EXAMINED BY : David Chang	EMERGING DISPLAY	FILE NO . CAS-10263
		ISSUE : NOV.23,2001
APPROVED BY: Teresa Chen	TECHNOLOGIES CORPORATION	TOTAL PAGE : 10
		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

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU-002A

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 ℃)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD – VSS	0	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VEE – VSS	0	27	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.

ITEM	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

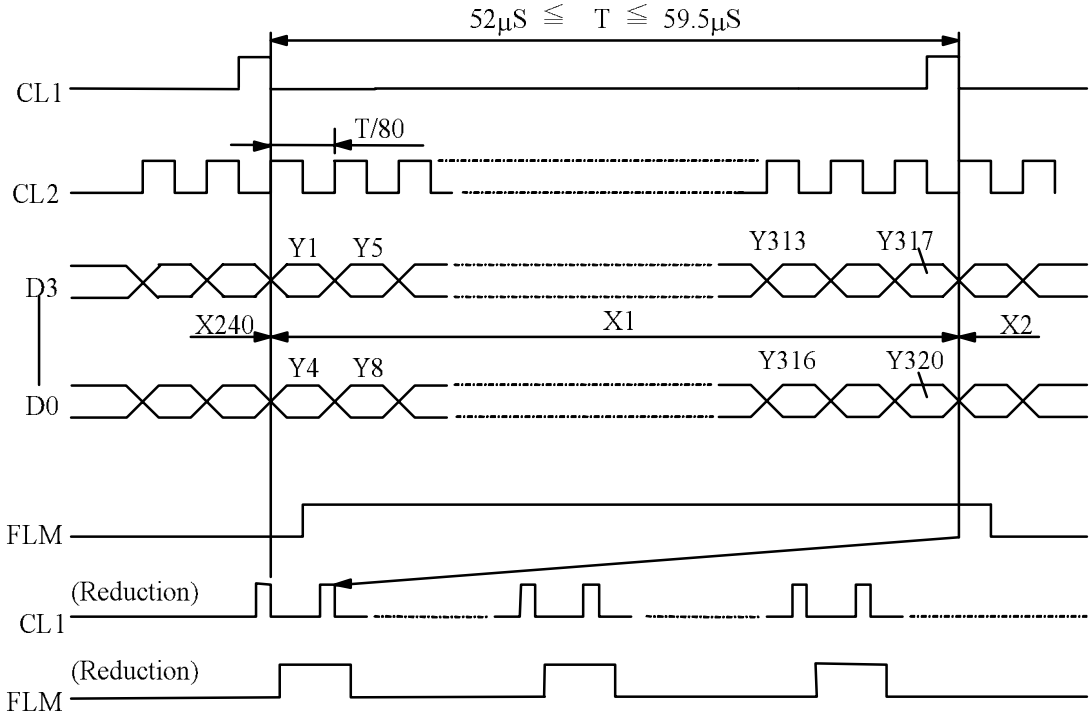
Ta = 25 °C

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.

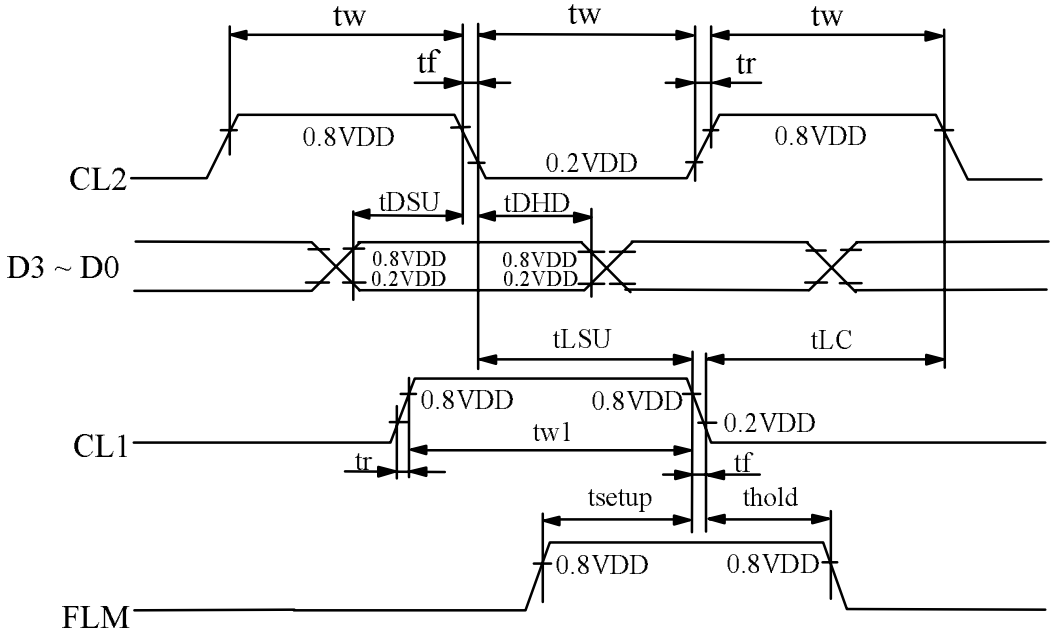
5. TIMING CHARACTERISTICS

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

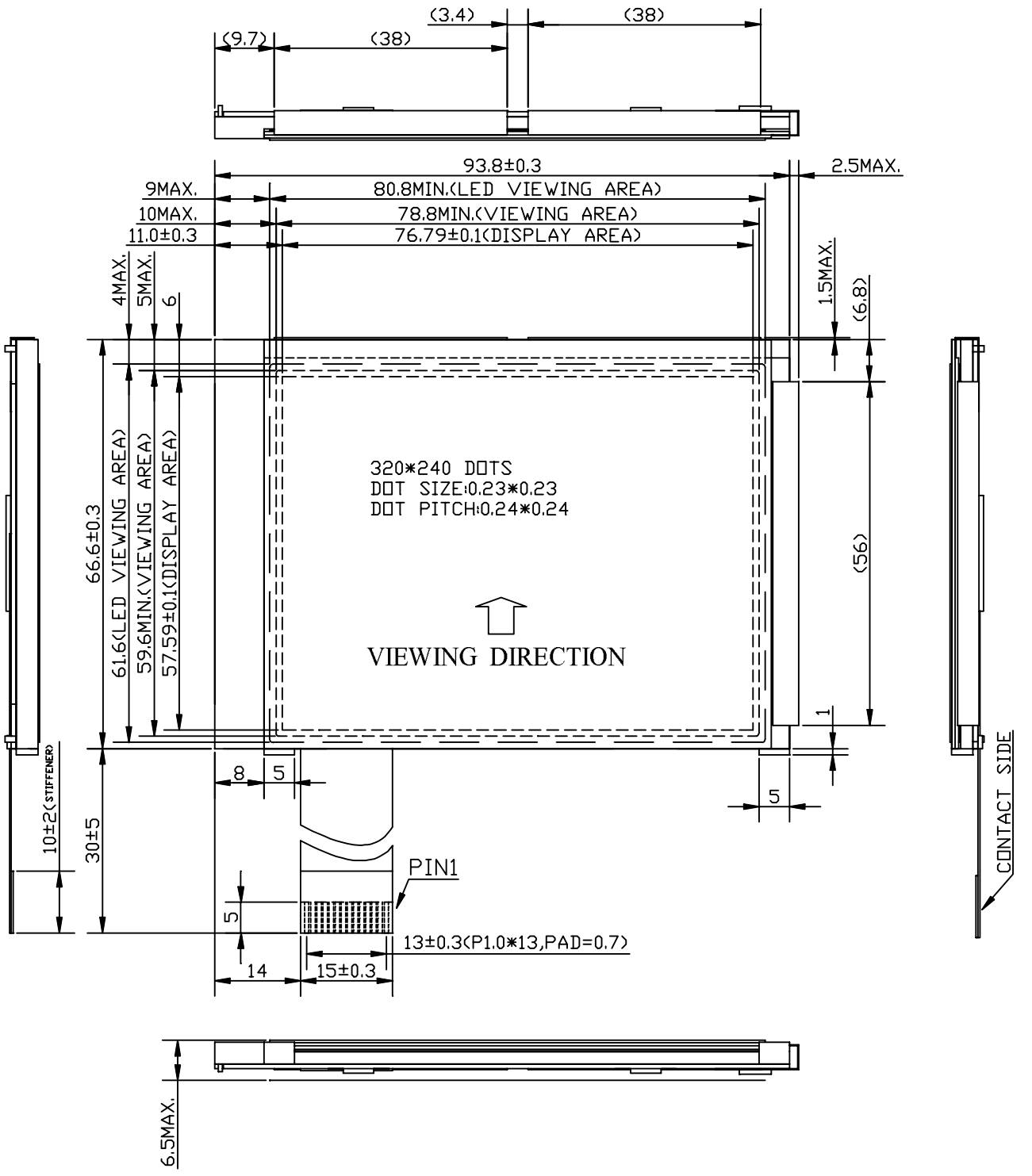
ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	STN	∅2 - ∅1	K ≧ 2.0	—	40	—	deg.	1
	FSTN			50	—	—	deg.	1
CONTRAST RATIO	STN	K	∅ = 10°	3	—	—	—	1
	FSTN			5	—	—	—	1
RESPONSE TIME		tr (rise)	∅ = 10° θ = 0°	—	(330)	—	msec	1
		tf (fall)	∅ = 10° θ = 0°	—	(330)	—	msec	1
THE BRIGHTNESS OF BACK-LIGHT		B	∅ = 10° θ = 0°	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 .

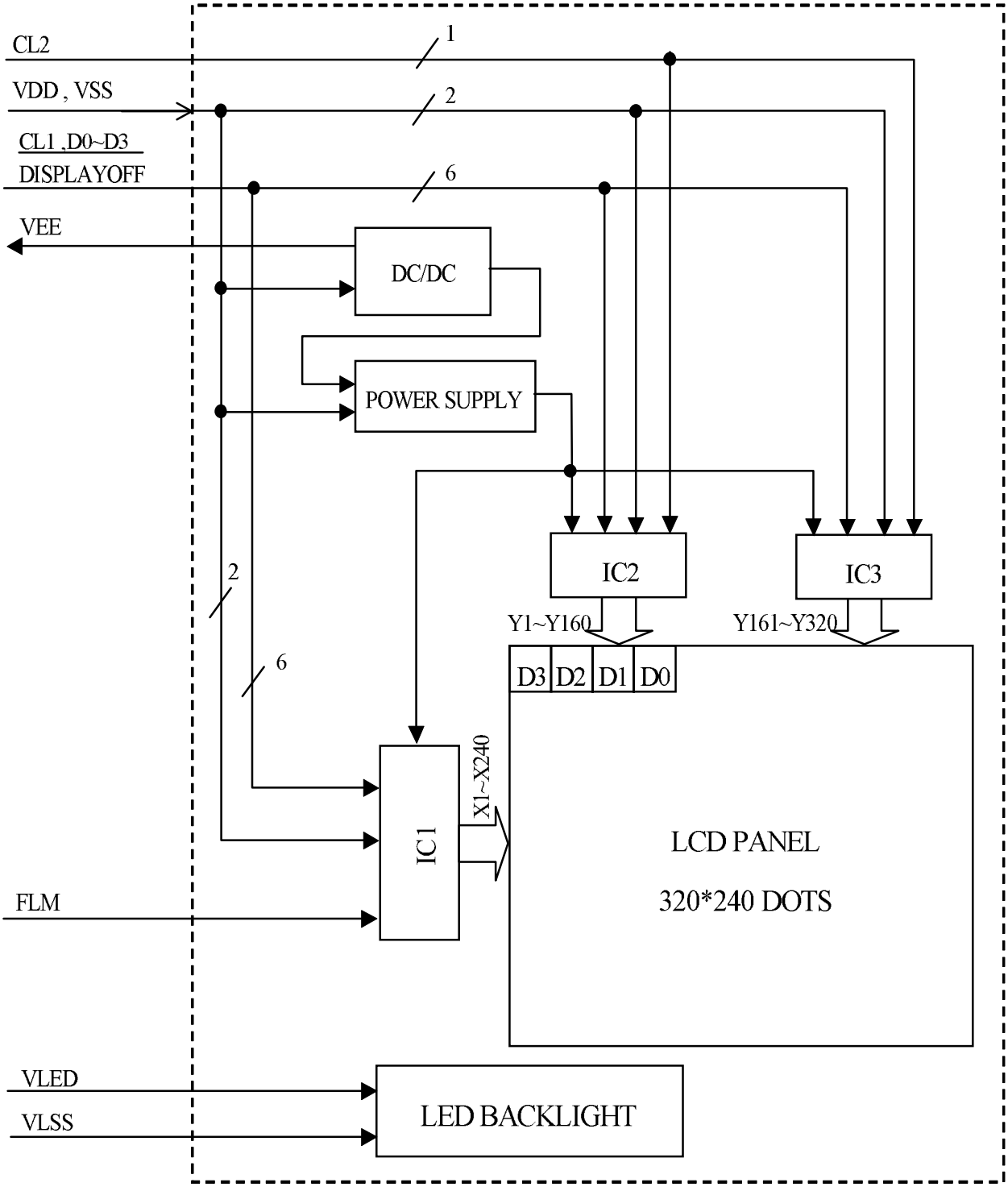
NOTE (3) : POLARIZER IS TRANSMISSIVE TYPE .

7. OUTLINE DIMENSION

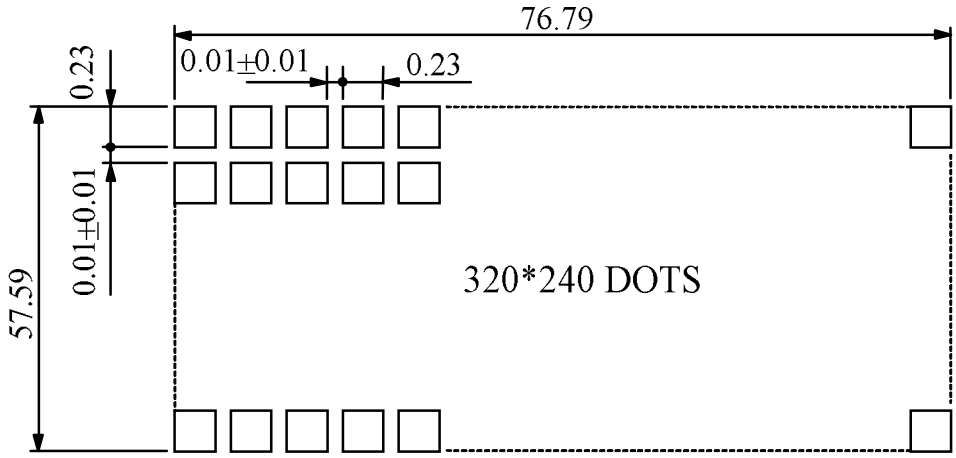


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



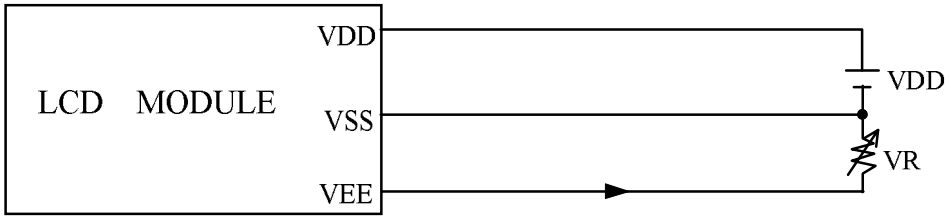
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

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	$\overline{\text{DISPLAYOFF}}$	CONTROLL 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

11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



RECOMMENDED : VR = 20KΩ

11.2 POWER SUPPLY FOR LED BACK - LIGHT