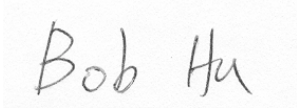



EXAMINED BY :  	<b>EMERGING DISPLAY</b>  TECHNOLOGIES CORPORATION	FILE NO . CAS-10248
APPROVED BY:  		ISSUE : APR.09,2002
TOTAL PAGE : 8		
VERSION : 2		

CUSTOMER

ACCEPTANCE

SPECIFICATIONS

MODEL NO. :

32FA2(LED TYPES)

FOR MESSRS :

\_\_\_\_\_

CUSTOMER'S APPROVAL

DATE :

\_\_\_\_\_

BY :

\_\_\_\_\_

RECORDS OF REVISION	DOC . FIRST ISSUE MAY.24,2001
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DATE	REVISED PAGE NO.	SUMMARY																																																			
APR.09,2002	2	3. ABSOLUTE MAXIMUM RATINGS VR7 - VSS → VEE - VSS DELETE : NOTE ( 2 )																																																			
	3	4. ELECTRICAL CHARACTERISTICS <table border="1"> <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>RECOMMENDED</td> <td>VEE - VSS</td> <td>Ta = -20 °C</td> <td>—</td> <td>24.2</td> <td>—</td> <td>V</td> </tr> <tr> <td rowspan="2">LCD DRIVING RESISTER VALUE NOTE ( 3 )</td> <td rowspan="2">∅ = 10° θ = 0° DUTY = 1/240</td> <td>Ta = 25 °C</td> <td>—</td> <td>21.7</td> <td>—</td> <td>V</td> </tr> <tr> <td>Ta = 60 °C</td> <td>—</td> <td>18.2</td> <td>—</td> <td>V</td> </tr> </tbody> </table> <table border="1"> <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>RECOMMENDED</td> <td>VEE - VSS</td> <td>Ta = -20 °C</td> <td>23.2</td> <td>24.2</td> <td>25.2</td> <td>V</td> </tr> <tr> <td rowspan="2">LCD DRIVING VOLTAGE</td> <td rowspan="2">∅ = 10° θ = 0° DUTY = 1/240</td> <td>Ta = 25 °C</td> <td>20.7</td> <td>21.7</td> <td>22.7</td> <td>V</td> </tr> <tr> <td>Ta = 60 °C</td> <td>17.2</td> <td>18.2</td> <td>19.2</td> <td>V</td> </tr> </tbody> </table> DELETE : NOTE ( 3 )	PARAMETER	SYMBOL	CONDITION	MIN .	TYP.	MAX .	UNIT	RECOMMENDED	VEE - VSS	Ta = -20 °C	—	24.2	—	V	LCD DRIVING RESISTER VALUE NOTE ( 3 )	∅ = 10° θ = 0° DUTY = 1/240	Ta = 25 °C	—	21.7	—	V	Ta = 60 °C	—	18.2	—	V	PARAMETER	SYMBOL	CONDITION	MIN .	TYP.	MAX .	UNIT	RECOMMENDED	VEE - VSS	Ta = -20 °C	23.2	24.2	25.2	V	LCD DRIVING VOLTAGE	∅ = 10° θ = 0° DUTY = 1/240	Ta = 25 °C	20.7	21.7	22.7	V	Ta = 60 °C	17.2	18.2	19.2
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JUN.03,2002	3	4. ELECTRICAL CHARACTERISTICS VEE - VSS : - 20 °C ~ 60 °C → - 10 °C ~ 60 °C																																																			

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

E W 3 2 F A 2 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.	OPTICAL CHARACTERISTICS -----	4
6.	OUTLINE DIMENSION -----	5
7.	BLOCK DIAGRAM -----	6
8.	DETAIL DRAWING OF DOT MATRIX -----	7
9.	INTERFACE SIGNALS -----	7, 8
10.	POWER SUPPLY -----	8

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 - S E D 1 3 3 5

2. MECHANICAL SPECIFICATIONS

( 1 ) NUMBER OF DOTS	-----	320W * 240H DOTS
( 2 ) MODULE SIZE	-----	126.2W * 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 .

PARAMETER	SYMBOL	MIN .	MAX .	UNIT	REMARK
POWER SUPPLY FOR LOGIC	VDD – VSS	2.7	5.5	V	
POWER SUPPLY FOR LCD DRIVING	VEE – VSS	—	27V	V	NOTE ( 2 )
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE ( 1 )
POWER SUPPLY FOR LED	VLED – VLSS	—	5	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 )	10~100 HZ XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m/s <sup>2</sup> ( 3 G )	—	490.0 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 .  
60°C : 168HR MAX .

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

4 . ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD-VSS = 5 . 0 V

PARAMETER	SYMBOL	CONDITION	MIN .	TYP.	MAX .	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	2.7	—	5.0	V
INPUT VOLTAGE NOTE ( 1 )	VIH	H LEVEL	0.5*VDD	—	—	V
	VIL	L LEVEL	—	—	0.2*VDD	V
OUTPUT VOLTAGE NOTE ( 1 )	VOH	H LEVEL	2.4	—	—	V
	VOL	L LEVEL	—	—	VSS+0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE ( 2 )	IDD	VDD – VSS = 5 . 0 V VEE – VSS = 21.7V	—	16.0	—	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE ( 2 )	IEE	VDD – VSS = 5 . 0 V VEE – VSS = 21.7V	—	6.0	—	mA
RECOMMENDED LCD DRIVING 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	f <sub>osc</sub>	—	—	8	—	MHZ
POWER SUPPLY FOR LED	VLED – VLSS	IF = 100 mA	—	5	—	V

NOTE ( 1 ) : APPLIED TO TERMINALS D0 TO D7 , A0 ,  $\overline{CS}$  ,  $\overline{RD}$  ,  $\overline{WR}$  .

NOTE ( 2 ) : THE DISPLAY PATTERN IS ALL “OFF” / “ON” .

5. 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 <sup>2</sup>	1 , 2
				13	—	—		1 , 3

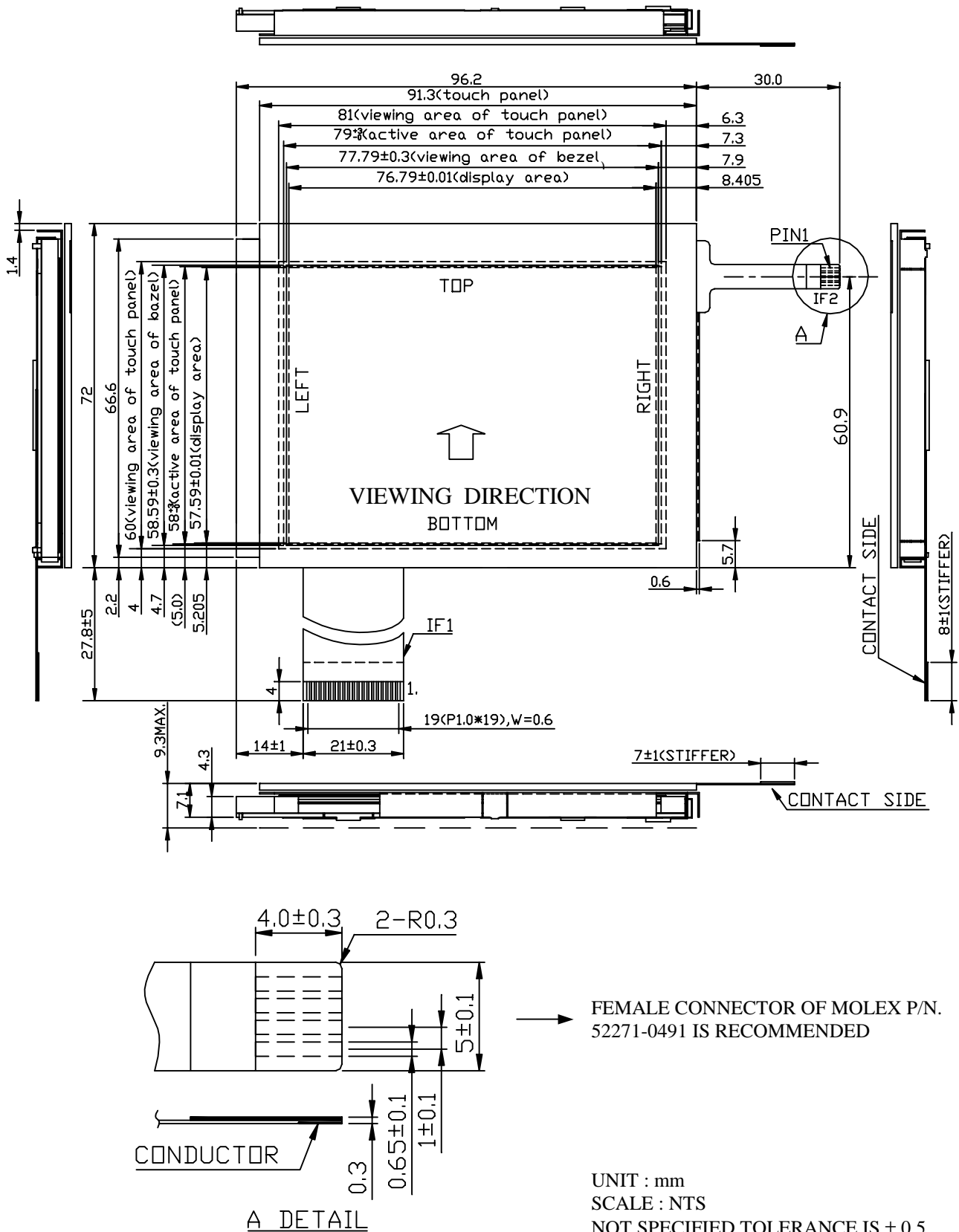
NOTE ( 1 ) : PLEASE REFER TO :  
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. ( EU - 002A)

NOTE ( 2 ) : POLARIZER IS TRANSFLECTIVE TYPE .

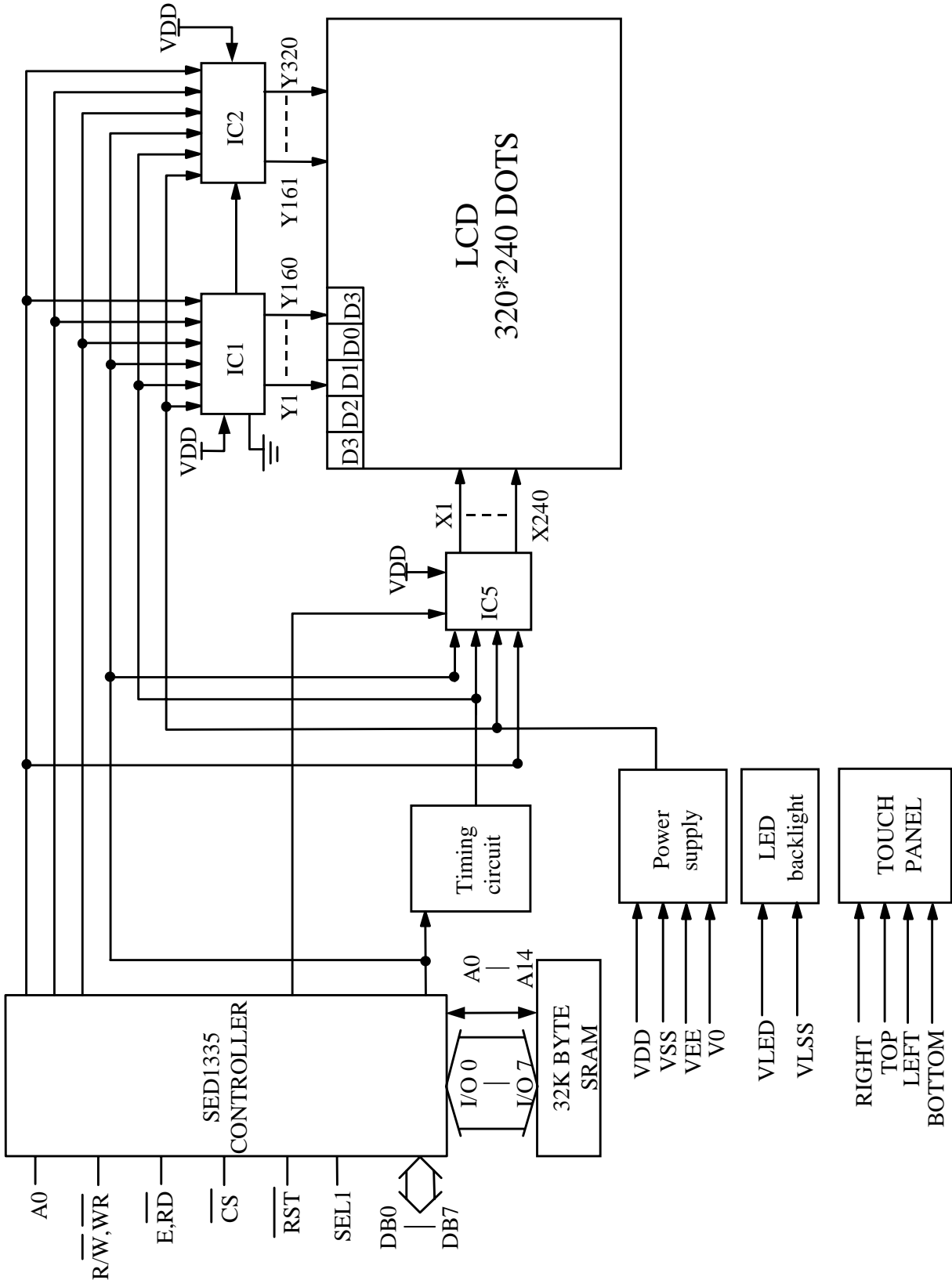
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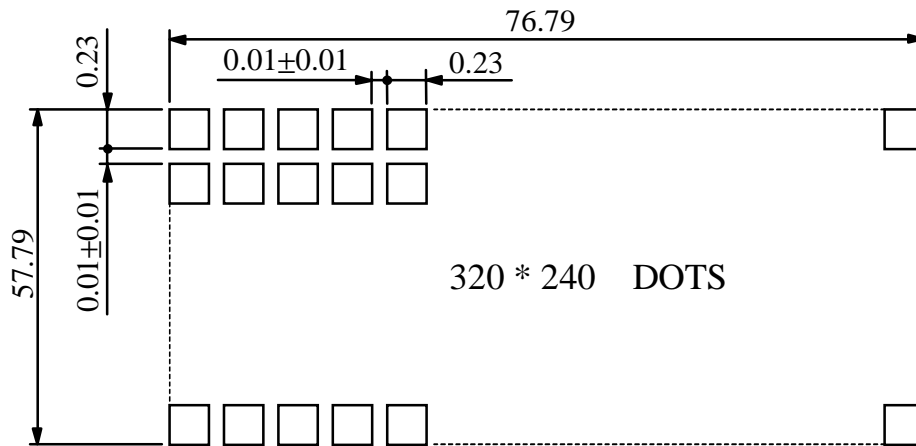
6. OUTLINE DIMENSION



7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX



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

9. INTERFACE SIGNALS

IF1:

PIN NO	SYMBOL	LEVEL	FUNCTION																				
1	VSS	—	GROUND																				
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT																				
3	N.C	—	N.C.																				
4	A0	—	8080 FAMILY INTERFACE																				
			<table border="1"> <thead> <tr> <th>AO</th> <th><math>\overline{RD}</math></th> <th><math>\overline{WR}</math></th> <th>FUNCTION</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> <td>STATUS FLAG READ</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>DISPLAY DATA AND CURSOR ADDRESS READ</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>DISPLAY DATA AND PARAMETER WRITE</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>COMMAND WRITE</td> </tr> </tbody> </table>	AO	$\overline{RD}$	$\overline{WR}$	FUNCTION	0	0	1	STATUS FLAG READ	1	0	1	DISPLAY DATA AND CURSOR ADDRESS READ	0	1	0	DISPLAY DATA AND PARAMETER WRITE	1	1	0	COMMAND WRITE
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5	$\overline{WR,R/W}$	H/L	8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW WRITE STROBE . 6800 FAMILY INTERFACE ACTS AS THE READ/ WRITE CONTROL SIGNAL .																				
6	$\overline{RD,E}$	H/L	8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW READ STROBE . 6800 FAMILY INTERFACE ACTS AS THE ACTIVE-HIGH ENABLE CLOCK																				

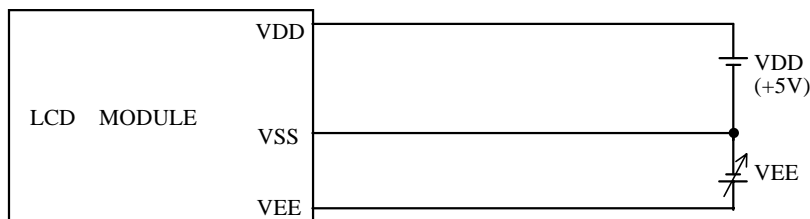
7	D0	H/L	DISPLAY DATA
14	D7		
15	$\overline{CS}$	H/L	CHIP SELECT
16	$\overline{RST}$	H/L	RESET
17	VEE	—	CONNECTION RESISTER TO GND (FOR CONTRST ADJUST)
18	SEL1	H/L	8080 OR 6800 FAMILY INTERFACE SELECT , NC OR H:6800 , L:8080
19	VLED	—	POWER SUPPLY FOR LED B.L
20	VLSS	—	POWER SUPPLY FOR LED B.L

IF2:

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

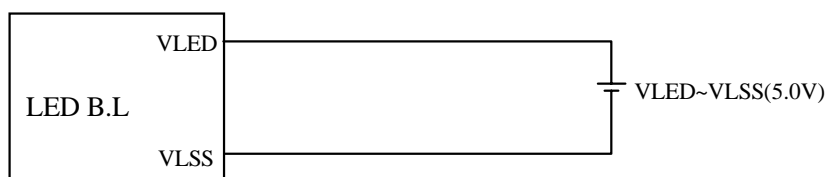
## 10. POWER SUPPLY

### 10.1 POWER SUPPLY FOR LCM



VEE - VSS : LCD DRIVING VOLTAGE

### 10.2 POWER SUPPLY FOR LED BACK - LIGHT



### 10.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

