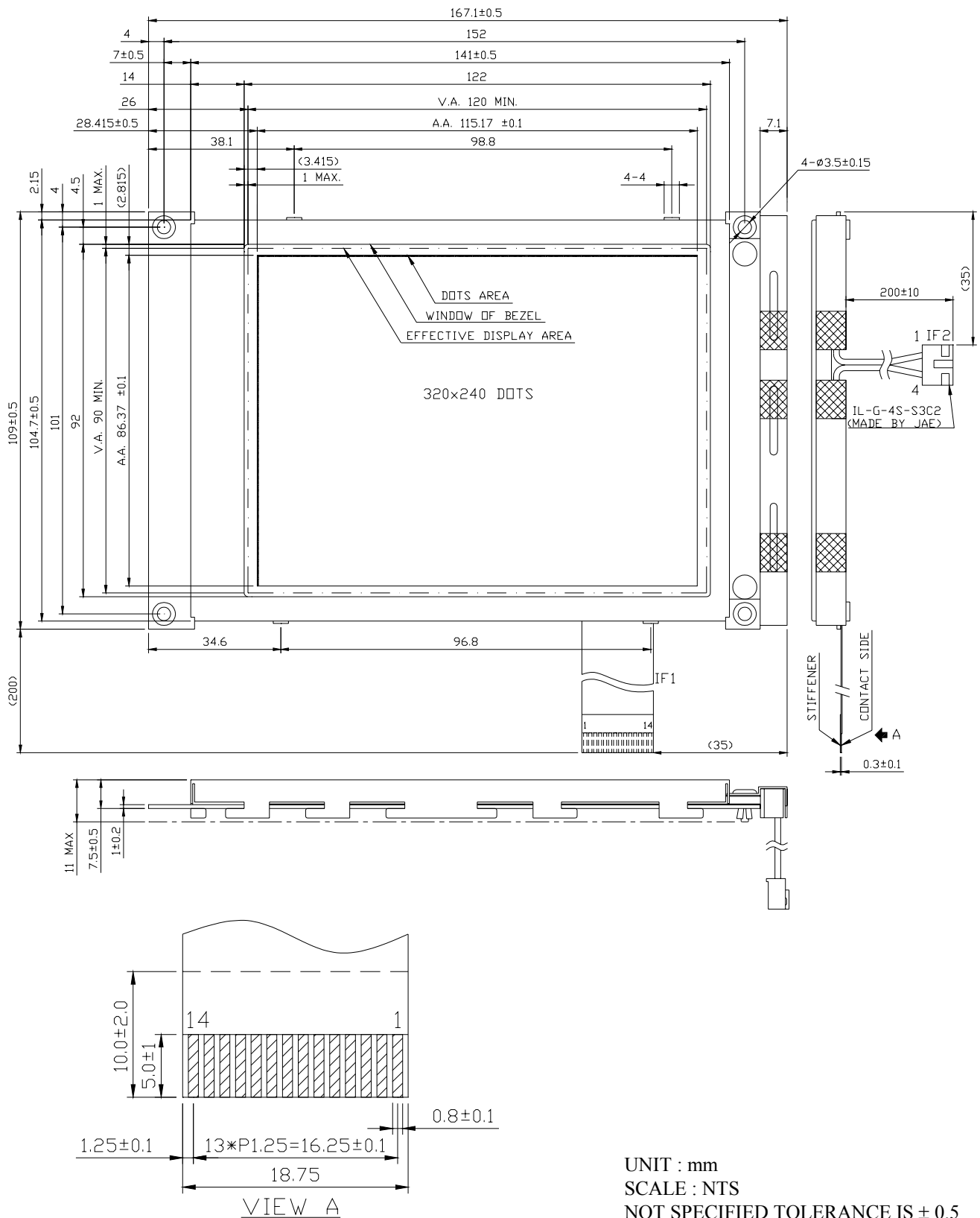
NOTE (4) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.

