EXAMINED BY : Tony Chen	EMERGING DISPLAY	FILE NO . CAS-10425
		ISSUE : JUL.14,2006
APPROVED BY: David Chang	TECHNOLOGIES CORPORATION	TOTAL PAGE : 10
		VERSION : 2

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO. :

32F90(LED TYPES)

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

SEP.06,2005

DATE	REVISED PAGE NO.	SUMMARY
JUL.14,2006	3	4 . ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	3.3	—	5.5	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD–VSS =5.0V VLCD–VSS=21.7V	—	0.3	0.6	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	ILCD		—	2.5	5.0	mA

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PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
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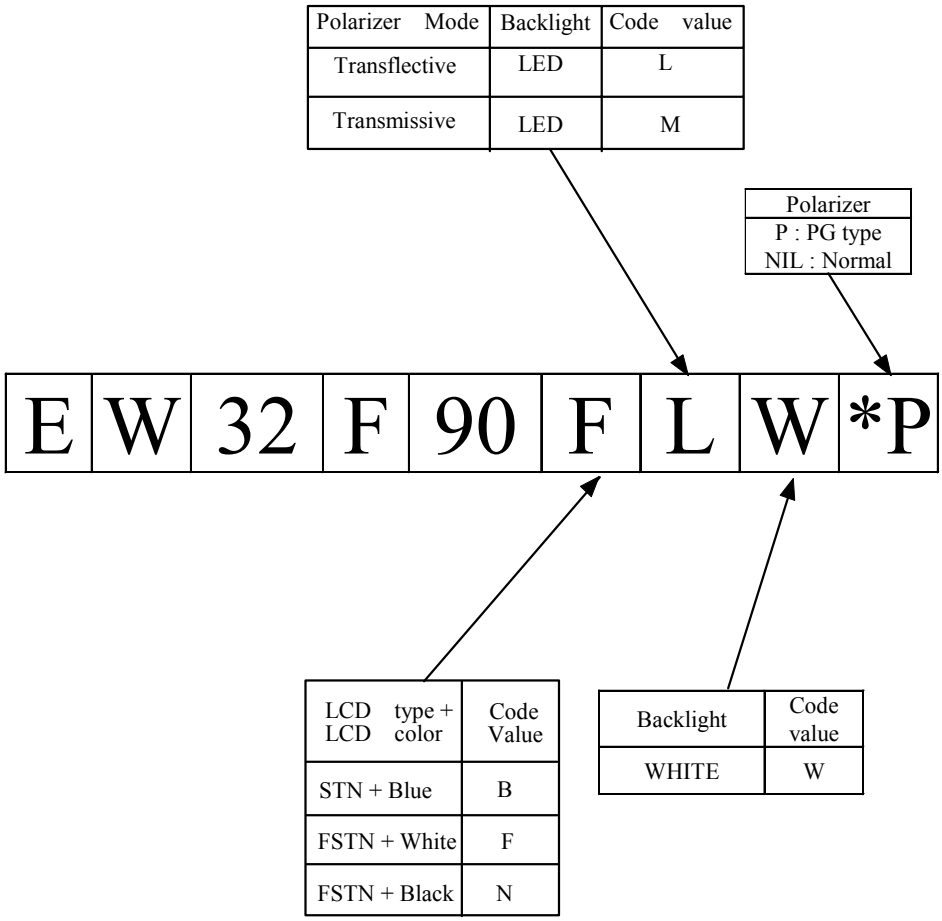
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)	IDD	VDD–VSS =3.0V & 5.0V VLCD–VSS=21.7V	—	0.3	0.6	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	ILCD		—	2.5	5.0	mA

NUMBERING SYSTEM



*P : PG TYPE ONLY FOR EW32F90FLWP

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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 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

1.3 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 * 7.0 D (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 / 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	0	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VLCD – 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	-20 °C	70 °C	NOTE (1), (3)
HUMIDITY	NOTE (2)		NOTE (2)		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 (1) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE.
NOTE (2) : ON NORMAL SITUATION : Ta ≤ 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) : ON NORMAL SITUATION : Ta AT -20°C : WILL BE < 48hr
70°C : WILL BE < 168hr

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	3.0	—	5.5	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VLCD – 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 & 5.0V VLCD–VSS=21.7V	—	0.3	0.6	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	ILCD		—	2.5	5.0	mA
CONTRAST ADJUST VOLTAGE	VLCD – VSS DUTY=1/240 θy -=10° , θx=0°	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
FLM 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.

