EXAMINED BY : *Kevin Kuo*	EMERGING DISPLAY	FILE NO . CAS-10395
APPROVED BY: *Eric Lew*	TECHNOLOGIES CORPORATION	ISSUE : OCT.27,2005
		TOTAL PAGE : 8
		VERSION : 2

CUSTOMER   ACCEPTANCE   SPECIFICATIONS

MODEL   NO . :

32FY0(LED TYPES)

(RoHS)

FOR   MESSRS :

_____

CUSTOMER'S APPROVAL

DATE :

_____

BY :

_____

RECORDS OF REVISION	DOC. FIRST ISSUE APR.06,2005

DATE	REVISED PAGE NO.	SUMMARY
OCT.27,2005	0-2	NUMBERING SYSTEM ADD Polarizer P : PG type NIL : Normal EW32FY0FLW → EW32FY0FLW*P ADD *P : PG TYPE ONLY FOR EW32FY0FLWP
	1	1.1 GENERAL SPECIFICATIONS EU-002A → EU-002B
	2	3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-20°C	70°C	NOTE(2),(3) →
HUMIDITY	—	85 % RH	—	85 % RH	WITHOUT CONDENSATION

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-20°C	70°C	-20°C	70°C	NOTE(1),(3)
HUMIDITY	NOTE(2)		NOTE(2)		WITHOUT CONDENSATION

NOTE (3) → NOTE (1)
ADD NOTE (2)
NOTE (2) : Ta AT -20°C : 48HR MAX.
           70°C : 168HR MAX. →
NOTE (3) : Ta AT -20°C : WILL BE < 48hr
           70°C : WILL BE < 168hr

DATE	REVISED PAGE NO.	SUMMARY
	3	4. ELECTRICAL CHARACTERISTICS RECOMMENDED LCD DRIVING VOLTAGE : $\varnothing = 10°$ $\theta = 0°$ DUTY $=1/240$ → $\theta y\text{-} = 10°$ $\theta x = 0°$ DUTY $=1/242$
	4	5. OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE STN	∅2-∅1	K ≥ 2.0	—	40	—	deg.	1
VIEWING ANGLE FSTN			50	—	—	deg.	1
CONTRAST RATIO STN	K	∅=10°	1.5	3.0	—	—	1
CONTRAST RATIO FSTN		θ=0°	1.5	3.1	—	—	1
RESPONSE TIME tr(rise) ∅=10° θ=0°		TA=-20°C	—	4500	9000	ms	1 →
		TA=25°C		300	600		
		TA=70°C		70	140		
tf(fall) ∅=10° θ=0°		TA=-20°C	—	3000	6000		
		TA=25°C		190	380		
		TA=70°C		90	180		
THE BRIGHTNESS OF MODULE	L	VLED-VSS=5.0V	8	10	—	cd/m²	1,3
			12	15	—		1,4

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE θy+	K*	θx=0°	45	50	—	deg.	1
θy-			45	50	—		
θx+		θy=0°	40	45	—	deg.	1
θx-			30	35	—		
CONTRAST RATIO STN	K	θy-=10°,θx=0°	1.5	3.0	—	—	1
FSTN			1.5	3.1	—	—	1
			1.5	5.9	—	—	1,4
RESPONSE TIME tr(rise) θy-=10° θx=0°		Ta=-20°C	—	4500	5850	msec	1
		Ta=25°C		300	390		
		Ta=70°C		70	91		
tf(fall)		Ta=-20°C	—	3000	3900		
		Ta=25°C		190	247	msec	
		Ta=70°C		90	117		
THE BRIGHTNESS OF MODULE	L	VLED-VLSS=5.0V	8	10	—		1,2
			12	15	—	cd/m²	1,3
			6.4	8.0	—		1,4

NOTE (1) : EU-002A → EU-002B

DATE	REVISED PAGE NO.	SUMMARY
	6	7. BLOCK DIAGRAM DB0 ~ DB7 → D0 ~ D7
	8	10.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL 5V → VDD , 4.75V → 0.5*VDD , GND → VSS

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

Backlight	Code Value
White	W

Polarizer
P : PG type
NIL : Normal

E W 3 2 F Y 0 F L W *P

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

*P : PG TYPE ONLY FOR EW32FY0FLWP

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EMERGING DISPLAY	MODEL NO.	VERSION	PAGE
TECHNOLOGIES CORPORATION	32FY0(LED TYPES) (RoHS)	2	0-3

T A B L E   O F   C O N T E N T S

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1.   GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS
PLEASE REFER TO :

CUSTOMER   ACCEPTANCE   STANDARD   SPECIFICATIONS :

E U - 0 0 2 B

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :
PLEASE REFER TO :

E P S O N - S 1 D 1 3 7 0 0

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL
SPECIFICATIONS .

1.4 MATERIAL SAFETY DESCRIPTION
ASSEMBLIES SHALL COMPLY WITH EUROPEAN ROHS REQUIREMENTS,
INCLUDING PROHIBITED MATERIALS/COMPONENTS CONTAINING
LEAD,MERCURY, CADMIUM, HEXAVALENT CHROMIUM,
POLYBROMINATED BIPHENYLS (PBB) AND POLYBROMINATED
DIPHENYL ETHERS (PBDE)

2.   MECHANICAL SPECIFICATIONS

(1) NUMBER OF DOTS   -------------------------- 320W * 240H DOTS

(2) MODULE SIZE   -------------------------------- 96.3W * 66.6H * 8.5D (max.)mm
(NOT INCLUDED FFC LENGTH)

(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 / 242 DUTY MULTIPLEX DRIVE

(9) BACKLIGHT   ----------------------------------- LED , COLOR : WHITE

(10) VIEWING DIRECTION   ----------------------- 6 O'CLOCK

* 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	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	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	-20°C	70°C	NOTE (1),(3)
HUMIDITY	NOTE (2)		NOTE (2)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m/s2 (0.25 G)	—	11.76 m/s2 (1.2 G)	10~100 Hz XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m/s2 (3 G)	—	490.0 m/s2 (50 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (1) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT
TEMPERATURE THIS PHENOMENON IS REVERSIBLE .
NOTE (2) : Ta $\leq$ 60°C , 90%RH MAX.(96hr MAX.)
Ta > 60°C ABSOLUTE HUMIDITY MUST BE
LOWER THAN THE HUMIDITY OF 90%RH AT 60°C.(96hr MAX.)
NOTE (3) : Ta AT -20°C : WILL BE < 48hr
70°C : WILL BE < 168hr

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	—	3.3	—	5.5	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE – VSS	—	+15	—	+27	V
INPUT VOLTAGE	VIH	H LEVEL	0.5*VDD	—	—	V
NOTE (1)	VIL	L LEVEL	—	—	0.2*VDD	V
OUTPUT VOLTAGE	VOH	H LEVEL	2.4	—	—	V
NOTE (1)	VOL	L LEVEL	—	—	VSS+0.4	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD – VSS = 5 . 0 V VEE – VSS = 21.7 V	—	16.0	23.0	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD – VSS = 5 . 0 V VEE – VSS = 21.7 V	—	6.0	9.0	mA
RECOMMENDED LCD DRIVING VOLTAGE	VEE – VSS θy-=10° θx= 0° DUTY =1/242	Ta =-20 °C NOTE(3)	21.5	22.5	23.5	V
		Ta = 25 °C NOTE(4)	20.7	21.7	22.7	V
		Ta = 70 °C NOTE(4)	19.9	20.9	21.9	V
CLOCK OSCILLATION FREQUENCY	f OSC	—	—	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) :   THIS DISPLAY PATTERN IS ALL " OFF " / " ON" .

NOTE (3) :   THIS DISPLAY PATTERN IS BAR (ONLY , Ta=-20°C)

NOTE (4) :   THIS DISPLAY PATTERN IS ALL "Q".

5. OPTICAL CHARACTERISTICS

Ta = 2 5 °C   VDD = 5 . 0 V

| I T E M		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE		θy+	K *	θx=0°	45	50	—	d e g .	1
		θy-			45	50	—		
		θx+		θy=0°	40	45	—	d e g .	1
		θx-			30	35	—		
CONTRAST RATIO	STN	K	θy -=10°, θx=0°		1.5	3.0	—	—	1
	FSTN				1.5	3.1	—	—	1
					1.5	5.9	—	—	1 , 4
RESPONSE TIME		t r (rise)	θy -=10° θx=0°	Ta=-20°C	—	4500	5850	msec	1
				Ta=25°C	—	300	390		
				Ta=70°C	—	70	91		
		t f (fall)		Ta=-20°C	—	3000	3900	msec	1
				Ta=25°C	—	190	247		
				Ta=70°C	—	90	117		
THE BRIGHTNESS OF MODULE		L	VLED-VLSS=5.0V		8	10	—	cd/m$_2$	1 , 2
					12	15	—		1 , 3
					6.4	8.0	—		1 , 4
THE UNIFORMITY OF MODULE		—			—	—	30	%	2

NOTE (1) :   PLEASE REFER TO :
  CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU – 002B)
NOTE (2) :   BRIGHTNESS AT GLASS SURFACE(NEGATIVE GLASS DISPLAY ALL "ON"
  POSITIVE GLASS DISPLAY ALL "OFF")
NOTE (3) :   POLARIZER IS TRANSFLECTIVE TYPE.
NOTE (4) :   POLARIZER IS TRANSMISSIVE TYPE.

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6. OUTLINE DIMENSIONS

(9.7) (38) (3.4) (38)

93.8±0.3　　2.5 MAX.

9 MAX.　80.8 MIN.(LED VIEWING AREA)

10 MAX.　78.8 MIN.(VIEWING AREA)

11.0±0.3　76.79±0.1(DISPLAY AREA)

1.5 MAX.　(6.8)

4 MAX.　5 MAX.　6

320*240 DOTS
DOT SIZE:0.23*0.23
DOT PITCH:0.24*0.24

66.6±0.3

61.6(LED VIEWING AREA)

59.6 MIN.(VIEWING AREA)

57.59±0.1(DISPLAY AREA)

(56)

CONTACT SIDE

8　5

5　1

25.5±5

PIN1

4

19(P1.0*19),W=0.6

0.3±0.05

14　21±0.3

8±1(STIFFENER)

8.5 MAX.

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

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7. BLOCK DIAGRAM

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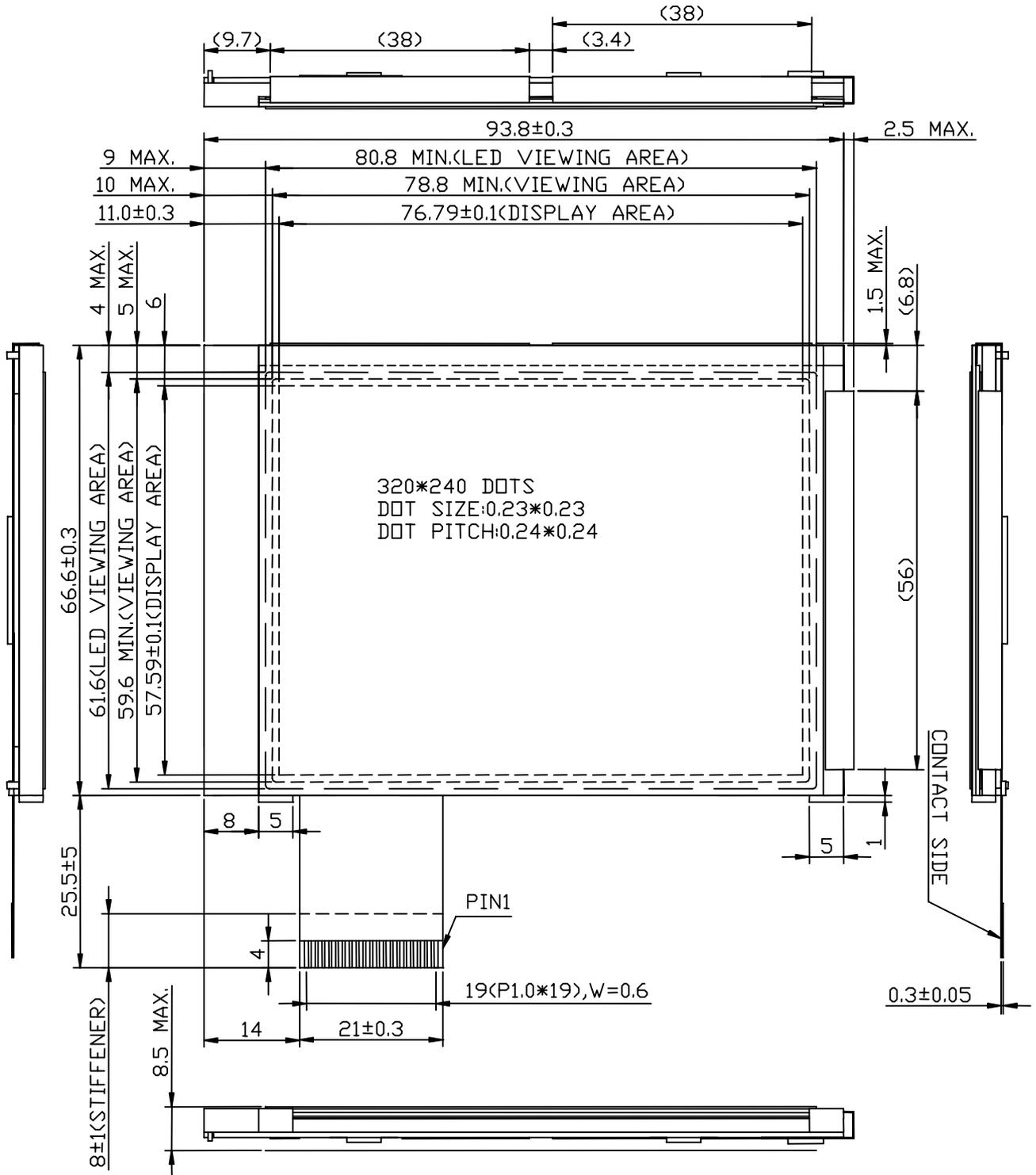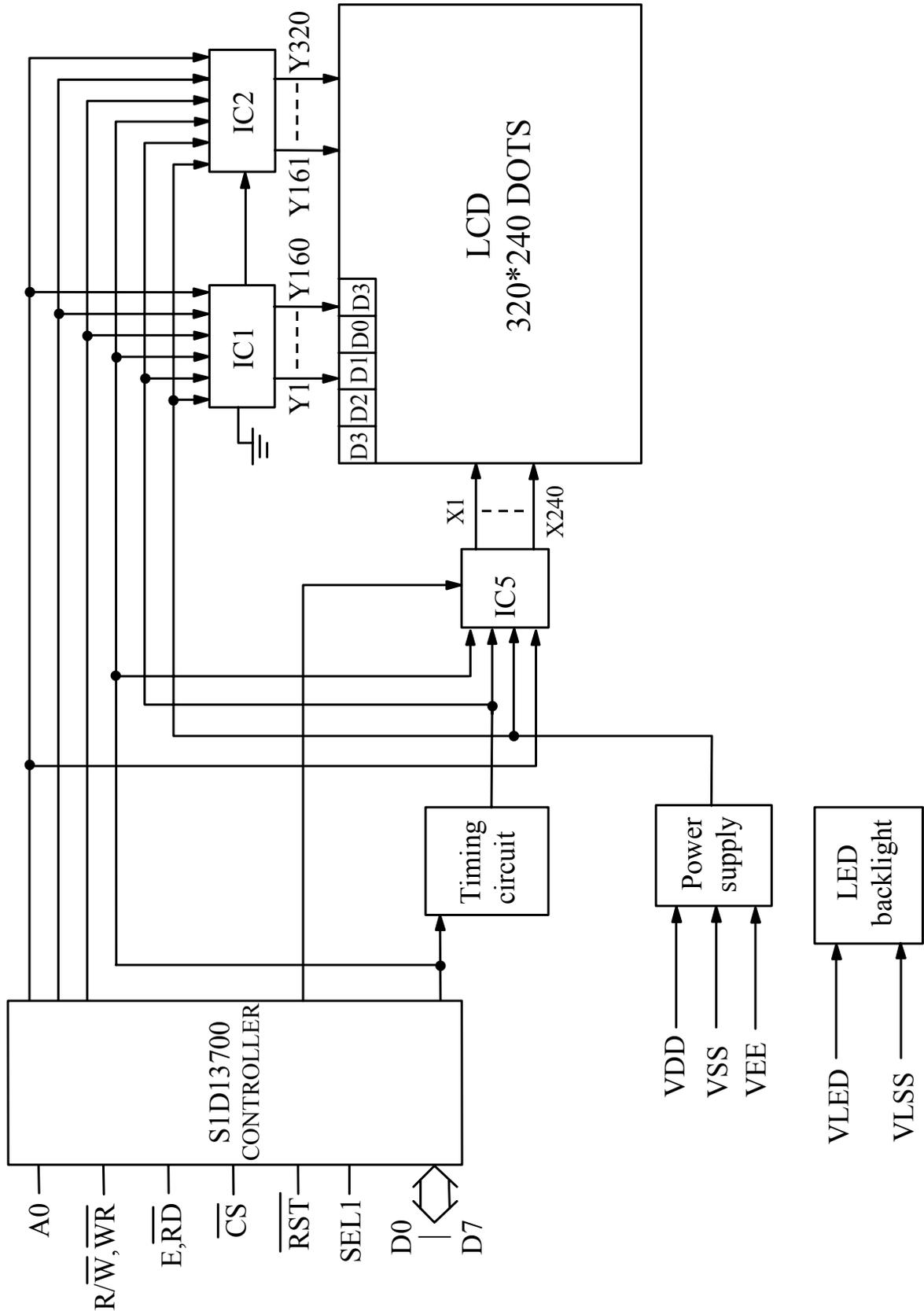
8. DETAIL DRAWING OF DOT MATRIX

320 * 240   DOTS

76.79

57.79

0.23

0.01±0.01

0.23

0.01±0.01
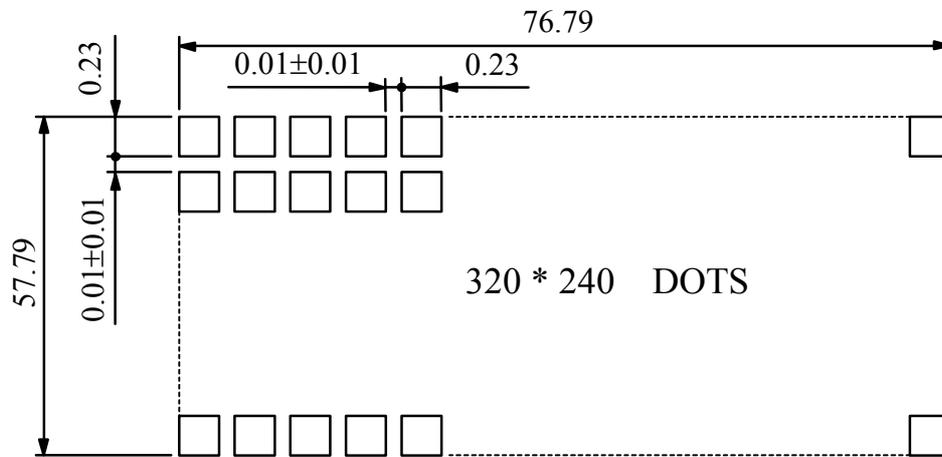
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.1

9. INTERFACE SIGNALS

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

8080 FAMILY INTERFACE

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

6800 FAMILY INTERFACE

AO	$R/\overline{W}$	E	FUNCTION
0	1	1	STATUS FLAG READ
1	1	1	DISPLAY DATA AND CURSOR ADDRESS READ
0	0	1	DISPLAY DATA AND PARAMETER WRITE
1	0	1	COMMAND WRITE

PIN NO	SYMBOL	LEVEL	FUNCTION
5	$\overline{WR}, R/\overline{W}$	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 | 14	D0 | D7	H/L	DISPLAY DATA
15	$\overline{CS}$	H/L	CHIP SELECT
16	$\overline{RST}$	H/L	RESET
17	VEE	—	POWER SUPPLY FOR LCD DRIVING
18	SEL1	H/L	8080 OR 6800 FAMILY INTERFACE SELECT , H:6800 , L:8080
19	VLED	—	POWER SUPPLY FOR LED B.L
20	VLSS	—	POWER SUPPLY FOR LED B.L

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1 0．POWER SUPPLY

1 0.1 POWER SUPPLY FOR LCM
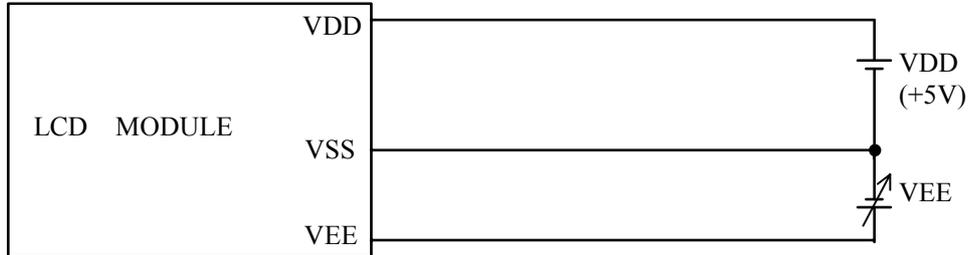
VEE − VSS : LCD DRIVING VOLTAGE

1 0.2 POWER SUPPLY FOR LED BACK - LIGHT

1 0.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

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