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Jason Ma.		ISSUE : AUG.03,2000
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David Chang		VERSION : 4

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

EW 3 2 F 9 0 F L W

FOR MESSRS :

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CUSTOMER'S APPROVAL

DATE :

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BY :

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EMERGING DISPLAY  
TECHNOLOGIES CORPORATION

MODEL NO. E W 3 2 F 9 0 F L W	VERSION 4
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RECORDS OF REVISION	DOC . FIRST ISSUE	MAR.31,2000
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DATE	REVISED PAGE NO.	SUMMARY
APR.05,2000	1	2. MECHANICAL SPECIFICATIONS (2) MODULE SIZE : 88.3W * 68.6H * 7.0 D (max.) mm → 88.3W * 68.6H * 7.5 D (max.) mm
	7	7. OUTLINE DIMENSION ① MODULE THICKNESS : 7.0max → 7.5 max ② FLEX CABLE : PITCH 1.25 → PITCH 1.0
	9	9. DETAIL DRAWING OF DOT MATRIX 57.59 L * 76.79 W → 76.79 L * 57.59 W
JUN.12,2000	1	2. MECHANICAL SPECIFICATIONS (2) MODULE SIZE : 88.3W * 68.6H * 7.5 D (max.) mm → 93.8W * 66.6H * 6.5 D (max.) mm
	7	7. OUTLINE DIMENSION ALL PAGE WAS CHANGED.
AUG.03,2000	2	3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS POWER SUPPLY FOR LED : VLED - VLSS : 4.0 V max → 5.0 V max
	3	ALL PAGE WAS CHANGED .
	10	11.1 POWER SUPPLY FOR LCM VEE - VSS = 18.0 → 21.5 V VLED - VLSS = 3.6 → 5.0 V

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 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
(8) DOT PITCH	-----	0.24W * 0.24H mm
(9) LCD TYPE	-----	FSTN, POSITIVE, BLACK/WHITE, TRANSFLECTIVE
(10) DRIVING METHOD	-----	1 / 240 DUTY MULTIPLEX DRIVE
(11) VIEWING DIRECTION	-----	6 O'CLOCK
(12) BACK LIGHT	-----	LED; COLOR : WHITE

### 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	—	—	1.0	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	- 2 0 °C	7 0 °C	- 2 0 °C	7 0 °C	NOTE ( 2 ), ( 3 )
HUMIDITY	—	8 5 % RH	—	8 5 % RH	WITHOUT CONDENSATION
VIBRATION	—	2 . 4 5 m/S <sup>2</sup> ( 0 . 2 5 G )	—	11.76 m/S <sup>2</sup> ( 1 . 2 G )	10---100HZ XYZ DIRECTIONS 1 Hr.EACH
SHOCK	—	2 9 . 4 m/S <sup>2</sup> ( 3 G )	—	4 9 0 m/S <sup>2</sup> ( 5 0 G )	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE ( 2 ) : Ta AT -20°C : 48HR MAX.  
70°C : 168HR MAX.

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

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

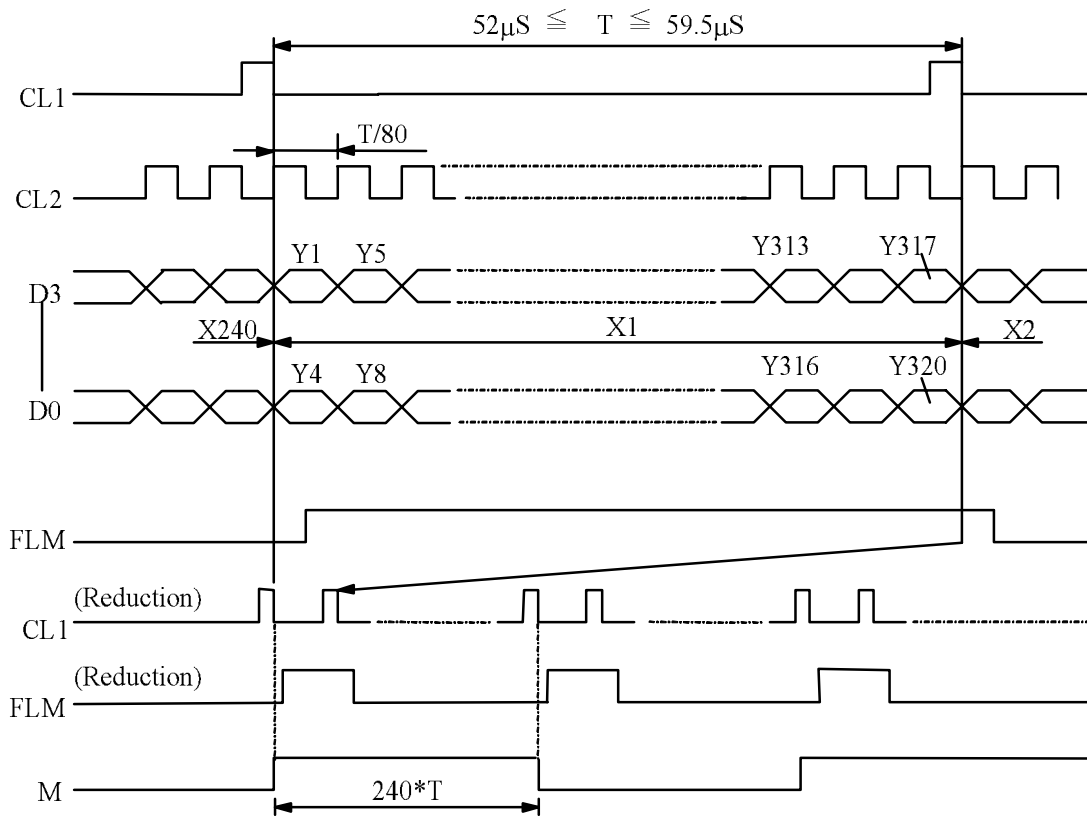
PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	2.5	—	5.0	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE – VSS	—	+15	—	+27	V
INPUT VOLTAGE NOTE ( 1 )	VIH	H LEVEL	0.8VDD	—	—	V
	VIL	L LEVEL	—	—	0.2VDD	V
POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD–VSS =3.0V VEE–VSS=21.5V	—	( 90 )	—	μA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD–VSS =3.0V VEE–VSS=21.5V	—	( 3.0 )	—	mA
CONTRAST ADJUST VOLTAGE	VEE – VSS ∅ = 10°, θ = 0° DUTY=1/240	Ta = -20 °C	—	( 24 )	—	V
		Ta = 25 °C	—	( 21.5 )	—	V
		Ta = 70 °C	—	( 18 )	—	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, M, D0, D1, D2, D3.

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

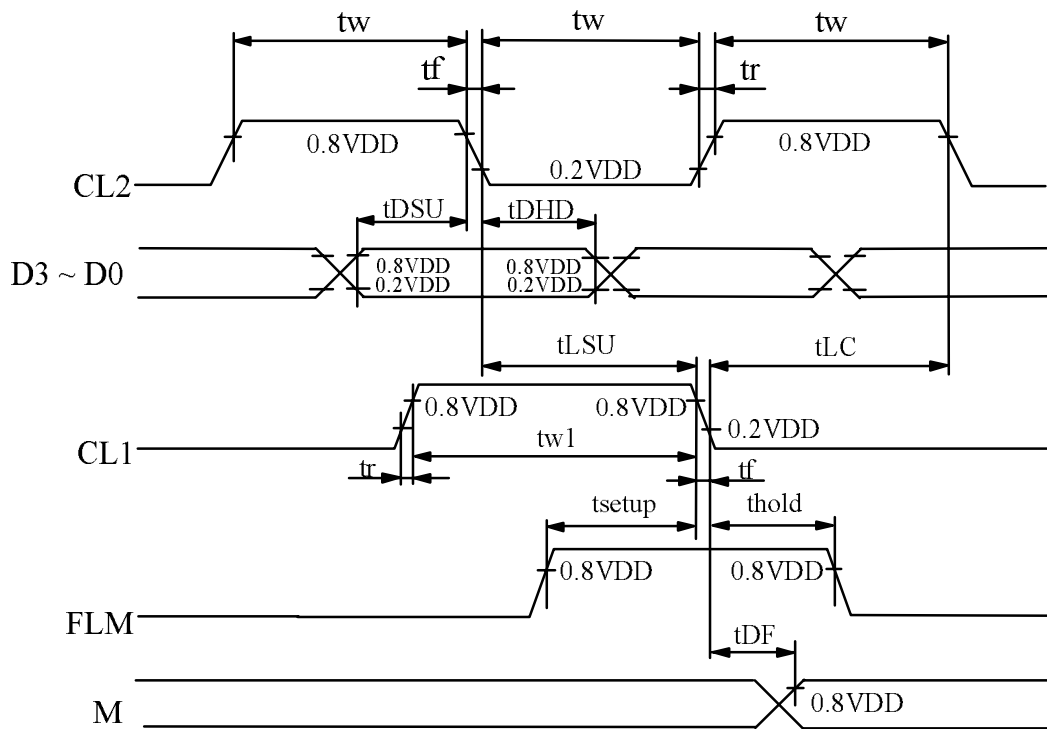
NOTE ( 3 ) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ± 1 . 0 V  
BY EACH MODULE.

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





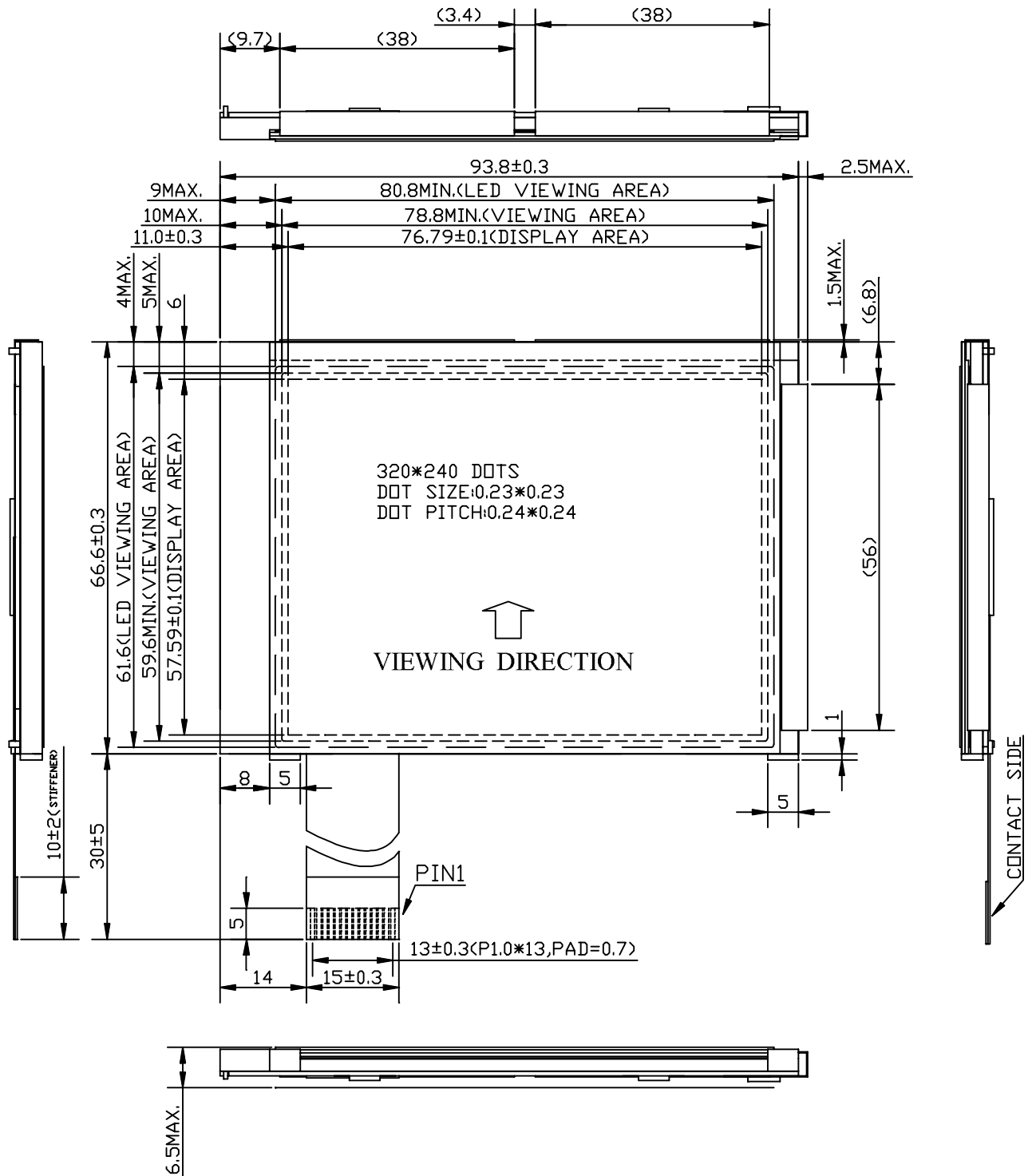
6. OPTICAL CHARACTERISTICS

Ta = 25 °C

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	$\varnothing 2 - \varnothing 1$	$K \geq 2.0$	50	—	—	deg.	1
CONTRAST	K	$\varnothing = 10^\circ$	5	—	—	—	1