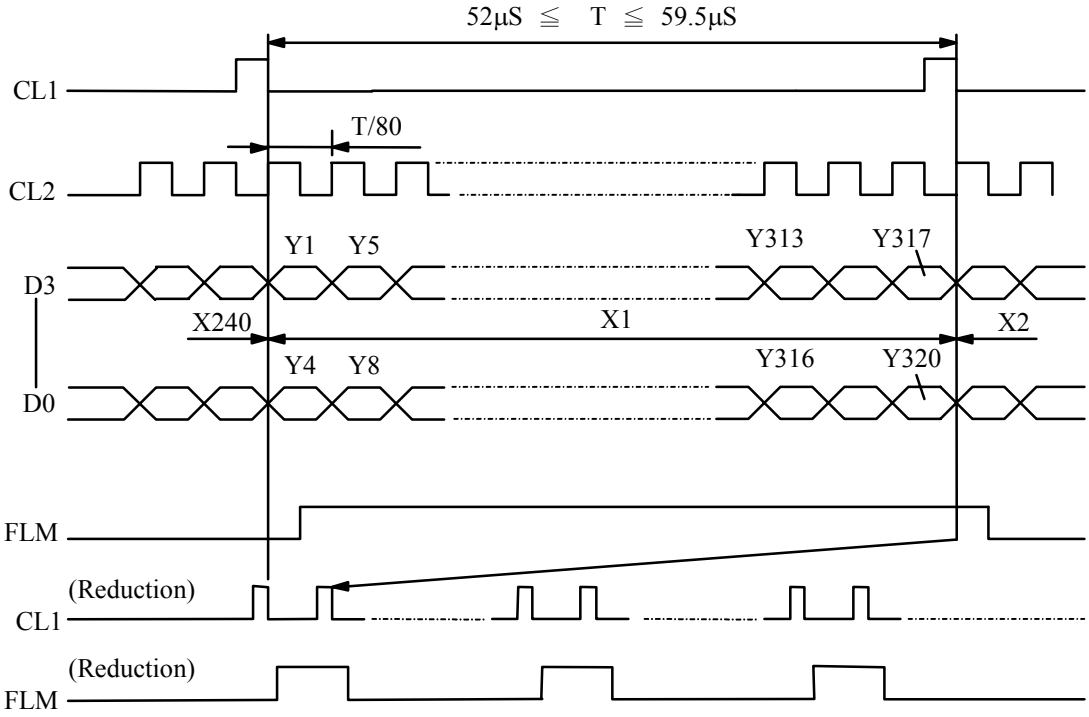
NOTE (2) : THIS DISPLAY PATTERN IS ALL ON OR OFF.

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

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

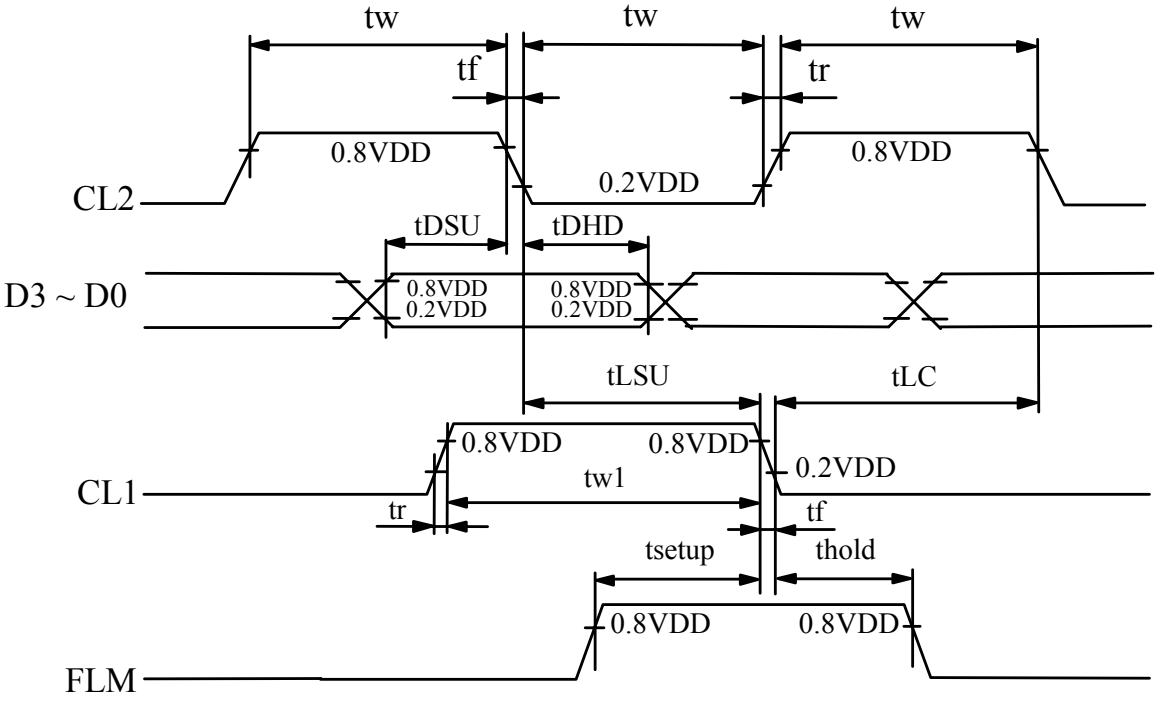
5 . TIMING CHARACTERISTICS

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



6. OPTICAL CHARACTERISTICS

Ta = 2 5 °C VDD =5.0V VLCD-VSS =21.7V

I T E M		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		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, 3, 4

K* =STN : K≥1.5 ,FSTN : K≥2.0

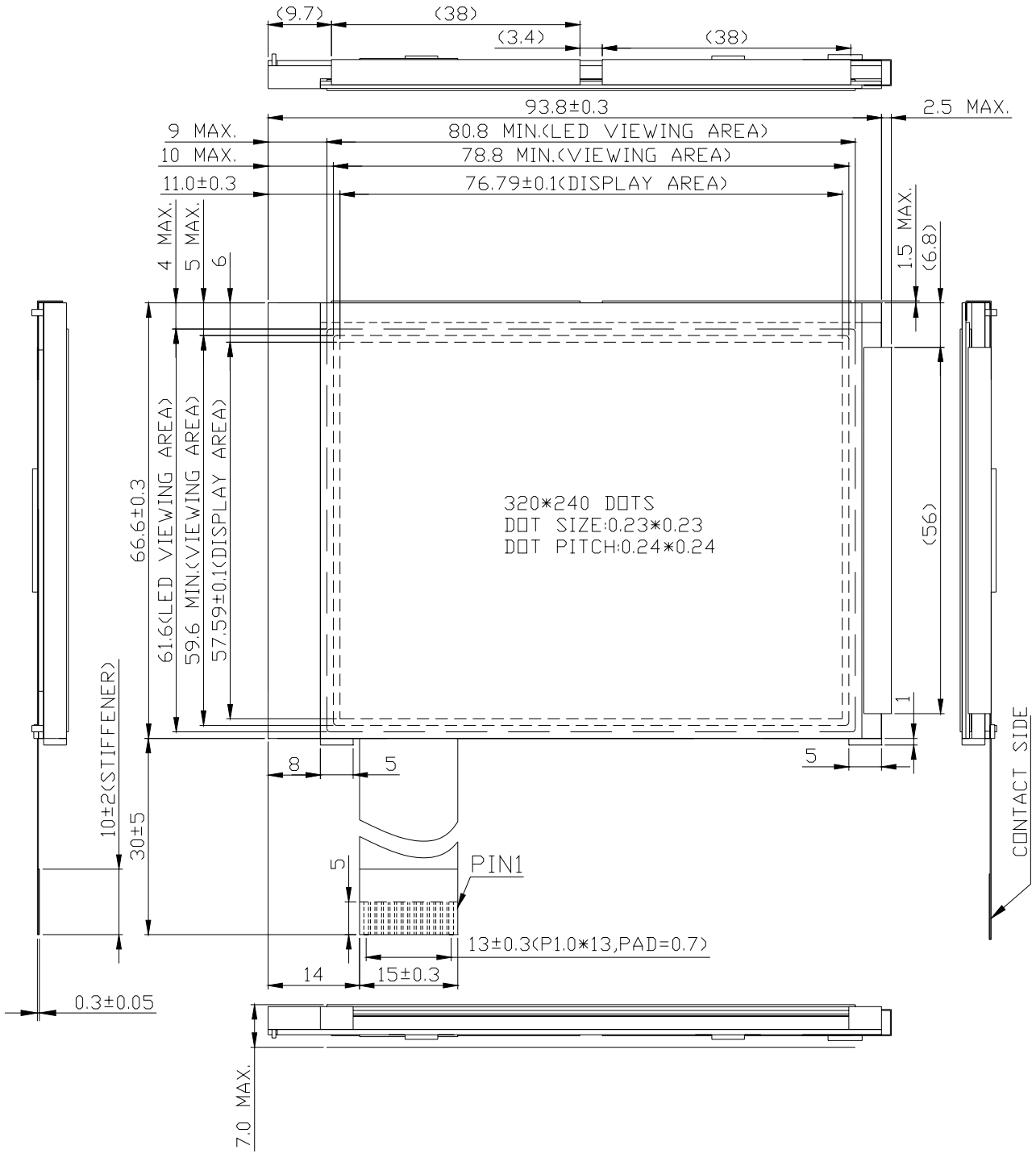
NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU-002B)

NOTE (2) : POLARIZER IS TRANSFLECTIVE TYPE .

NOTE (3) : POLARIZER IS TRANSMISSIVE TYPE .

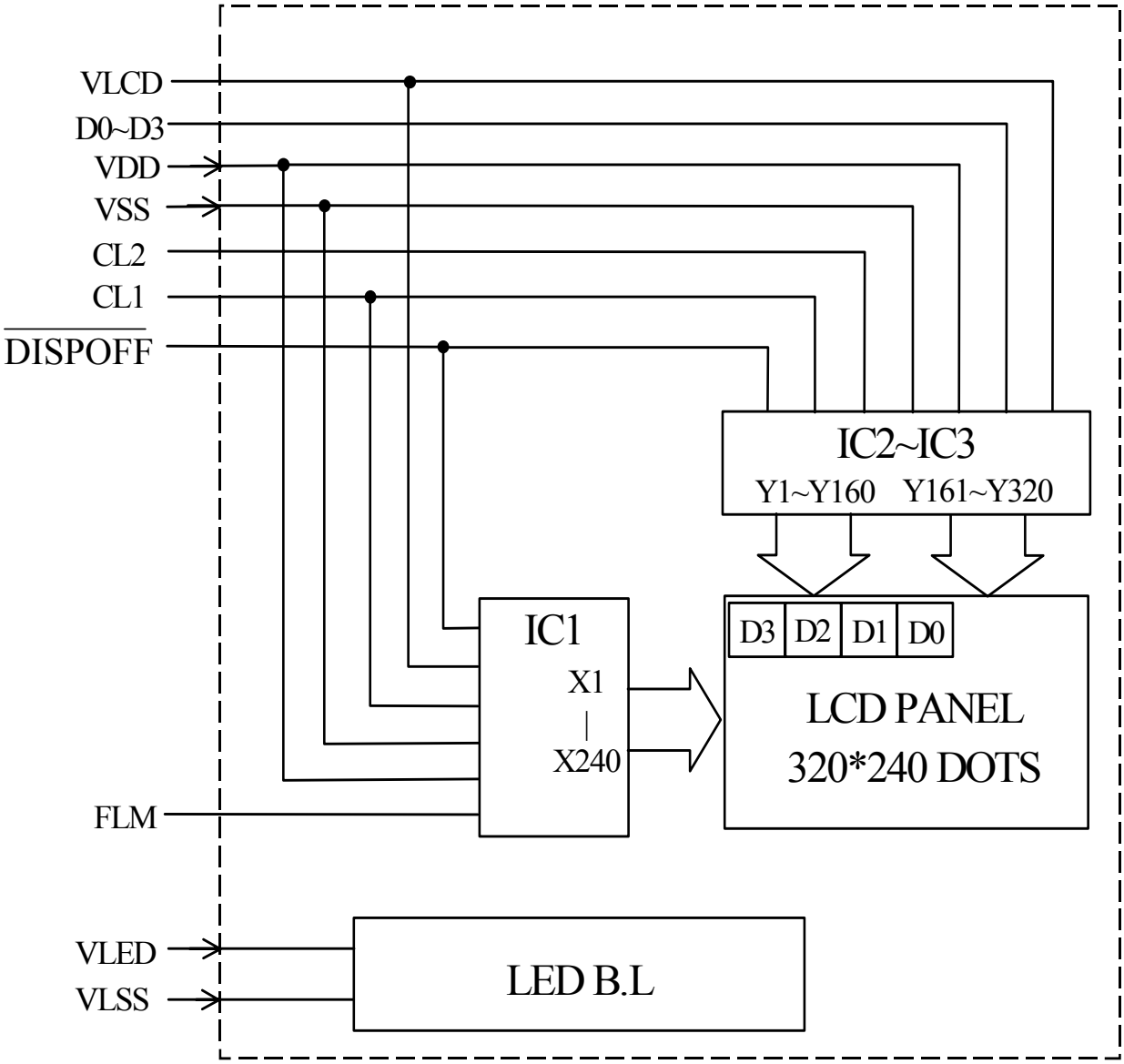
NOTE (4) : POLARIZER IS PG TYPE.

