

EXAMINED BY :	EMERGING DISPLAY TECHNOLOGIES CORPORATION	FILE NO . CAS-10263
<i>David Chang</i>		ISSUE : NOV.23,2001
APPROVED BY:		TOTAL PAGE : 10
<i>Yves Chen</i>		VERSION : 1

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

32F91 (LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO. 32F91(LED TYPES)	VERSION 1
-------------------------------	--------------

RECORDS OF REVISION	DOC . FIRST ISSUE NOV.23,2001
---------------------	----------------------------------

DATE	REVISED PAGE NO.	SUMMARY

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

E W 3 2 F 9 1 F L W

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

Backlight	Code value
WHITE	W

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	TIME CHARACTERISTICS -----	4,5
6.	OPTICAL CHARACTERISTICS -----	6
7.	OUTLINE DIMENSION -----	7
8.	BLOCK DIAGRAM -----	8
9.	DETAIL DRAWING OF DOT MATRIX -----	9
10.	INTERFACE SIGNAL -----	9
11.	POWER SUPPLY -----	10

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 002 A

1.2 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

(1) NUMBER OF DOTS	-----	320W * 240H DOTS
(2) MODULE SIZE	-----	93.8W * 66.6H * 6.5 D (max.) mm
(3) EFFECTIVE AREA	-----	78.8W * 59.6H mm
(4) ACTIVE AREA	-----	76.79W * 57.59H mm
(5) DOT SIZE	-----	0.23W * 0.23H mm
(6) DOT PITCH	-----	0.24W * 0.24H mm
(7) LCD TYPE *		
(8) DRIVING METHOD	-----	1 / 240 DUTY MULTIPLEX DRIVE
(9) VIEWING DIRECTION	-----	6 O'CLOCK
(10) BACK LIGHT	-----	LED;COLOR : WHITE

* PLEASE REFER TO NUMBERING SYSTEM .

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . (AT Ta = 25 °C)

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD – VSS	0	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VEE – VSS	0	2.7	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
POWER SUPPLY FOR LED	VLED – VLSS	—	5.0	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 ² (0.25 G)	—	11.76 m/S ² (1.2 G)	10~100HZ XYZ DIRECTIONS 1 Hr.EACH
SHOCK	—	29.4 m/S ² (3 G)	—	490 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 .

4. ELECTRICAL CHARACTERISTICS

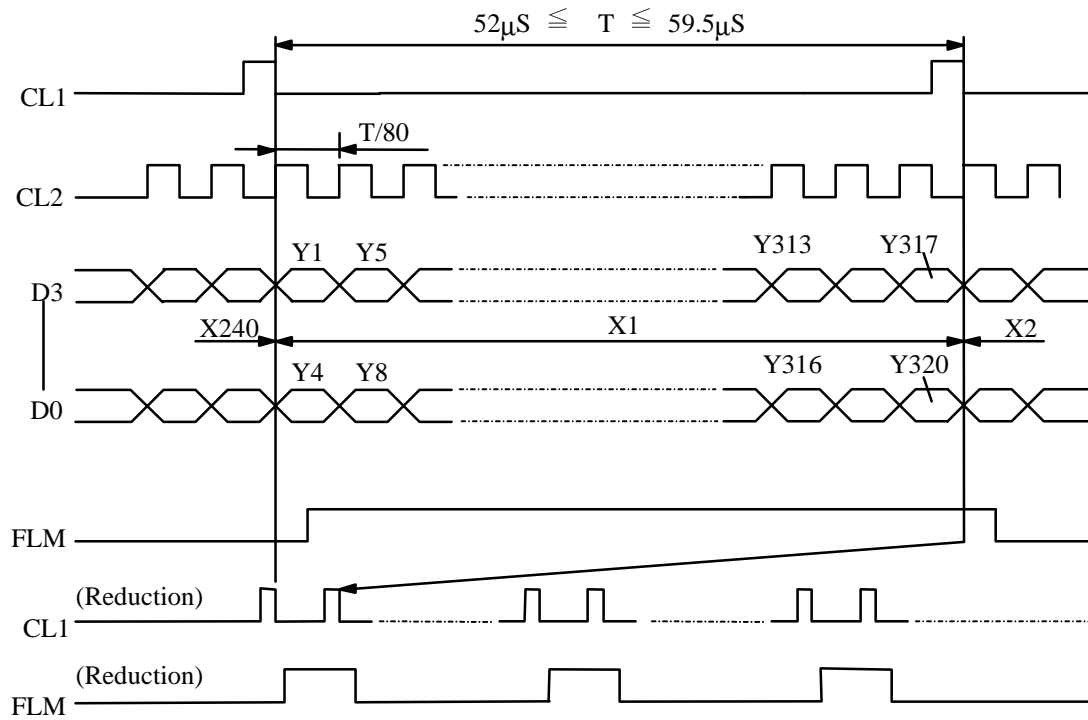
Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	2.5	—	5.0	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE – VSS	—	+15	—	+27	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8VDD	—	—	V
	VIL	L LEVEL	—	—	0.2VDD	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD–VSS =5V VR7–VSS=21.5V	—	17	30	mA
CONTRAST ADJUST VOLTAGE	VR7 – VSS ∅ = 10°, θ = 0° DUTY=1/240	Ta = -20 °C	23	24	25	V
		Ta = 25 °C	20.5	21.5	22.5	V
		Ta = 70 °C	17	18	19	V
CLOCK OSCILLATION FREQUENCY	fFLM	—	70	75	80	HZ
POWER SUPPLY FOR LED	VLED – VLSS	IF = 100 mA	—	5.0	—	V

NOTE (1) : APPLIED TO TERMINALS FLM , CL1 , CL2 , D0 , D1 , D2 , D3 , $\overline{\text{DISPLAYOFF}}$.

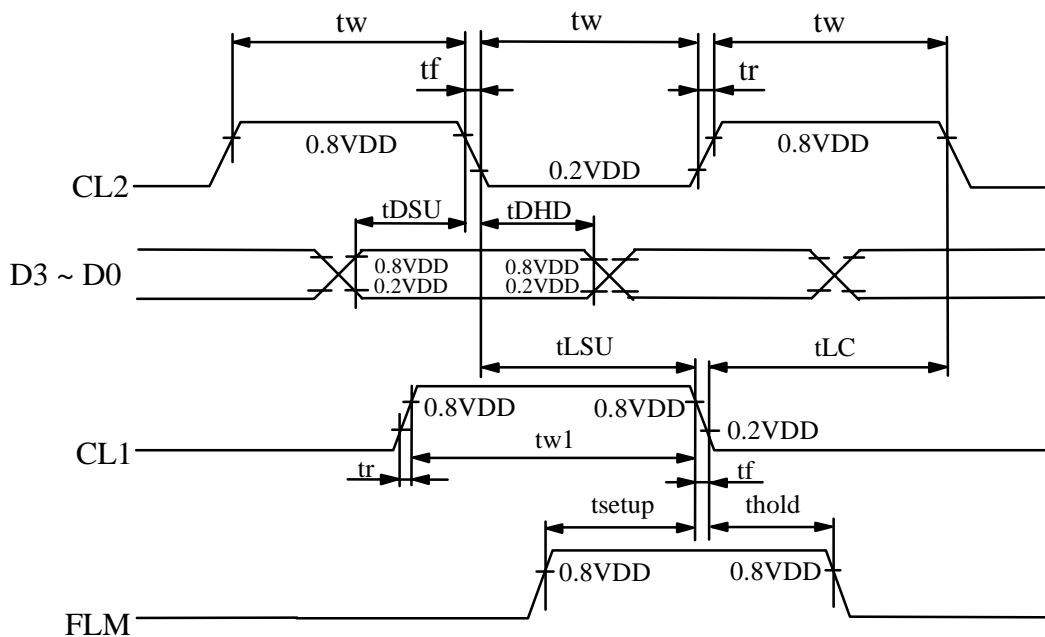
NOTE (2) : THIS DISPLAY PATTERN IS ALL ON OR OFF.

5. TIMING CHARACTERISTICS
5.1 INTERFACE TIMING



5.2 SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
CL1 PULSE WIDTH	tw1	30	—	—	ns
CL2 PULSE	tw	51	—	—	ns
RISE,FALL TIME	tr,tf	—	—	50	ns
DATA SETUP TIME	tDSU	30	—	—	ns
DATA HOLD TIME	tDHD	40	—	—	ns
CL1 SETUP TIME	tLSU	51	—	—	ns
CL1 TO CL2 TIME	tLC	51	—	—	ns
FLM SETUP TIME	tsetup	30	—	—	ns
FLM HOLD TIME	thold	50	—	—	ns
OUTPUT DELAY TIME	tDF	—	—	200	ns



6. OPTICAL CHARACTERISTICS

Ta = 25 °C

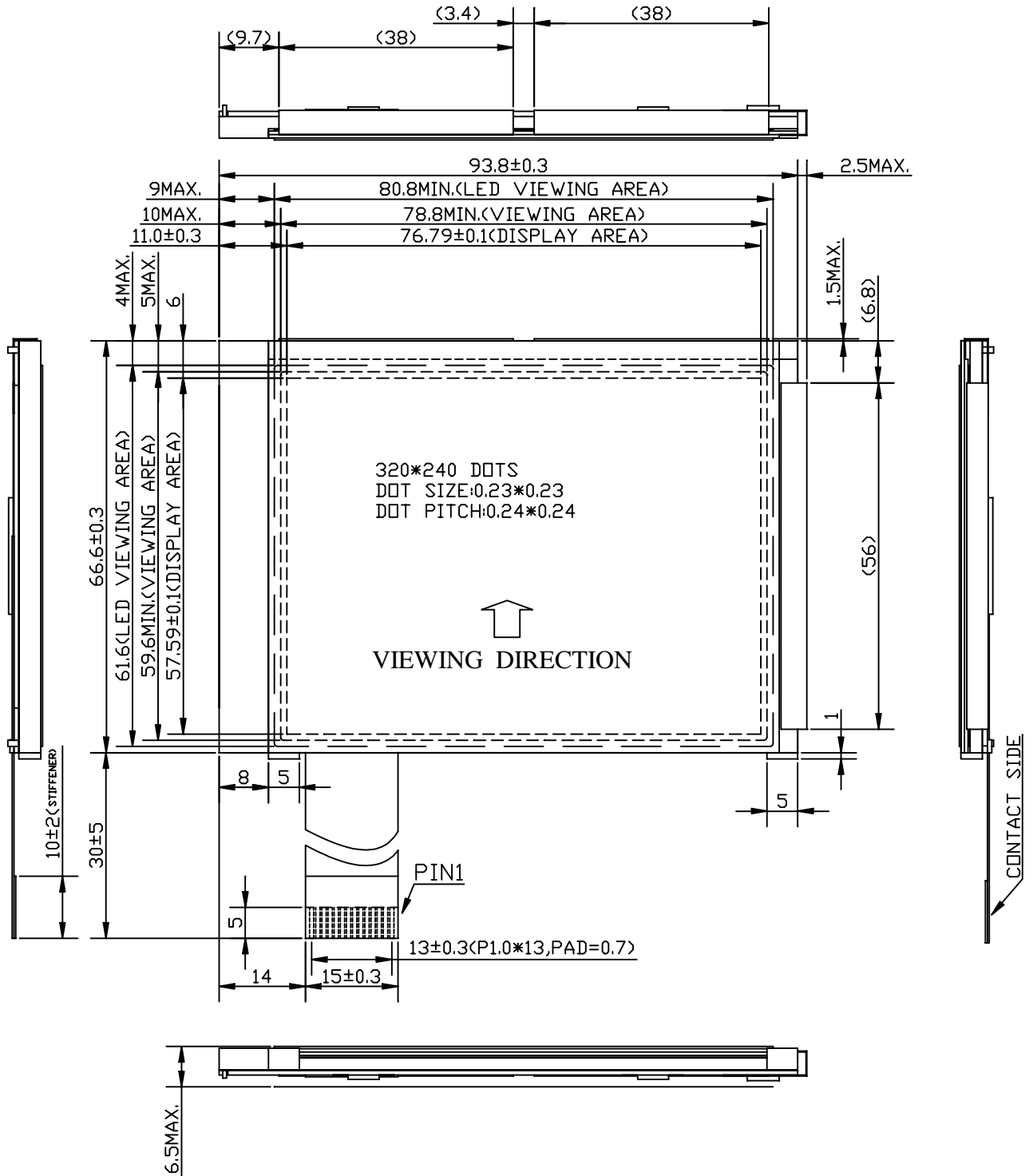
I T E M		SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING AREA	STN	$\varnothing 2 - \varnothing 1$	$K \geq 2.0$	—	40	—	deg.	1
	FSTN			50	—	—	deg.	1
CONTRAST RATIO	STN	K	$\varnothing = 10^\circ$	3	—	—	—	1
	FSTN			5	—	—	—	1
RESPONSE TIME		t r (rise)	$\varnothing = 10^\circ$ $\theta = 0^\circ$	—	(330)	—	msec	1
		t f (fall)	$\varnothing = 10^\circ$ $\theta = 0^\circ$	—	(330)	—	msec	1
THE BRIGHTNESS OF BACK-LIGHT		B	$\varnothing = 10^\circ$ $\theta = 0^\circ$	10	—	—	cd/m ²	1, 2
				13	—	—		1, 3

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

NOTE (2) : POLARIZER IS TRANSFLECTIVE TYPE .

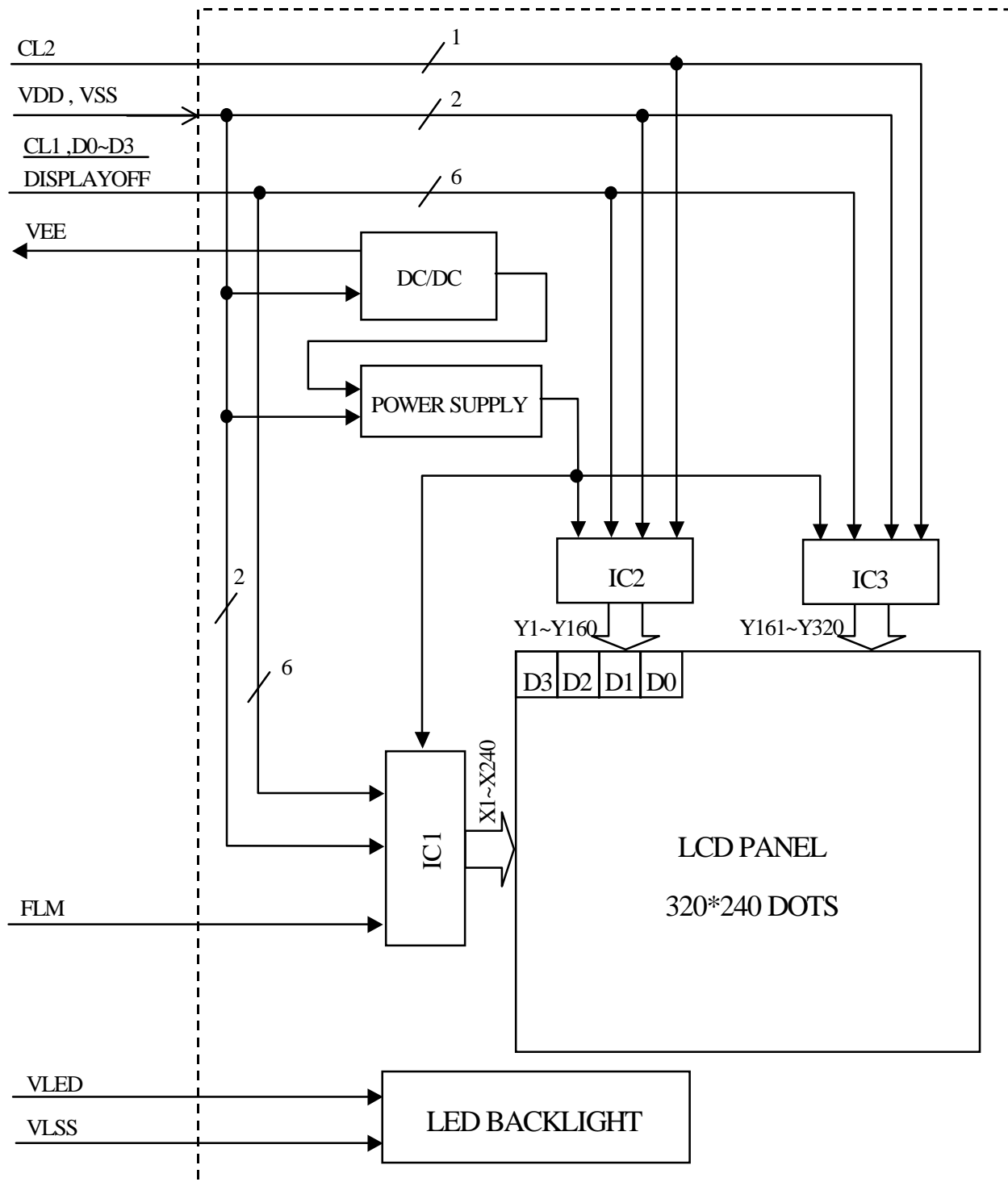
NOTE (3) : POLARIZER IS TRANSMISSIVE TYPE .

7. OUTLINE DIMENSION

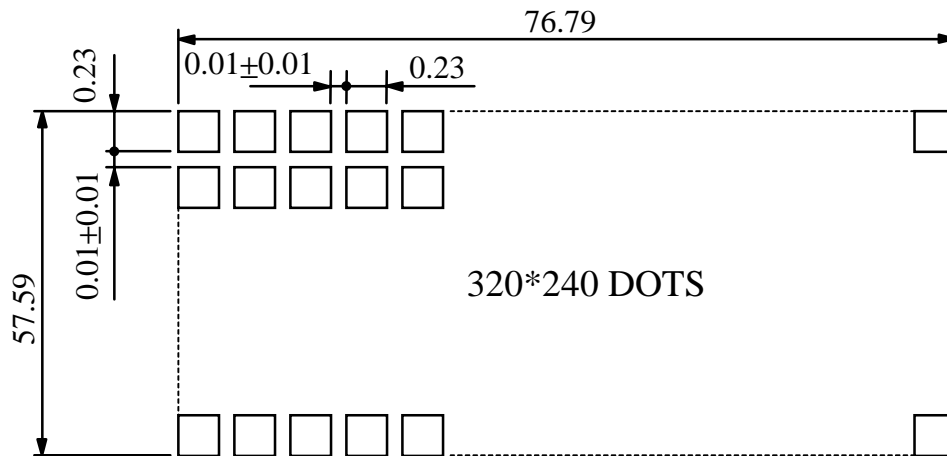


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

PIN NO.	SYMBOL	FUNCTION
1	VDD	POWER SUPPLY FOR LOGIC CIRCUIT.
2	VSS	GROUND.
3	VEE	POWER SUPPLY FOR LCD DRIVING VOLTAGE
4	FLM	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE.
5	N.C	NO CONNECTION
6	CL1	DISPLAY DATA LATCH.
7	CL2	DISPLAY DATA SHIFT.
8	D0	DISPLAY DATA
9	D1	DISPLAY DATA
10	D2	DISPLAY DATA
11	D3	DISPLAY DATA
12	$\overline{\text{DISPLAYOFF}}$	CONTROL LCD ON/OFF “ L “ : DISPLAY OFF , “ H “ DISPLAY ON
13	VLED	POWER SUPPLY FOR LED B.L
14	VLSS	POWER SUPPLY FOR LED B.L

1 1 . POWER SUPPLY

1 1 .1 POWER SUPPLY FOR LCM



RECOMMENDED : VR = 20K Ω

1 1 .2 POWER SUPPLY FOR LED BACK - LIGHT

