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APPROVED BY:		TOTAL PAGE : 10
<i>MS Huang</i>		VERSION : 5

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

32F92(LED TYPES)

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. 32F92(LED TYPES)	VERSION 5
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RECORDS OF REVISION	DOC . FIRST ISSUE	NOV.17,2000
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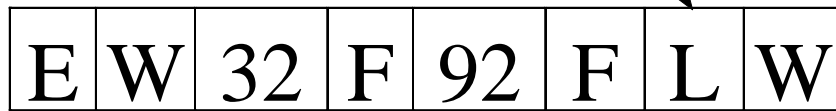
DATE	REVISED PAGE NO.	SUMMARY																																										
DEC.13,2000	1	2. MECHANICAL SPECIFICATIONS (2) MODULE SIZE : 116.8W * 97.9H * 8.9 D (max.) mm → 116.7W * 99.8H * 9.3 D (max.) mm																																										
	3	4. ELECTRICAL CHARACTERISTICS IDD = ( 90 ) μA → 0.3 mA , IEE = ( 3.0 ) → 2.5 mA																																										
	7	7. OUTLINE DIMENSION DIMENSION WAS CHANGED.																																										
	9	10. INTERFACE SIGNAL IF2 : 1. RIGHT → 1. BOTTOM 2. TOP → 2. LEFE 3. LEFE → 3. TOP 4. BOTTOM → 4. RIGHT																																										
MAR.01,2001	7	7. OUTLINE DIMENSION DIMENSION WAS CHANGED.																																										
	9	10. INTERFACE SIGNALS IF2 : 1.BOTTOM→LEFT,2. LEFT→TOP,3. TOP→RIGHT,4. RIGHT→ BOTTOM																																										
JUN.19,2002	2	3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS OPERATING : -10°C ~ 50°C → -10°C ~ 60°C STORAGE : -20°C ~ 60°C → -20°C ~ 70°C																																										
	3	4. ELECTRICAL CHARACTERISTICS CONTRAST ADJUST VOLTAGE : -10°C ~ 50°C → -10°C ~ 60°C DELETE NOTE ( 3 )																																										
FEB.13,2003	3	4. ELECTRICAL CHARACTERISTICS <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PARAMETER</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )</td> <td>IDD</td> <td>VDD-VSS=3.0V VEE-VSS=21.5V</td> <td>—</td> <td>0.3</td> <td>—</td> <td>mA</td> </tr> <tr> <td>POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )</td> <td>IEE</td> <td>VDD-VSS=3.0V VEE-VSS=21.5V</td> <td>—</td> <td>2.5</td> <td>—</td> <td>mA</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PARAMETER</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> <th>UNIT</th> </tr> </thead> <tbody> <tr> <td>POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )</td> <td>IDD</td> <td>VDD-VSS=3.0V VEE-VSS=21.5V</td> <td>—</td> <td>0.3</td> <td>0.52</td> <td>mA</td> </tr> <tr> <td>POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )</td> <td>IEE</td> <td>VDD-VSS=3.0V VEE-VSS=21.5V</td> <td>—</td> <td>2.5</td> <td>3.0</td> <td>mA</td> </tr> </tbody> </table>	PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD-VSS=3.0V VEE-VSS=21.5V	—	0.3	—	mA	POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD-VSS=3.0V VEE-VSS=21.5V	—	2.5	—	mA	PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD-VSS=3.0V VEE-VSS=21.5V	—	0.3	0.52	mA	POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD-VSS=3.0V VEE-VSS=21.5V	—	2.5	3.0	mA
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NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M



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

Backlight	Code value
WHITE	W

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 .

1.3 TOUCH PANEL SPECIFICATIONS PLEASE REFER TO :

E U - 3 0 0

2. MECHANICAL SPECIFICATIONS

( 1 ) NUMBER OF DOTS	-----	320W * 240H DOTS
( 2 ) MODULE SIZE	-----	116.7W * 99.8H * 9.3 D (max.) mm
( 3 ) EFFECTIVE AREA	-----	77.79W * 58.59H 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	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 .

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	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION
VIBRATION	—	2.45 m/S <sup>2</sup> (0.25 G)	—	11.76 m/S <sup>2</sup> (1.2 G)	10~100HZ XYZ DIRECTIONS 1 Hr.EACH
SHOCK	—	29.4 m/S <sup>2</sup> (3 G)	—	490 m/S <sup>2</sup> (50 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

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

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

4. ELECTRICAL CHARACTERISTICS

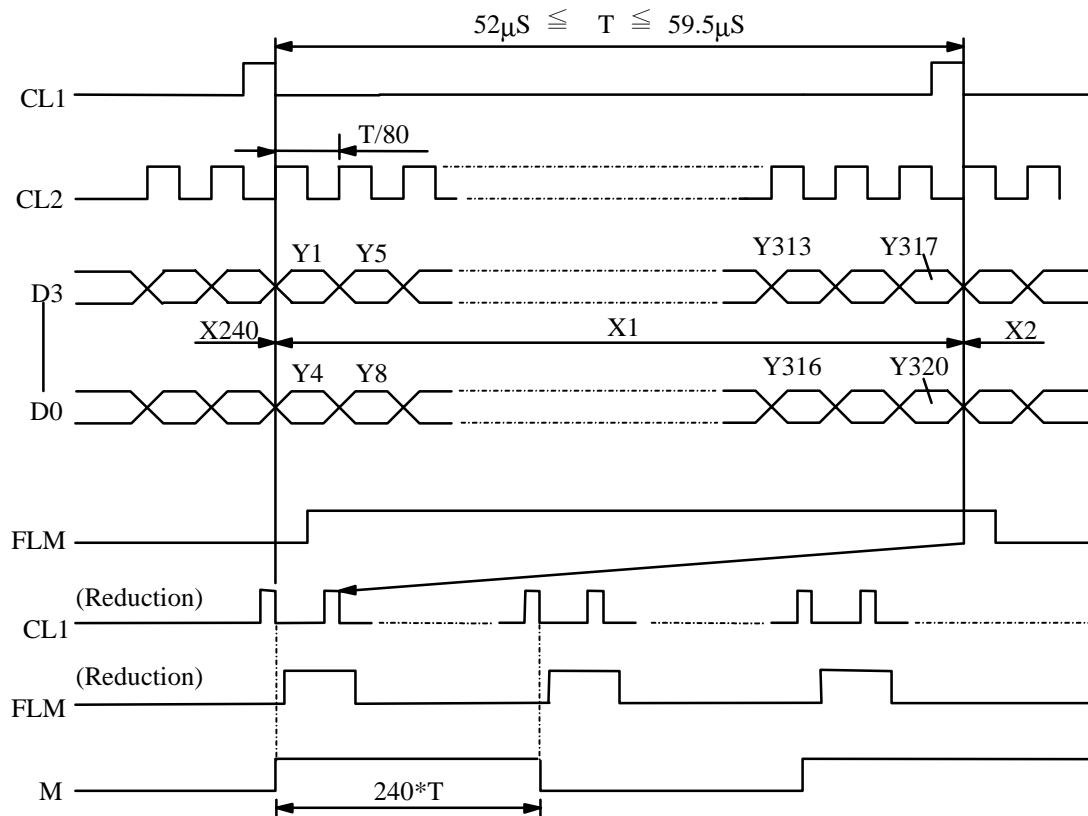
Ta = 25 °C

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	—	0.3	0.52	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD-VSS=3.0V VEE-VSS=21.5V	—	2.5	3.0	mA
CONTRAST ADJUST VOLTAGE	VEE - VSS ∅ = 10°, θ = 0° DUTY=1/240	Ta = -10 °C	23.2	24.2	25.2	V
		Ta = 25 °C	20.7	21.7	22.7	V
		Ta = 60 °C	17.2	18.2	19.2	V
CLOCK OSCILLATION FREQUENCY	fFLM	—	70	75	80	HZ
POWER SUPPLY FOR LED	VLLED - 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.

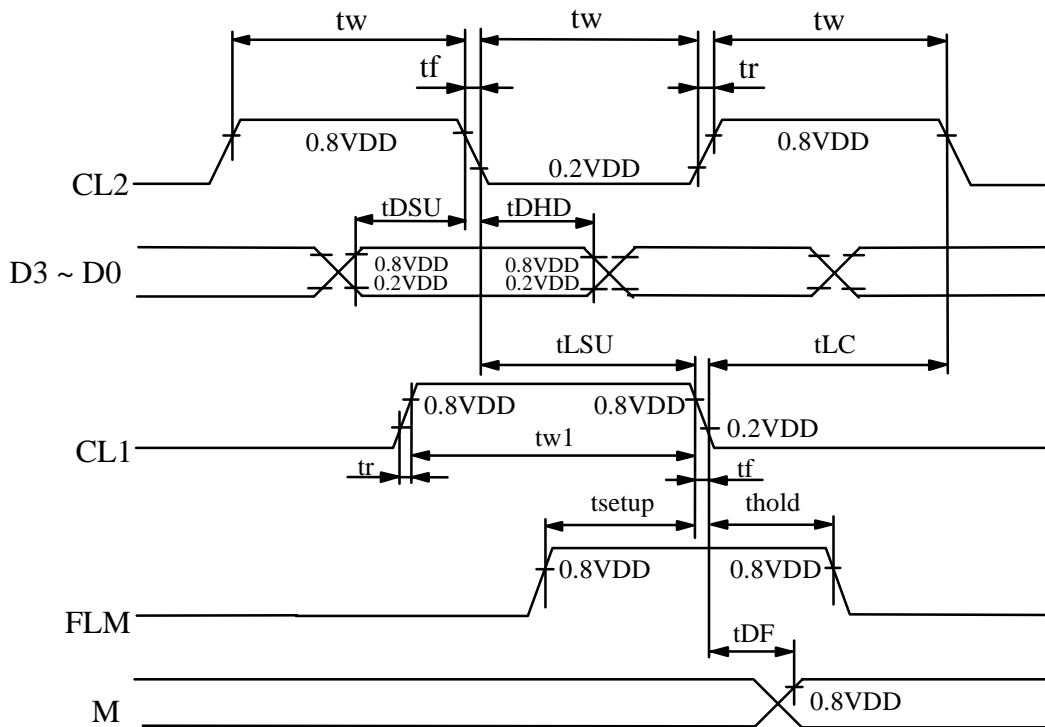
5. TIMING CHARACTERISTICS  
5.1 INTERFACE TIMING





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

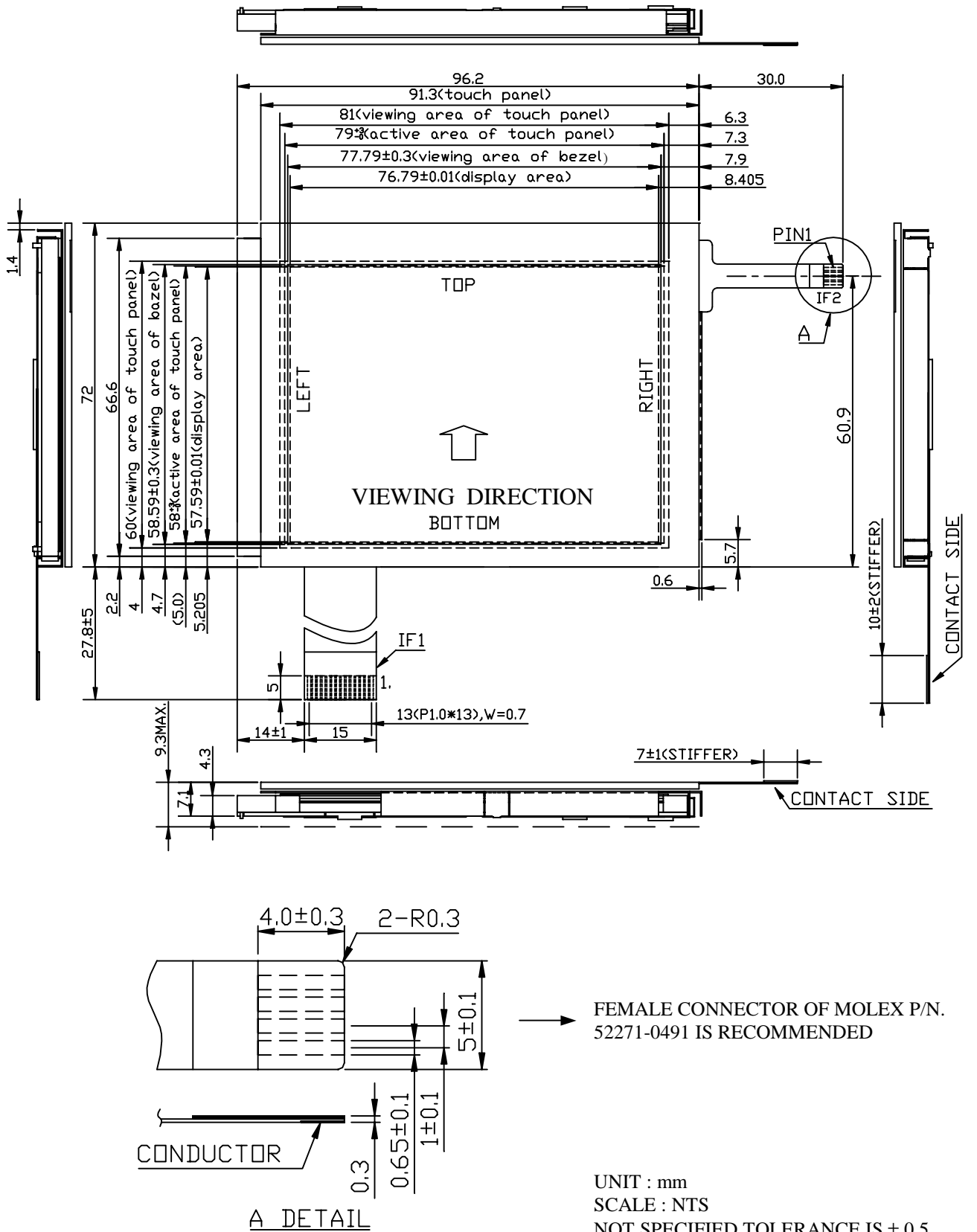
I T E M		SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE
VIEWING AREA	STN	∅ 2 - ∅ 1	K ≥ 2.0	—	40	—	deg.	1
	FSTN			50	—	—	deg.	1
CONTRAST RATIO	STN	K	∅ = 10°	3	—	—	—	1
	FSTN			5	—	—	—	1
RESPONSE TIME	t r ( rise )	∅ = 10° θ = 0°	∅ = 10° θ = 0°	—	( 330 )	—	msec	1
	t f ( fall )			—	( 330 )	—	msec	1
THE BRIGHTNESS OF BACK-LIGHT	B	∅ = 10° θ = 0°	∅ = 10° θ = 0°	10	—	—	cd/m <sup>2</sup>	1, 2
				13	—	—		1, 3

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

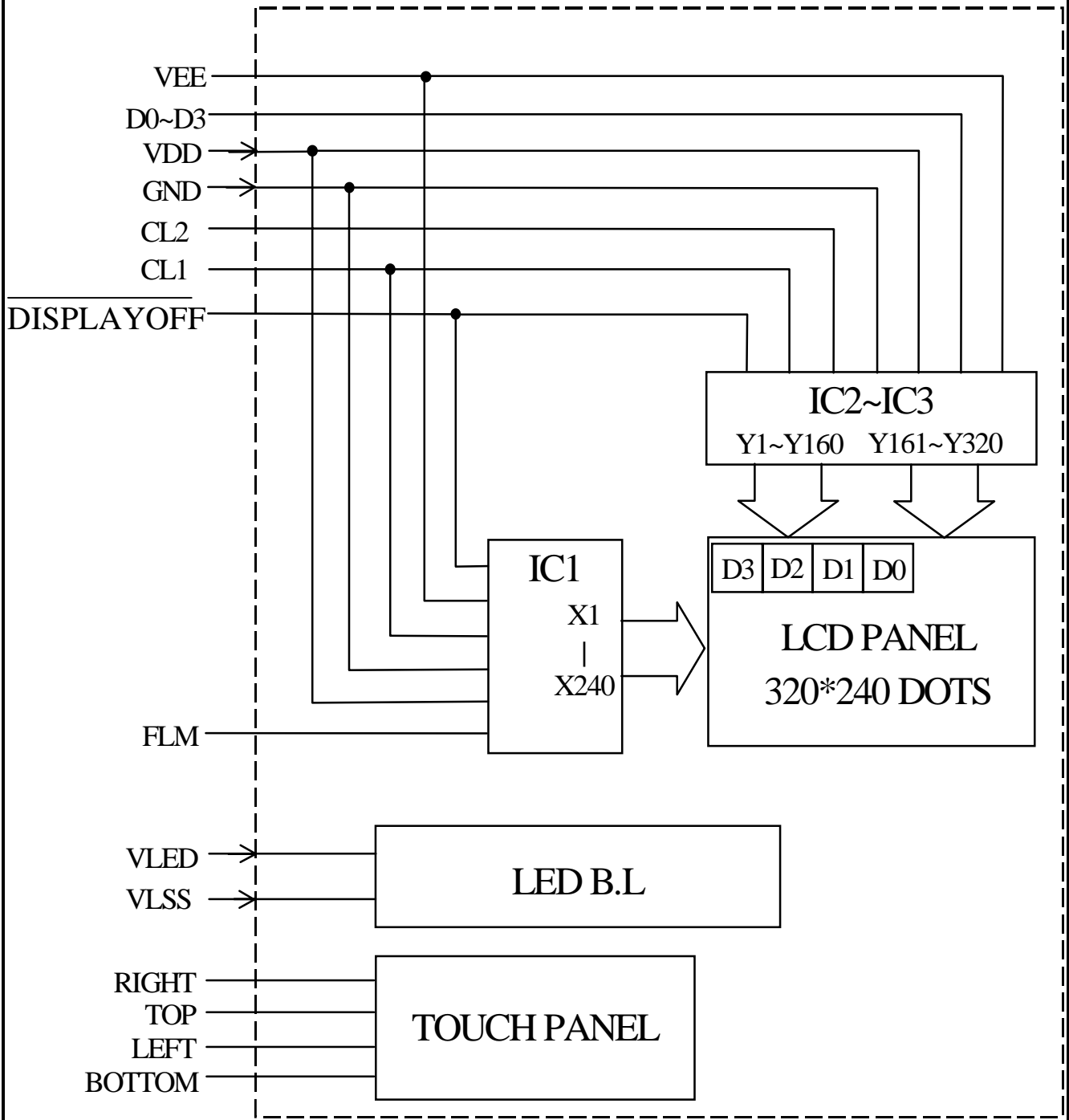
NOTE ( 2 ) : POLARIZER IS TRANSFLECTIVE TYPE .

NOTE ( 3 ) : POLARIZER IS TRANSMISSIVE TYPE .

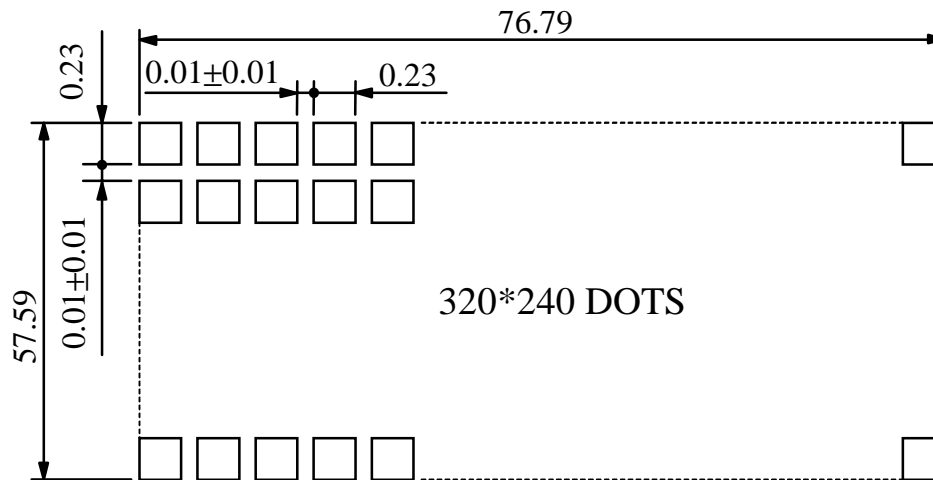
7. OUTLINE DIMENSION



8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

IF1 :

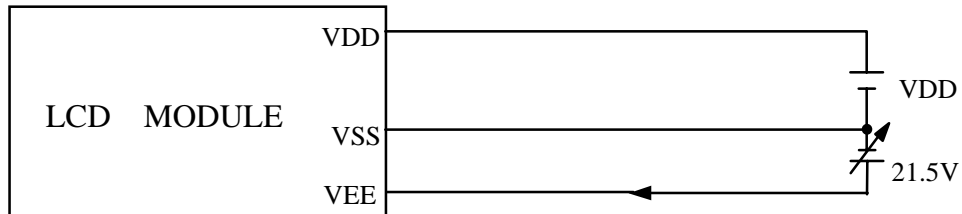
PIN NO.	SYMBOL	FUNCTION
1	VDD	POWER SUPPLY FOR LOGIC CIRCUIT.
2	VSS	GROUND.
3	VEE	POWER SUPPLY FOR LCD DRIVING VOLTAGE
4	FLM	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE.
5	N.C	NO CONNECTION
6	CL1	DISPLAY DATA LATCH.
7	CL2	DISPLAY DATA SHIFT.
8	D0	DISPLAY DATA
9	D1	DISPLAY DATA
10	D2	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

IF2 : TOUCH PANEL INTERFACE

PIN NO.	SYMBOL	FUNCTION
1	LEFT	LEFT SIDE
2	TOP	TOP
3	RIGHT	RIGHT SIDE
4	BOTTOM	BOTTOM

## 1 1 . POWER SUPPLY

### 1 1 .1 POWER SUPPLY FOR LCM



### 1 1 .2 POWER SUPPLY FOR LED BACK - LIGHT