DEFINITION OF THE BRIGHTNESS TOLERANCE .

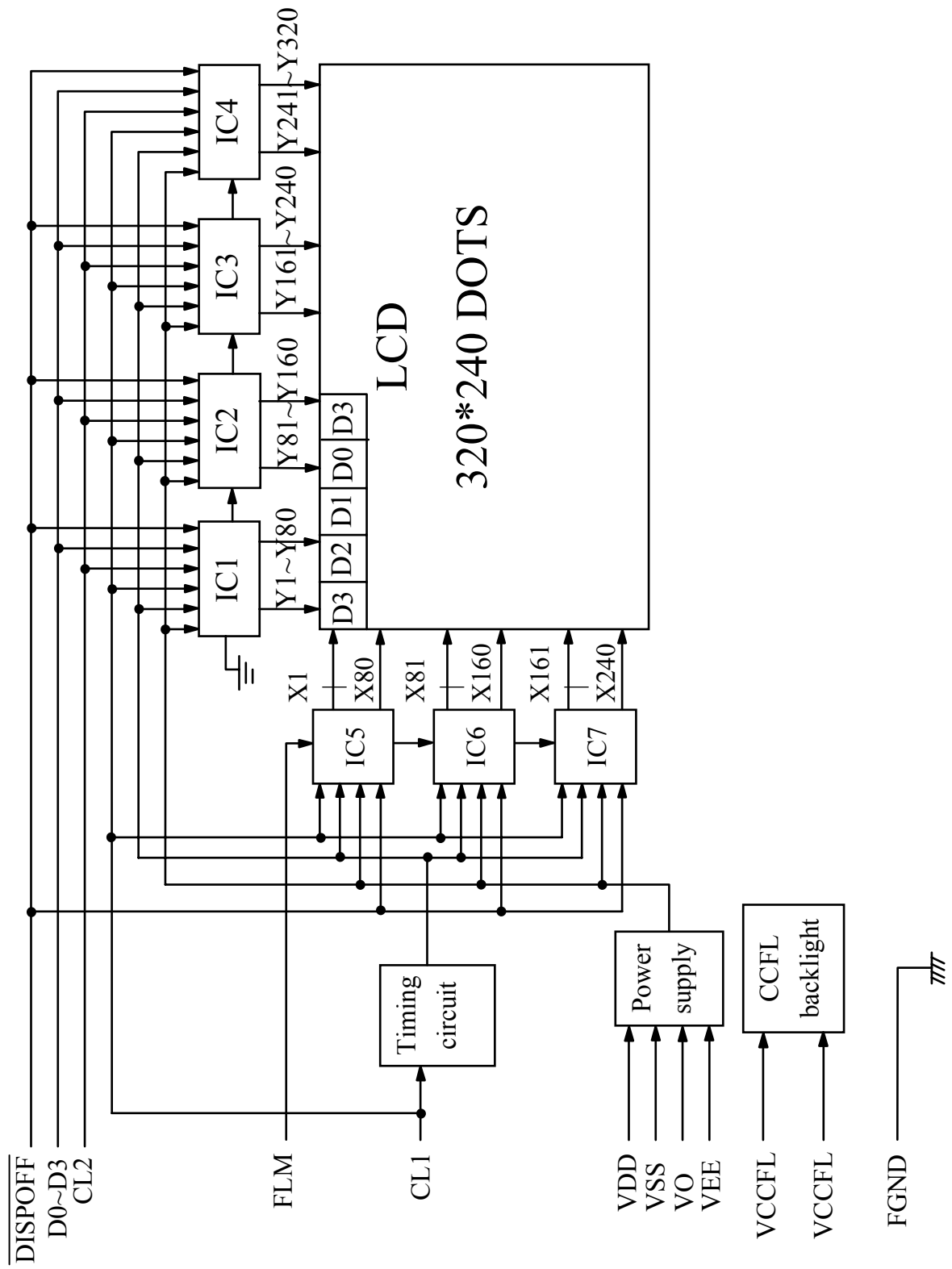


NOTE (5) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING
(MIN./MAX.)×100%

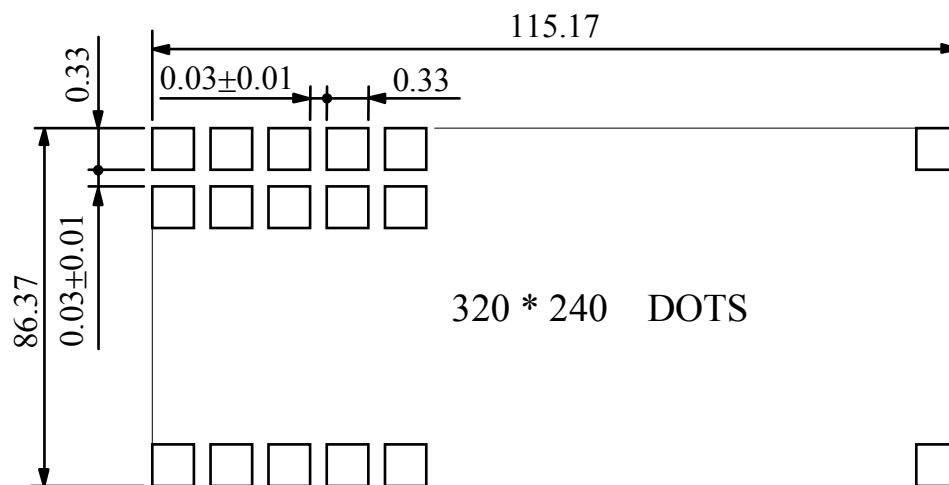
7. OUTLINE DIMENSIONS



8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

IF1 :

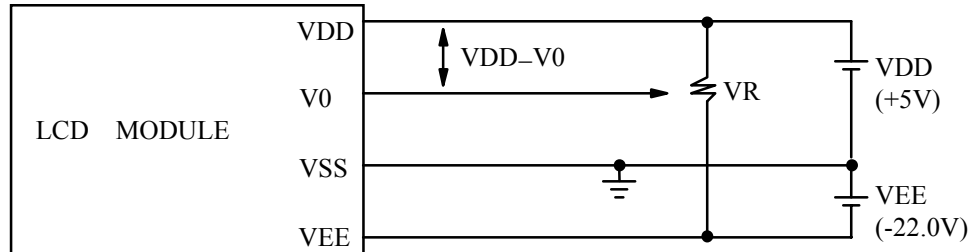
PIN NO	SYMBOL	LEVEL	FUNCTION
1	D0	H / L	DISPLAY DATA
2	D1	H / L	
3	D2	H / L	
4	D3	H / L	
5	$\overline{\text{DISPOFF}}$	H / L	H : DISPLAY ON , L : DISPLAY OFF
6	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
7	NC	—	NO CONNECTION
8	CL1	H → L	DISPLAY DATA LATCH
9	CL2	H → L	DISPLAY DATA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

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

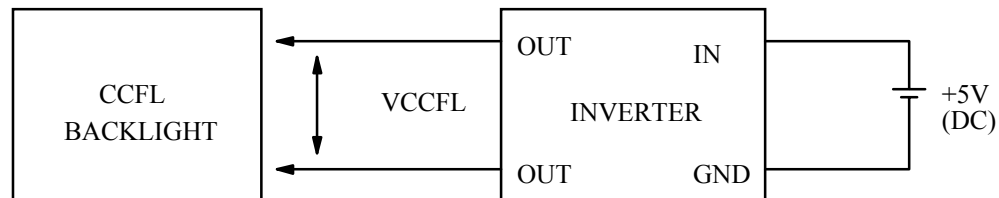
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD - V0 : LCD DRIVING VOLTAGE
VR : 20K Ω

1 1 . 2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : 1A-EM02A1

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