RESPONSE TIME	tr (rise)	$\varnothing = 10^\circ$ $\theta = 0^\circ$	—	(330)	—	msec	1
	tf (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 <sup>2</sup>	1

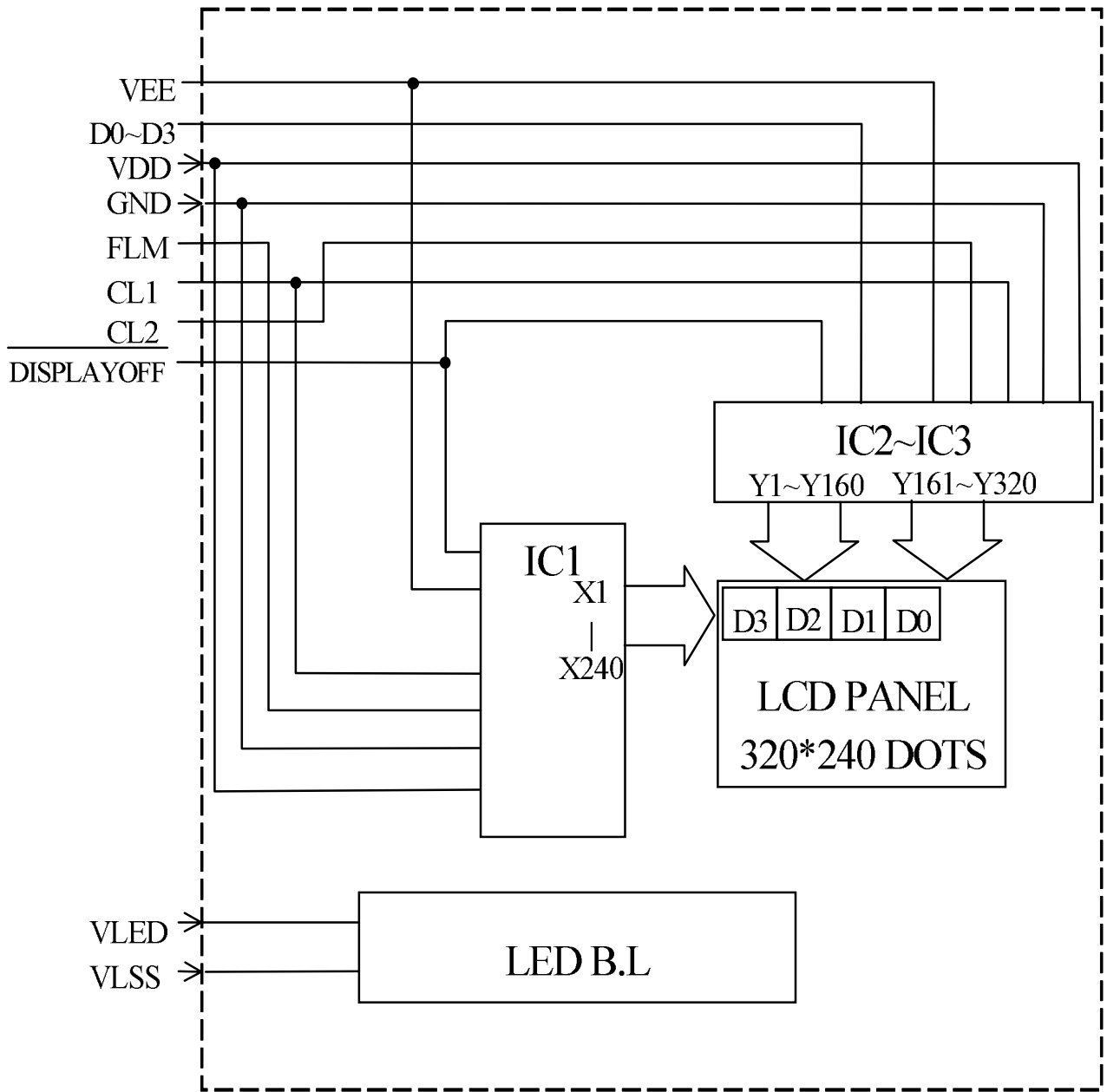
NOTE (1) : PLEASE REFER TO :  
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 002A)

7. OUTLINE DIMENSION

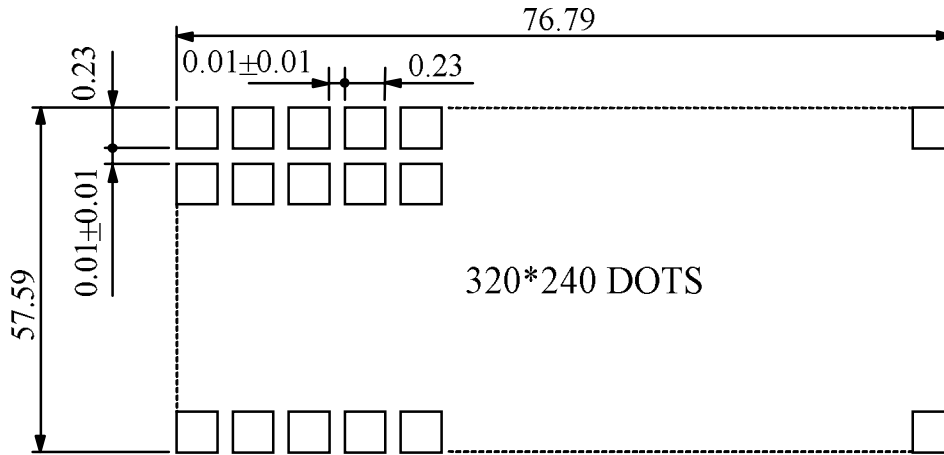


UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.5$

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



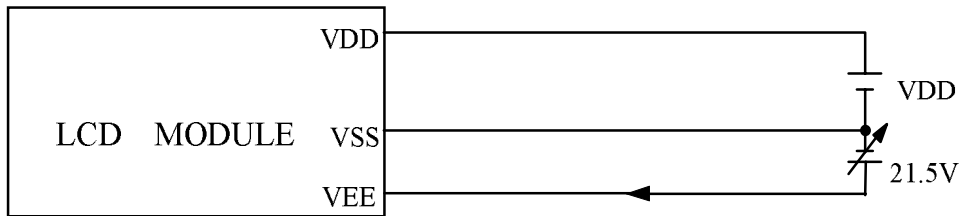
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS  $\pm 0.1$

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

1.1. POWER SUPPLY

1.1.1. POWER SUPPLY FOR LCM



1.1.2. POWER SUPPLY FOR LED BACK - LIGHT