7 . OUTLINE DIMENSIONS

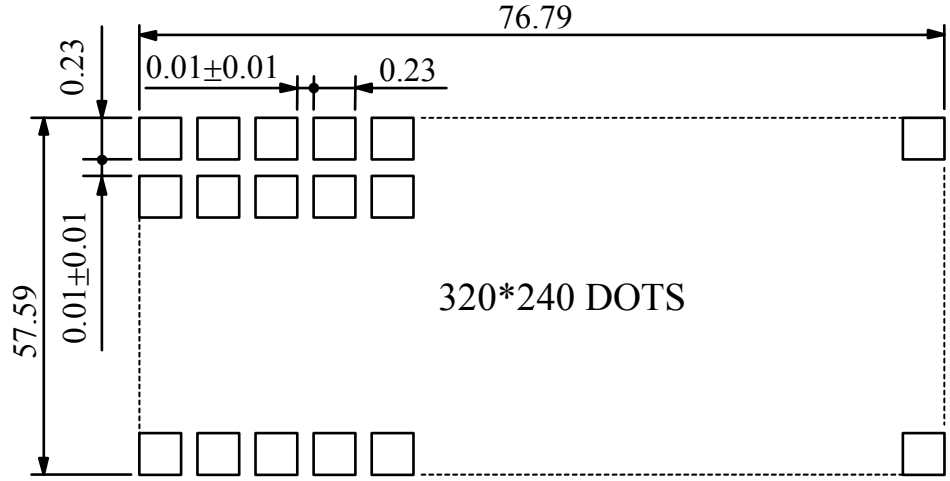


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.5

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

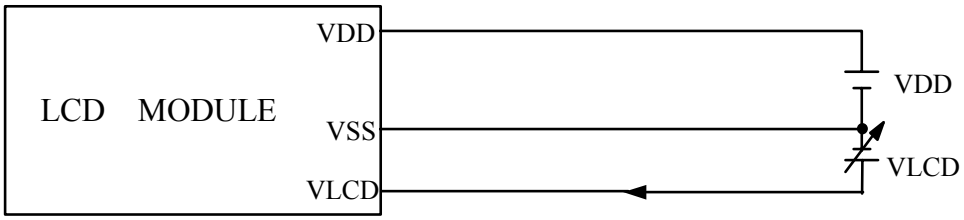
10. INTERFACE SIGNALS

IF1 :

PIN NO.	SYMBOL	FUNCTION
1	VDD	POWER SUPPLY FOR LOGIC CIRCUIT.
2	VSS	GROUND.
3	VLCD	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	$\overline{\text{DISPOFF}}$	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

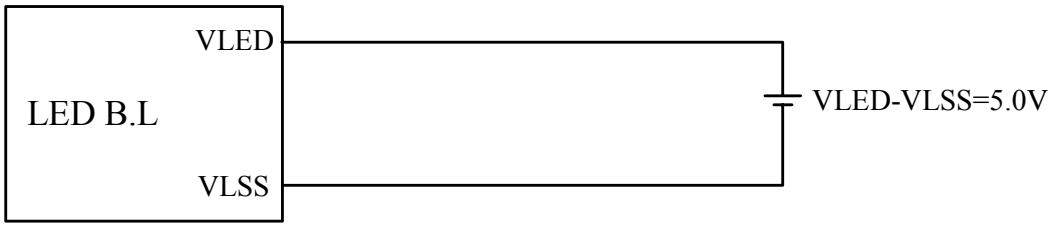
11. POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



VLCD – VSS : LCD DRIVING VOLTAGE

11.2 POWER SUPPLY FOR LED BACK - LIGHT



11.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL