EXAMINED BY : Kevin Kuo	EMERGING DISPLAY	FILE NO . CAS-0006600
		ISSUE : FEB.12, 2008
APPROVED BY: David Chang	TECHNOLOGIES CORPORATION	TOTAL PAGE : 10
		VERSION : 1

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :

32FZ0(CCFL TYPES)

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

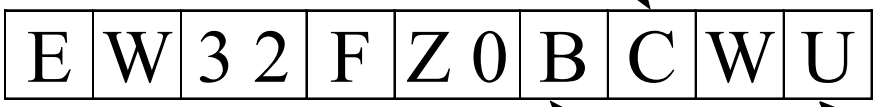
DOC. FIRST ISSUE

FEB.12, 2008

DATE	REVISED PAGE NO.	SUMMARY

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C



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

LCD type + LCD color	Code Value
STN + Gray	G
STN + Blue	B
FSTN + White	F
FSTN + Black	N

TABLE OF CONTENTS

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU-002B

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	173.3W * 135.8H * 14.0D(max.) mm
(3)	VIEWING AREA	122.0W * 92.0H mm
(4)	DISPLAY 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	32.0	V	
INPUT VOLTAGE	VI	(VSS–0.3)	(VDD+0.3)	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	—	90% RH	—	90% RH	50°C , 1KHz MAX
VIBRATION	—	2.45 m /s^2 (0.25 G)	—	19.6 m /s^2 (2 G)	
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) : WHEN Ta = 60°C , 90 % RH : 48 Hr max FOR CONTINUE OPERATING
Ta = -10°C , 48 Hr max FOR CONTINUE OPERATING

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

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C VDD = 5.0 V

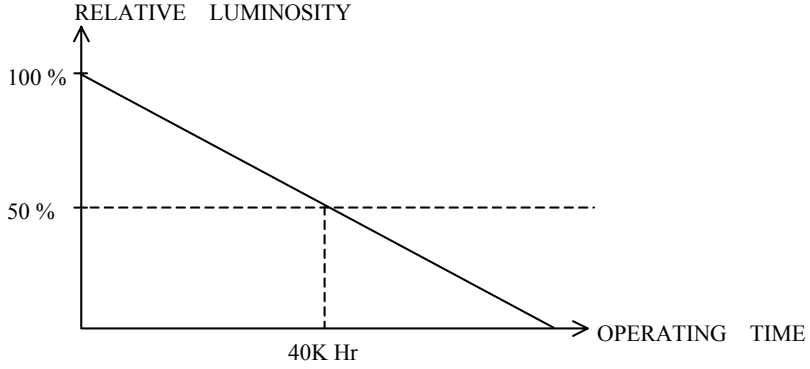
PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC		VDD – VSS	—	4.75	5.0	5.25	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE		VEE – VSS	—	-23.75	-24.0	-24.25	V
INPUT VOLTAGE NOTE (1)		VIH	H LEVEL	0.8*VDD	—	—	V
		VIL	L LEVEL	—	—	0.2*VDD	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)		IDD	VDD – VSS = 5.0 V VDD – VO = 24.2 V	—	3.0	5.0	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)		IEE	VDD – VSS = 5.0 V VDD – VO = 24.2 V	—	2.8	6.0	mA
RECOMMENDED LCD DRIVING VOLTAGE		VDD – VO ** DUTY =1/240	Ta =-10 °C	25	25.5	26	V
			Ta = 25 °C	23.7	24.2	24.7	V
			Ta = 60 °C	22.9	23.4	23.9	V
CLOCK FREQUENCY FOR FRAME		f FLM	—	70	75	80	Hz
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	330	352	370	Vrms
	FREQUENCY	f CCFL	—	45K	50K	55K	Hz
	CURRENT	IL	—	4.9	5.0	5.1	mA
	LIFE TIME	LIFE (NOTE(3))	IL = 5.0mA	40K	50K	—	Hrs

** θy-=10° , θx=0° WHEN VIEWIHG DIRECTION IS 6 O'CLOCK.
θy=0° , θx+=10° WHEN VIEWIHG DIRECTION IS 3 O'CLOCK.
θy+=10° , θx=0° WHEN VIEWIHG DIRECTION IS 12 O'CLOCK.

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

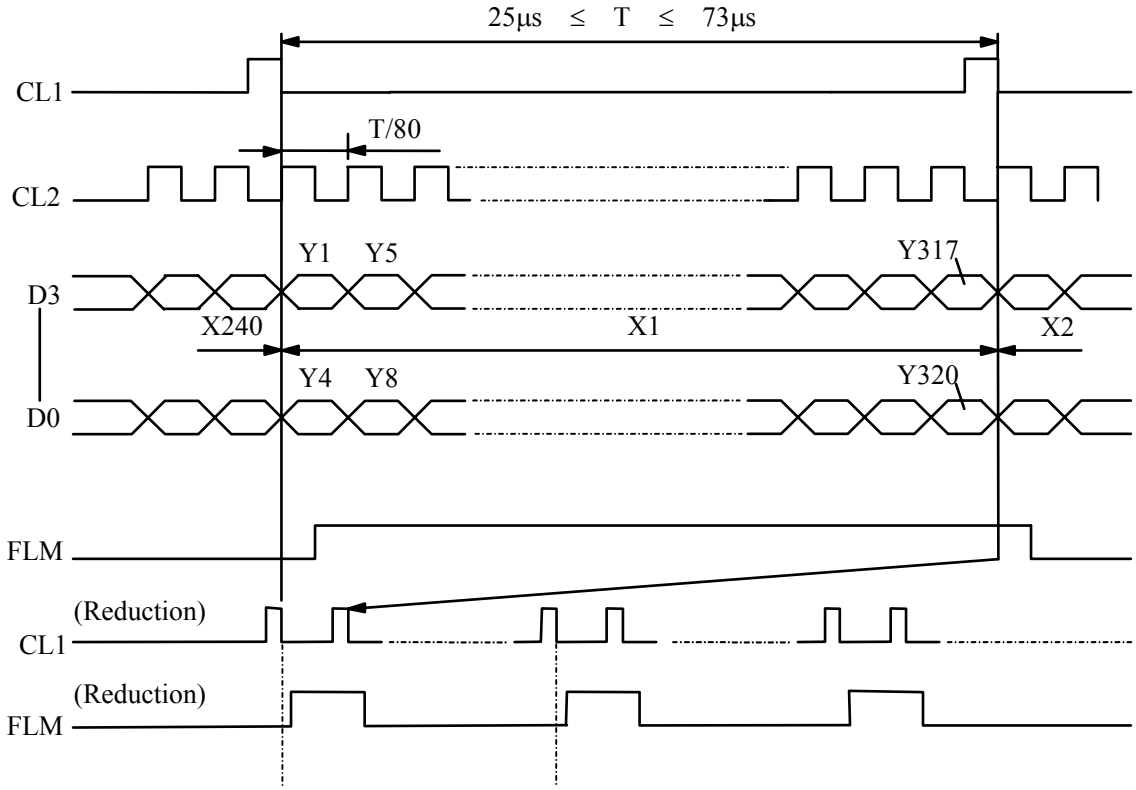
NOTE (2): THE DISPLAY PATTERN IS ALL "OFF" OR "ON ".

NOTE (3): DEFINITION OF LIFT TIME FOR CCFL B/L



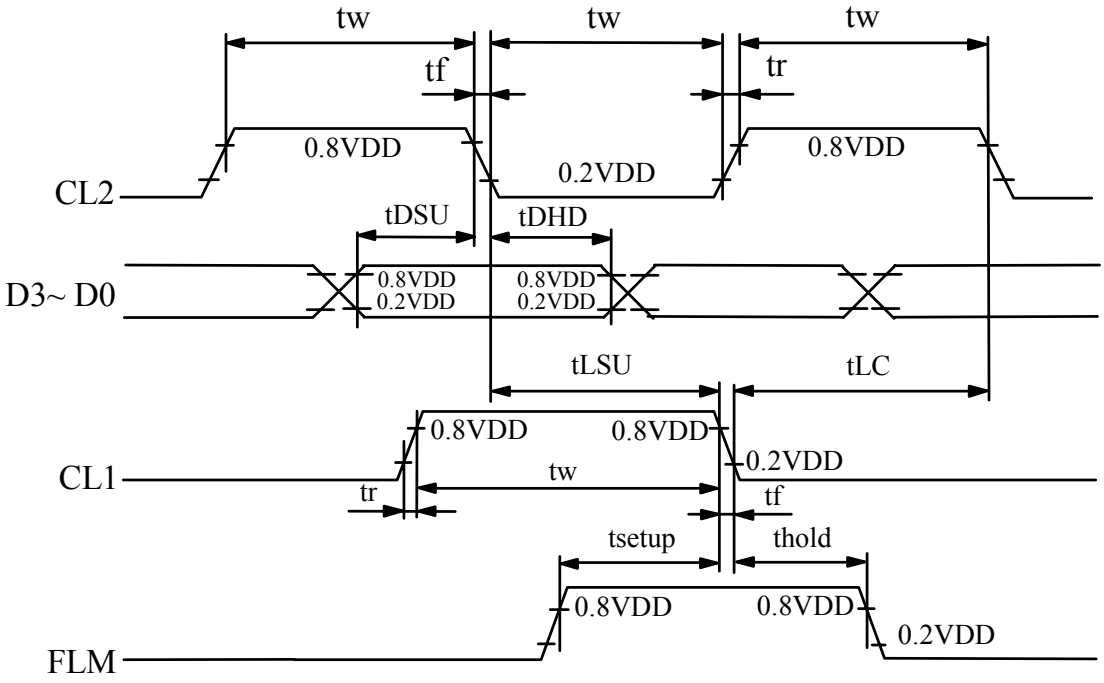
5. TIMING CHARACTERISTICS

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		θy+	K *	θx=0°	18	28	33	d e g .	1
		θy-			35	45	50		
		θx+		θy=0°	35	45	50		
		θx-			35	45	50		
CONTRAST RATIO	STN	K	**		3	5	—	—	1
	FSTN				5	7	—	—	1
RESPONSE TIME		tr (rise)	* *	Ta = -10 °C	—	2150	4300	ms	1
				Ta = 25 °C	—	300	500		
				Ta = 60 °C	—	125	250		
		tf (fall)		Ta = -10 °C	—	1700	3400		
				Ta = 25 °C	—	180	360		
				Ta = 60 °C	—	100	200		
BRIGHTNESS OF MODULE		L	—		87	123	—	cd / m^2	2
					50	60	—		3
RISE TIME OF BACKLIGHT		TC	Ta = 25 °C		5	—	10	MINUTE	
			Ta = -20 °C		10	—	20		
BRIGHTNESS UNIFORMITY		—	—		—	—	30	%	4 , 5

K* : STN K≥1.5, FSTN K≥2.0

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

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

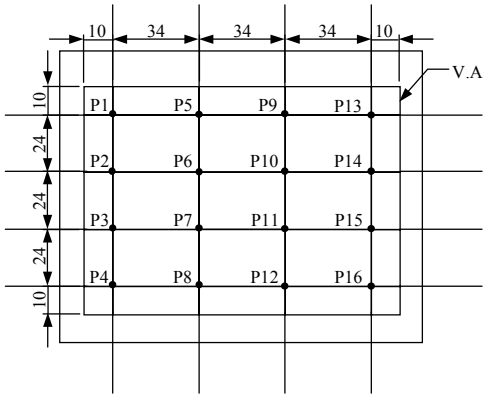
θy+=10°, θx=0° WHEN VIEWING DIRECTION IS 12 O'CLOCK

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

NOTE (2) : POLARIZER MODE : TRANSMISSIVE

NOTE (3) : POPLARIZER MODE : TRANSFLECTIVE

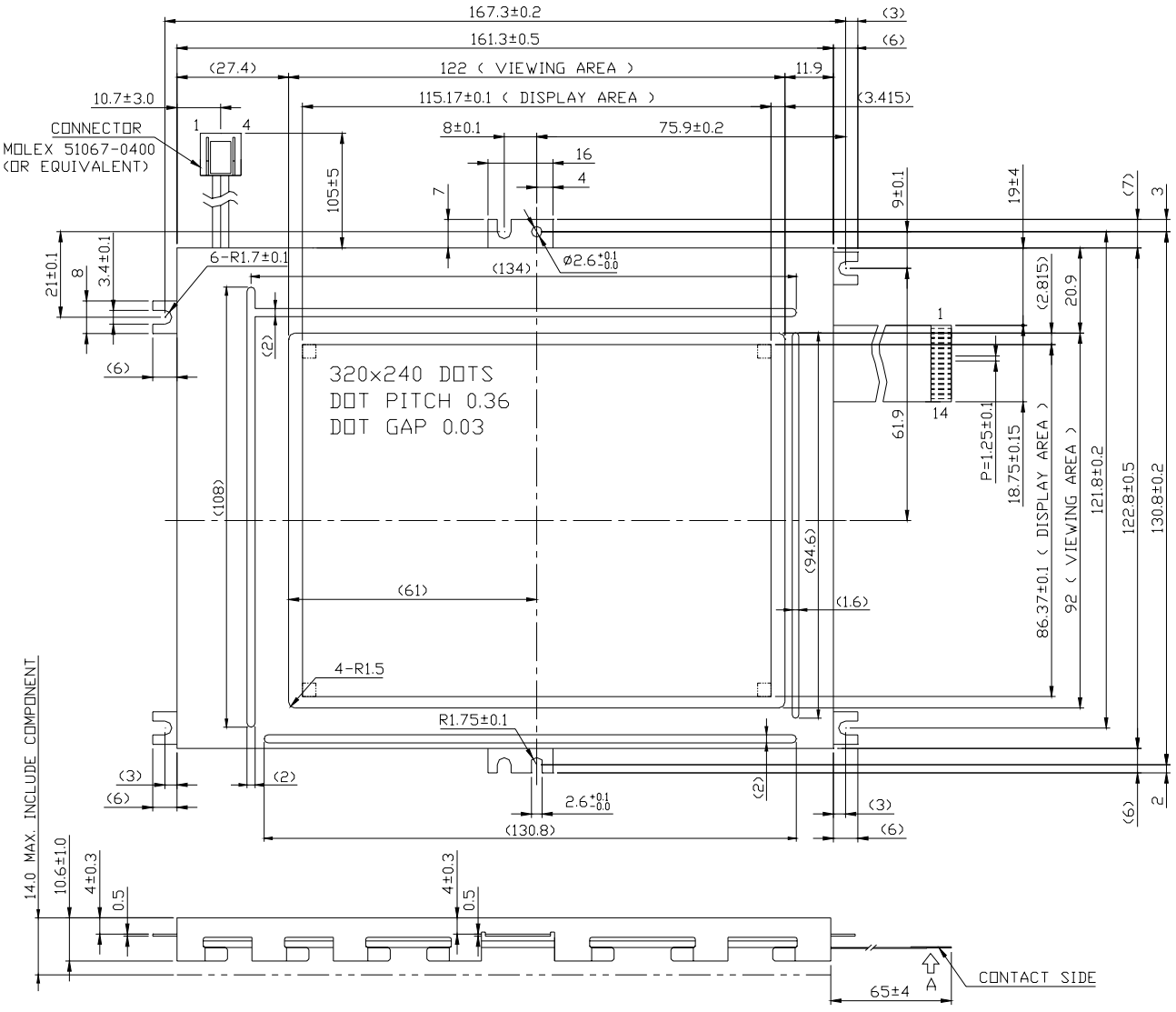
NOTE (4) : MEASUREMENT OF THE FOLLOWING 16 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE .

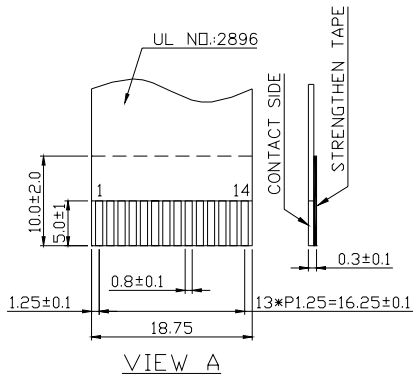


NOTE (5) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

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

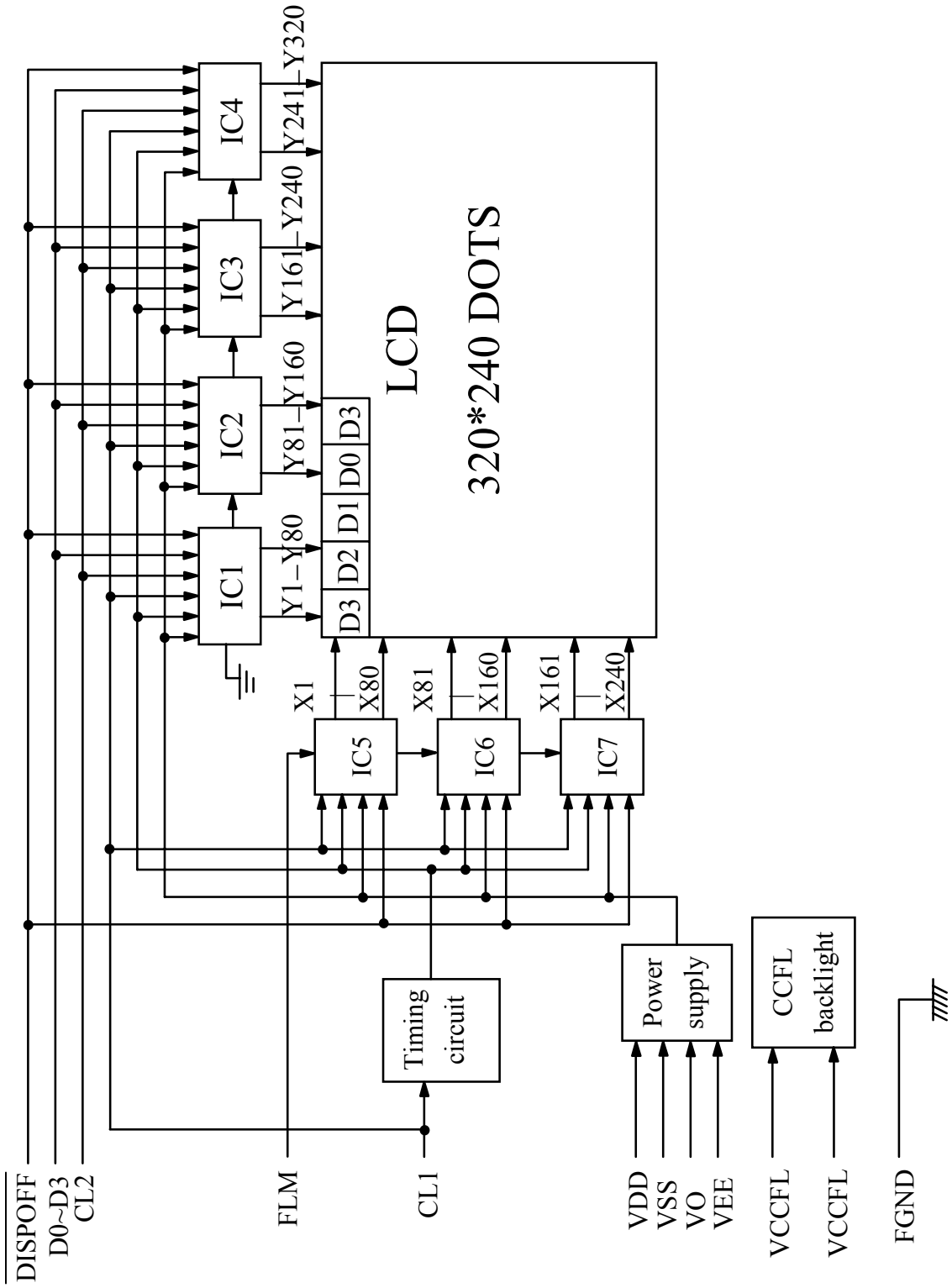
7. OUTLINE DIMENSIONS



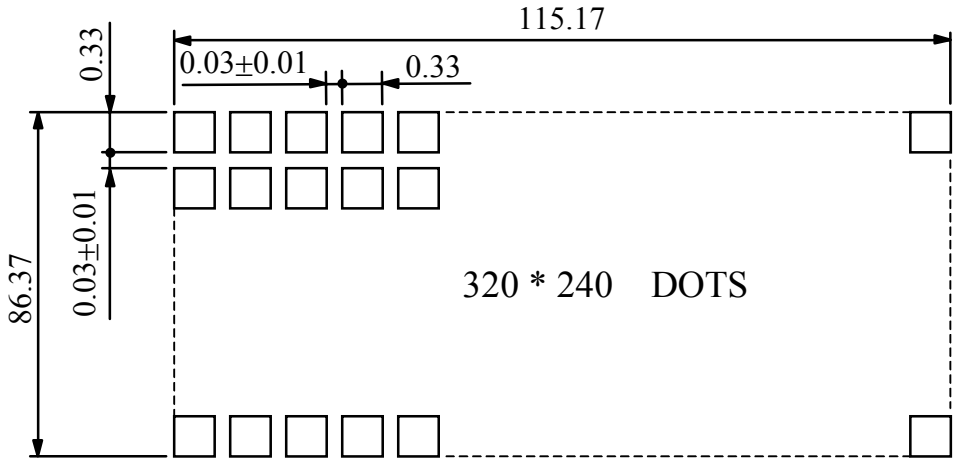


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.3

8. BLOCK DIAGRAM



9 . DETAIL DRAWING OF DOT MATRIX



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

10 . INTERFACE SIGNALS

IF1：

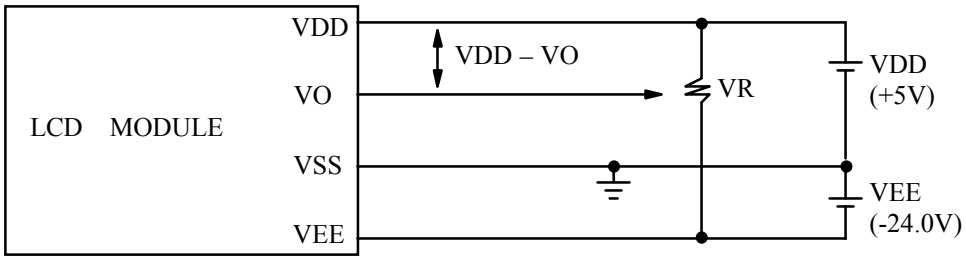
PIN NO	SYMBOL	LEVEL	FUNCTION
1	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
2	VEE	—	POWER SUPPLY FOR LCD DRIVING
3	D3	H / L	DISPLAY DATA
4	D2	H / L	
5	D1	H / L	
6	D0	H / L	
7	VEE	—	POWER SUPPLY FOR LCD DRIVING
8	VSS	—	GROUND
9	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
10	CL2	H → L	DISPLAY DATA SHIFT
11	CL1	H →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

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

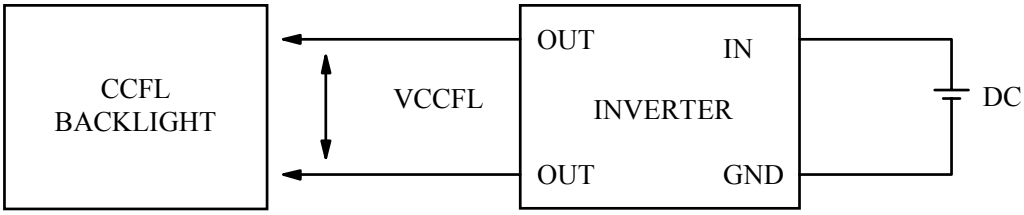
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



VDD – VO：LCD DRIVING VOLTAGE
VR：20KΩ

11.2 POWER SUPPLY FOR CCFL BACK - LIGHT



INVERTER：DECIDED BY CUSTOMER

11.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL