EXAMINED BY : Kevin Kuo	EMERGING DISPLAY	FILE NO . CAS-10626
		ISSUE : FEB.08, 2007
APPROVED BY: David Chang	TECHNOLOGIES CORPORATION	TOTAL PAGE : 14
		VERSION : 3

CUSTOMER ACCEPTANCE SPECIFICATIONS

MODEL NO . :

ER057000(LED TYPES)

(RoHS)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

RECORDS OF REVISION

DOC . FIRST ISSUE

OCT.31,2006

DEC.22, 2006 — Drawing No. 2

3.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	0°C	60°C	-20°C	70°C	NOTE (2),(3)

↓

ITEM	OPERATING		STORAGE		REMARK
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	-10°C	70°C	-20°C	80°C	NOTE (2),(3)

NOTE (2) : 70 °C : 120HR MAX .→ 80 °C : 120HR MAX .

Drawing No. 3

4.1 ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION	MIN.		TYP.	MAX	UNIT
RECOMMENDED LCD DRIVING VOLTAGE (NORMAL TEMP. LCM)	VLCD–VSS	θx = θy =0° DUTY=1/240 VDD=3.0V/5.0V	0 °C	25.6	26.1	26.6	V
			25°C	25.1	25.6	26.1	
			60°C	24.3	24.8	25.3	

↓

ITEM	SYMBOL	CONDITION	MIN.		TYP.	MAX	UNIT
RECOMMENDED LCD DRIVING VOLTAGE (NORMAL TEMP. LCM)	VLCD–VSS	θx = θy =0° DUTY=1/240 VDD=3.0V/5.0V	-10 °C	27	27.5	28	V
			25°C	25.1	25.6	26.1	
			70°C	24.3	24.8	25.3	

Drawing No. 4

4.2.2 ABSOLUTE MAXIMUM RATINGS AT Ta=25°C

PARAMETER	SYMBOL	SPECIFICATION	UNIT	REMARK
REVERSE VOLTAGE	VR	ZENER DIODE INSIDE THE LED		

↓

PARAMETER	SYMBOL	SPECIFICATION	UNIT	REMARK
REVERSE VOLTAGE	VR	15	V	

Drawing No. 8

6. OPTICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
RESPONSE TIME	RISE TIME	Tr	θx = 0° θy- = 0°	Ta=0°C	—	1700	2550	ms	1
				Ta=25°C	—	350	525		
				Ta=60°C	—	200	260		
	FALL FIME	Tf		Ta=0°C	—	1040	1560		
				Ta=25°C	—	250	375		
				Ta=60°C	—	90	135		

↓

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
RESPONSE TIME	RISE TIME	Tr	θx = 0° θy- = 0°	Ta=-10°C	—	2950	3840	ms	1
				Ta=25°C	—	350	525		
				Ta=70°C	—	115	150		
	FALL FIME	Tf		Ta=-10°C	—	1150	2000		
				Ta=25°C	—	250	375		
				Ta=70°C	—	90	120		

FEB.08, 2007 — Drawing No. 4

4.2.2 ABSOLUTE MAXIMUM RATINGS AT Ta=25°C

PARAMETER	SYMBOL	SPECIFICATION	UNIT	REMARK
POWER DISSIPATION	PAD	2.232	W	(1)
FORWARD CURRENT	IAF	180	mA	(1)

↓

PARAMETER	SYMBOL	SPECIFICATION	UNIT	REMARK
POWER DISSIPATION	PAD	1.989	W	(1)
FORWARD CURRENT	IAF	150	mA	(1)

NUMBERING SYSTEM

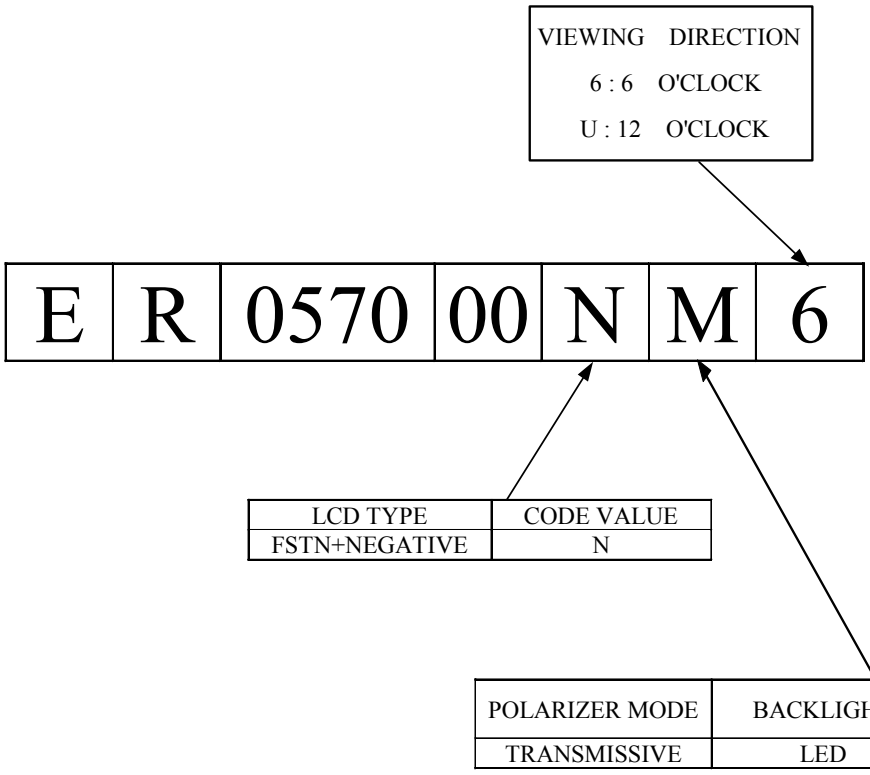


TABLE OF CONTENTS

1. GENERAL SPECIFICATION

1.1 GENERAL SPECIFICATION
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 6 B

1.2 THIS INDIVIDUAL SPECIFICATION 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 SPECIFICATION

(1)	DISPLAY SIZE	5.7 inches
(2)	NUMBER OF DOTS	320W * (RGB) * 240H pixels
(3)	MODULE SIZE	154.6W * 114.8H * 8.5D mm
(4)	VIEWING AREA	118.18W * 89.38H mm
(5)	ACTIVE AREA	115.17W * 86.37H mm
(6)	DOT SIZE	0.09Wmm * 0.33H mm
(7)	DOT PITCH	0.12Wmm * 0.36H mm
(8)	PIXEL SIZE	0.33W * 0.33H mm
(9)	PIXEL PITCH	0.36W * 0.36H mm
(10)	LCD TYPE*	
(11)	DRIVING METHOD	1 / 240 DUTY MULTIPLEX DRIVE
(12)	VIEWING DIRECTION*	
(13)	BACKLIGHT*	

* 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	-0.3	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VLCD – VSS	-0.3	45.0	V	
INPUT VOLTAGE	VI	-0.3	VDD+0.3	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)

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	70°C	-20°C	80°C	NOTE (2),(3)
HUMIDITY	NOTE (4)		NOTE (4)		WITHOUT CONDENSATION
VIBRATION	—	2.45 m /s^2 (0.25 G)	—	11.76 m /s^2 (1.2 G)	10~100 HZ XYZ DIRECTIONS 1 Hr. EACH
SHOCK	—	29.4 m /s^2 (3 G)	—	490.0 m /s^2 (50 G)	10 mSECONDS XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -20 °C : 48HR MAX.
80 °C : 120HR MAX.
NOTE (3) : BACKGROUND COLOR CHANGES SLIGHTLY DEPENDING ON AMBIENT TEMPERATURE THIS PHENOMENON IS REVERSIBLE.
NOTE (4) : 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.)

4. ELECTRICAL CHARACTERISTICS

4.1 ELECTRICAL CHARACTERISTICS OF LCM

Ta=25°C

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX	UNIT
LOGIC CIRCUIT POWER SUPPLY		VDD–VSS	—		2.7	3.0	3.3	V
					4.5	5.0	5.5	
INPUT VOLTAGE NOTE (1)	H LEVEL	VIH	—		0.8VDD	—	VDD	V
	L LEVEL	VIL	—		0	—	0.2*VDD	
OUTPUT VOLTAGE NOTE (1)	H LEVEL	VOH	—		VDD-0.4	—	—	V
	L LEVEL	VOL	—		—	—	+0.4	V
RECOMMENDED LCD DRIVING VOLTAGE (NORMAL TEMP. LCM)		VLCD–VSS	θx = θy =0° DUTY=1/240 VDD=3.0V/5.0V	-10 °C	27	27.5	28	V
				25°C	25.1	25.6	26.1	
				70°C	24.3	24.8	25.3	
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)		IDD	VLCD-VSS=25.6V VDD–VSS=3.0V/5.0V		—	2.0	4.0	mA
POWER SUPPLY CURRENT FOR LCD NOTE (2)		ILCD			—	11.0	15.0	
RECOMMENDED FRAME FREQUENCY FOR OPTIMNM CONTRAST		FLM	—		110	120	130	Hz
LED FORWARD VOLTAGE		VLED-VLSS	IF = 120mA		11.6	12	12.4	V

NOTE(1) : APPLIED TO TERMINALS FLM , CL1 , CL2 , D7~D0 , $\overline{\text{DISPOFF}}$.
NOTE(2) : THE DISPLAY PATTERN IS ALL “OFF” / ”ON”.

4.2 LED BACK-LIGHT UNIT

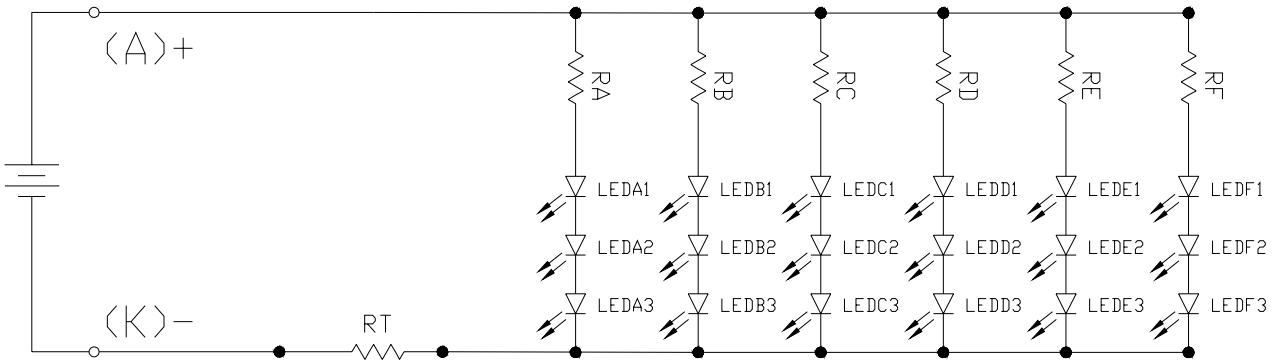
4.2.1 ELECTRICAL / OPTICAL CHARACTERISTICS AT Ta=25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
AVERAGE LUMINOUS INTENSITUY	Iv	3600	4000	—	Cd/m2	IF=120mA/BACK LIGHT
FORWARD VOLTAGE	V_F	11.6	12	12.4	V	IF=120mA
LED LIFE TIME		30K	40K	—	hr	Ta=25°

4.2.2 ABSOLUTE MAXIMUM RATINGS AT Ta=25°C

PARAMETER	SYMBOL	SPECIFICATION	UNIT	REMARK
POWER DISSIPATION	PAD	1.989	W	(1)
FORWARD CURRENT	IAF	150	mA	(1)
REVERSE VOLTAGE	VR	15	V	

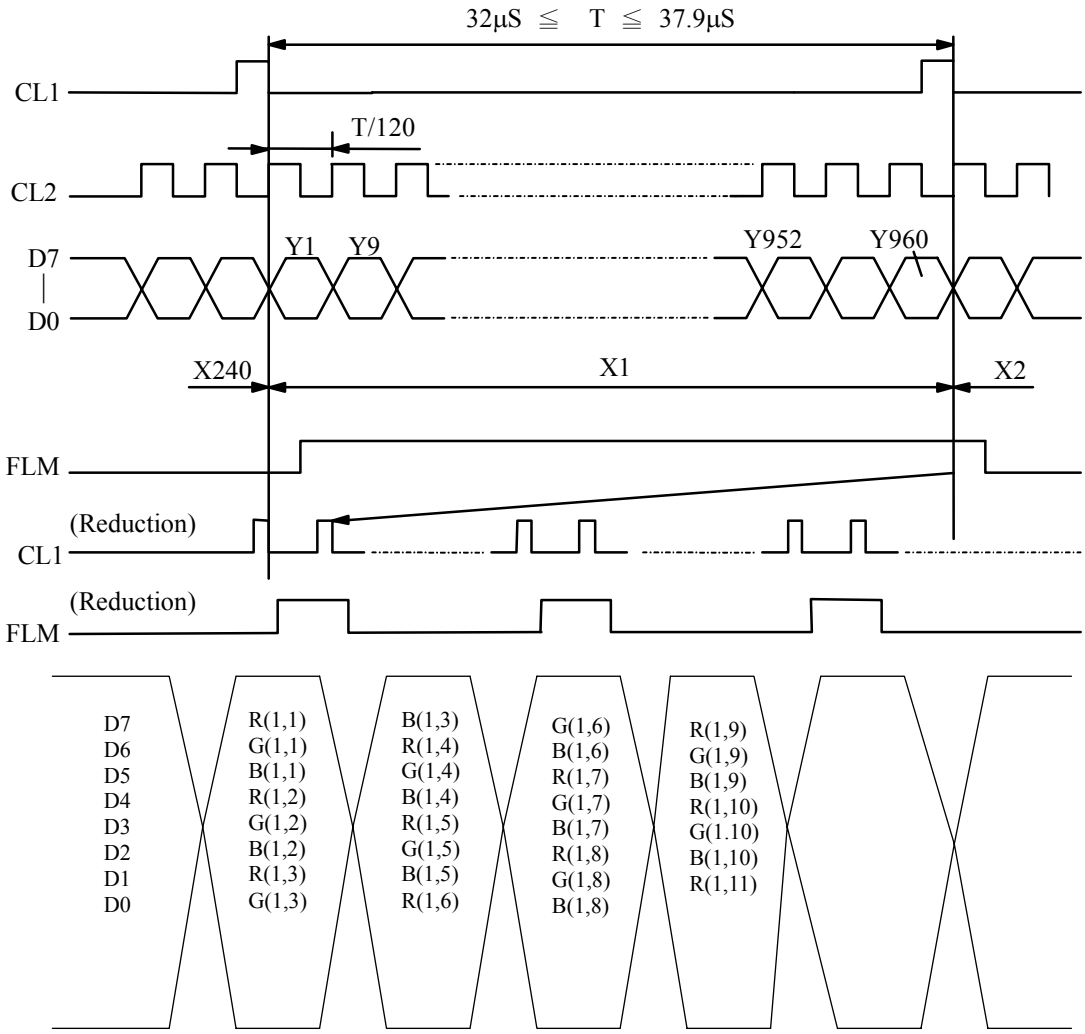
NOTE (1) : INTERNAL CIRCUIT DIAGRAM



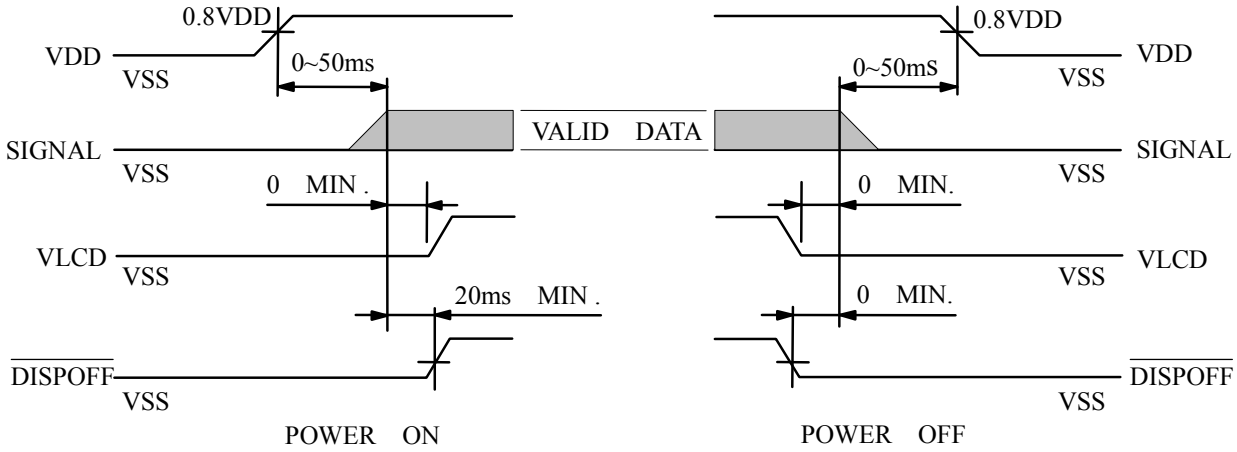
18 CHIPS
CURRENT = 20mA / ea *6 =120 mA
Ta = 25°C

5. TIMING CHARACTERISTICS

5.1 SERIAL INTERFACE TIMING



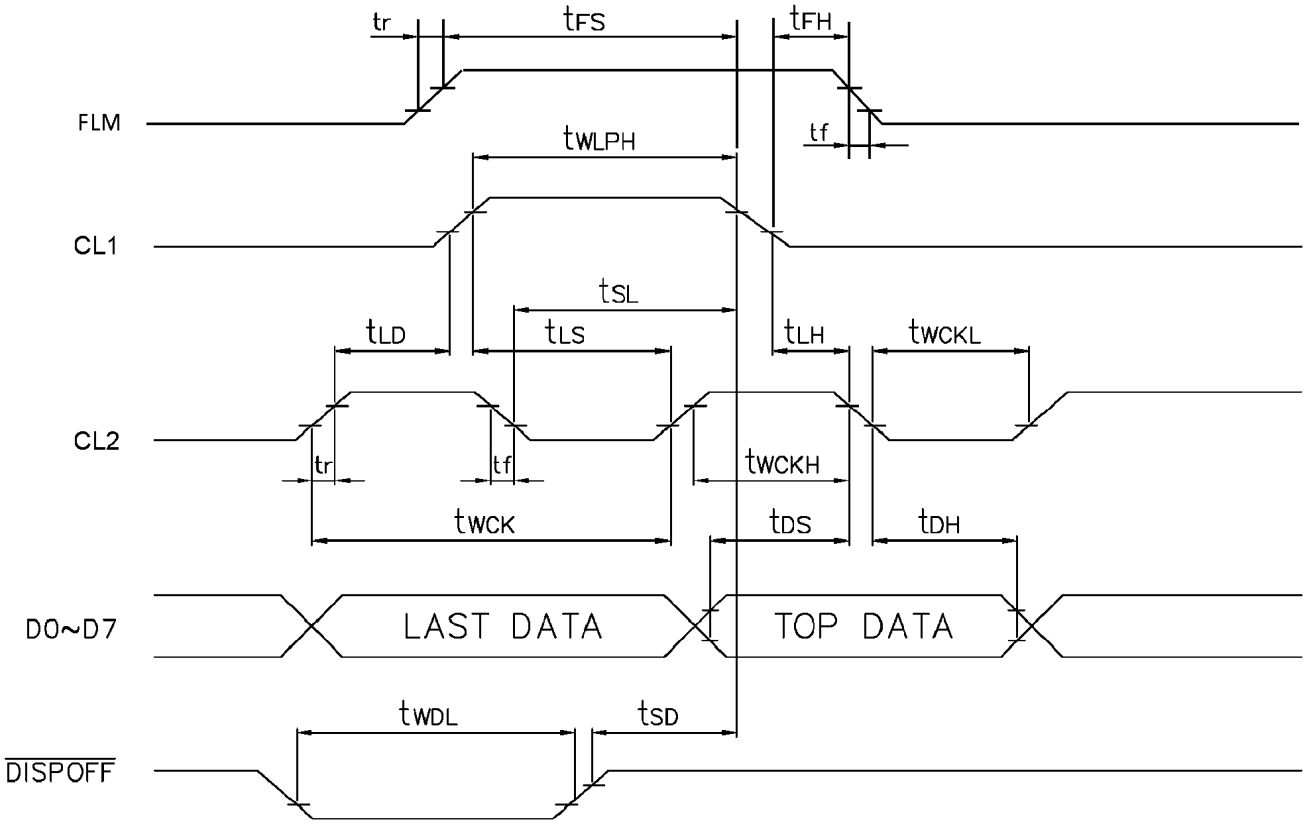
5.2 TIMING OF POWER SUPPLY



The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

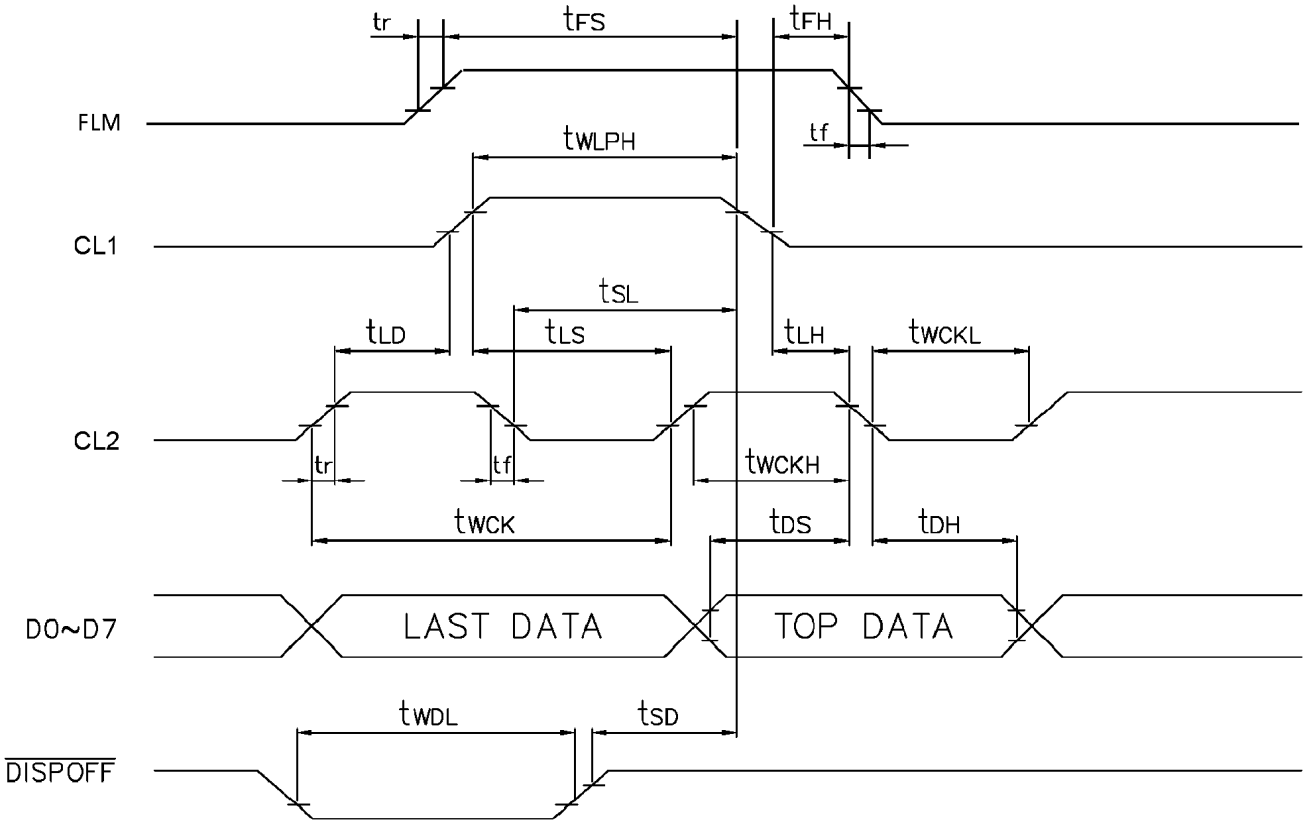
5.3 SWITCHING CHARACTERISTICS OF VDD=5.0V

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
CL2 PULSE CYCLE TIME	t_{WCK}	56	—	ns
CL2 PULSE HIGH LEVEL WIDTH	t_{WCKH}	17	—	ns
CL2 PULSE LOW LEVEL WIDTH	t_{WCKL}	19	—	ns
CL1 PULSE HIGH LEVEL WIDTH	t_{WLPH}	15	—	ns
CL2 RISE TO CL1 RISE TIME	t_{LD}	5	—	ns
CL2 FALL TO CL1 FALL TIME	t_{SL}	25	—	ns
CL1 RISE TO CL2 RISE TIME	t_{LS}	25	—	ns
CL1 FALL TO CL2 FALL TIME	t_{LH}	25	—	ns
CLOCK PULSE RISE/FALL TIME	tr , tf	—	50	ns
DATA SETUP TIME	t_{DS}	5	—	ns
DATA HOLD TIME	t_{DH}	15	—	ns
FLM SETUP TIME	t_{FS}	30	—	ns
FLM HOLD TIME	t_{FH}	50	—	ns
$\overline{\text{DISPOFF}}$ LOW LEVEL WIDTH	t_{WDL}	1.2	—	μs
$\overline{\text{DISPOFF}}$ CANCELLATION TIME	t_{SD}	100	—	ns



5.4 SWITCHING CHARACTERISTICS OF VDD=3.0V

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
CL2 PULSE CYCLE TIME	t_{WCK}	82	—	ns
CL2 PULSE HIGH LEVEL WIDTH	t_{WCKH}	28	—	ns
CL2 PULSE LOW LEVEL WIDTH	t_{WCKL}	28	—	ns
CL1 PULSE HIGH LEVEL WIDTH	t_{WLPH}	30	—	ns
CL2 RISE TO CL1 RISE TIME	t_{LD}	10	—	ns
CL2 FALL TO CL1 FALL TIME	t_{SL}	30	—	ns
CL1 RISE TO CL2 RISE TIME	t_{LS}	30	—	ns
CL1 FALL TO CL2 FALL TIME	t_{LH}	30	—	ns
CLOCK PULSE RISE/FALL TIME	tr , tf	—	50	ns
DATA SETUP TIME	t_{DS}	10	—	ns
DATA HOLD TIME	t_{DH}	30	—	ns
FLM SETUP TIME	t_{FS}	30	—	ns
FLM HOLD TIME	t_{FH}	50	—	ns
$\overline{\text{DISPOFF}}$ LOW LEVEL WIDTH	t_{WDL}	1.2	—	μs
$\overline{\text{DISPOFF}}$ CANCELLATION TIME	t_{SD}	100	—	ns



6. OPTICAL CHARACTERISTICS

Ta=25°C

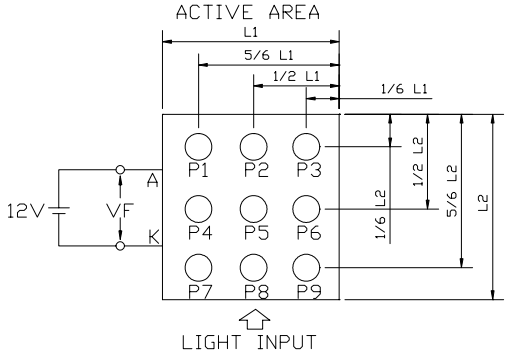
ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT	REMARK
VIEWING ANGLE	6 O'CLOCK	θy+	K ≥ 2	θx=0°	15	20	—	degree	1
		θy-			35	40	—		
		θx+		θy=0°	35	40	—		
		θx-			35	40	—		
	12 O'CLOCK	θy+		θx=0°	40	45	—		
		θy-			25	30	—		
		θx+		θy=0°	50	55	—		
		θx-			50	55	—		
COLOR OF CIE COORDINATE	WHITE	WX	θx = 0° , θy- = 0°		0.52	0.57	0.62	—	1
		WY			0.29	0.34	0.39	—	1
	RED	RX			0.23	0.28	0.33	—	1
		RY			0.49	0.54	0.59	—	1
	GREEN	GX			0.10	0.15	0.20	—	1
		GY			0.05	0.10	0.15	—	1
	BLUE	BX			0.25	0.30	0.35	—	1
		BY			0.26	0.31	0.36	—	1
CONTRAST RATIO		K	θy- = 0°, θx = 0°		35	50	—	—	1
RESPONSE TIME	RISE TIME	Tr	θx = 0° θy- = 0°	Ta=-10°C	—	2950	3840	ms	1
				Ta=25°C	—	350	525		
				Ta=70°C	—	115	150		
	FALL FIME	Tf		Ta=-10°C	—	1150	2000		
				Ta=25°C	—	250	375		
				Ta=70°C	—	90	120		
THE LUMINANCE OF MODULE		L	WHITE PATTERN		150	180	—	cd/m^2	2
THE UNIFORMITY OF MODULE		—	ILED = 120mA		75	80	—	%	3

NOTE (1) : REGARDING DEFINITION OF θx AND θy- , PLEASE REFFER TO EU – 006B. :

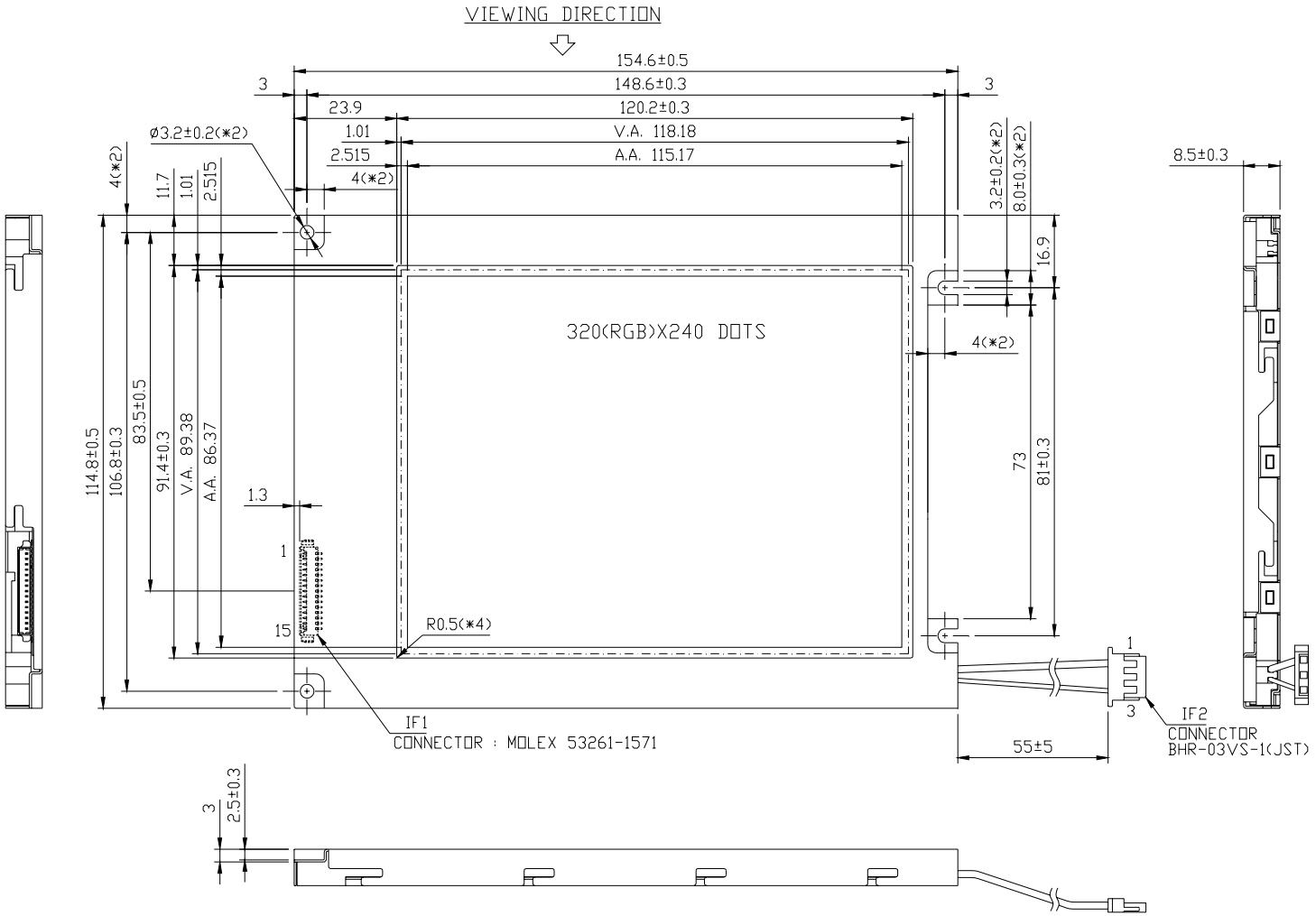
NOTE (2) : THE MEASURE CONDICTION ILED=120mA

NOTE (3) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
THE LUMINANCE SHOULD BE THE AVERAGE LUMINANCE OF POINT P1 ~ P9.
DEFINITION OF THE LUMINANCE UNIFORMITY.

$$\text{UNIFORMITY} : \left[1 - \frac{\text{MAX LUMINANCE} - \text{MIN LUMINANCE}}{\text{AVERAGE LUMINANCE}}\right] \times 100\%$$



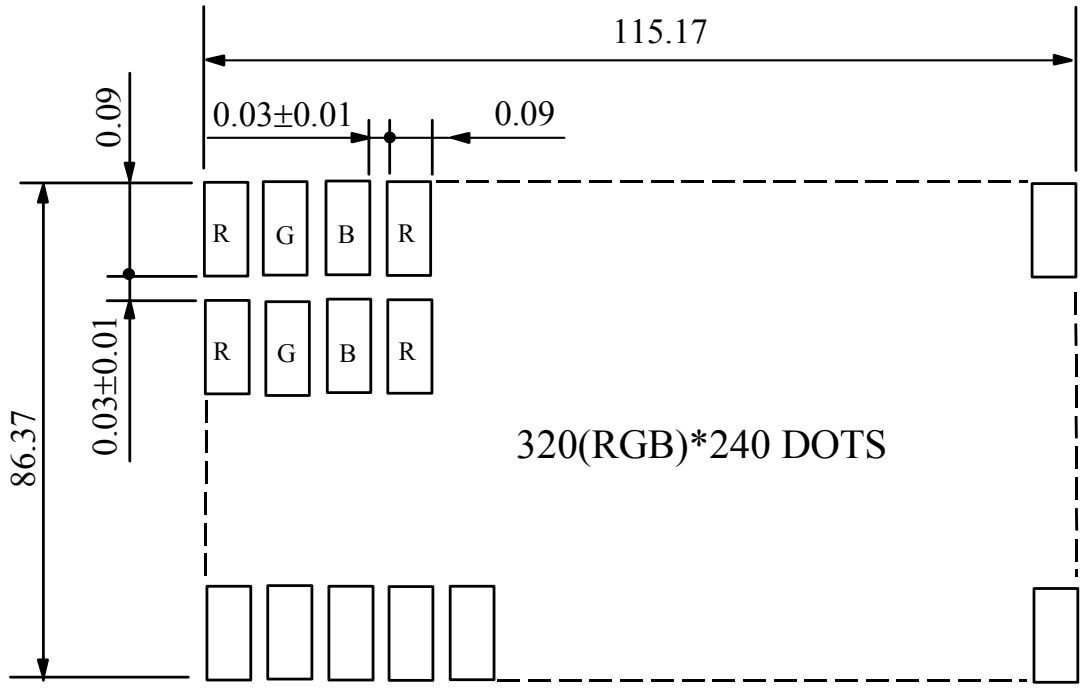
7 . OUTLINE DIMENSIONS



NOTES: 1.TOLERANCE NO SPECIFIED : ±0.5 mm
2. Matching Connector :
IF1 : 51021-1500(Molex)
IF2 : SM02-(8.0)B-BHS-1(JST)

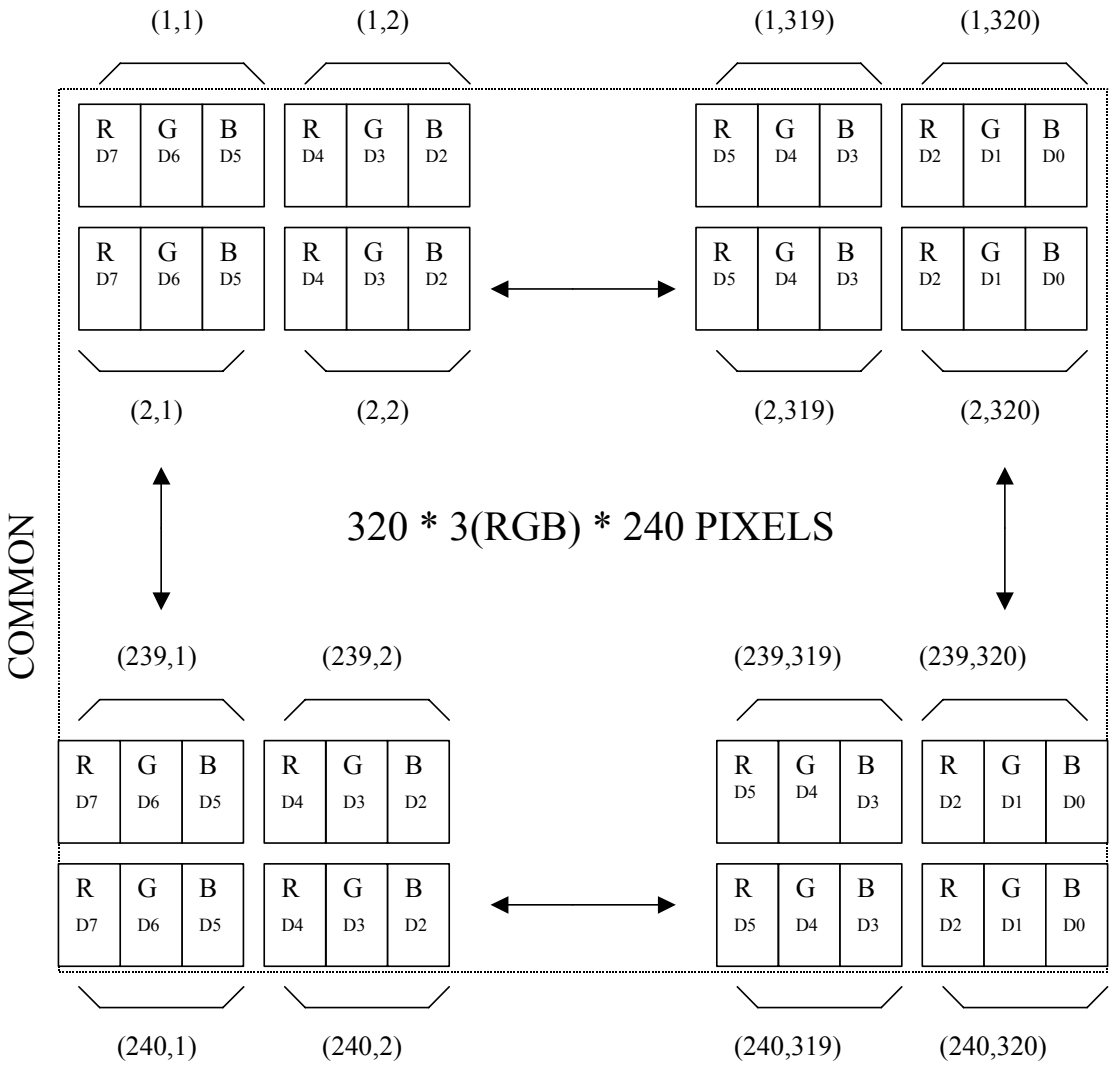
8. DETAIL DRAWING

8.1 DETAIL DRAWING OF PIXEL MATRIX

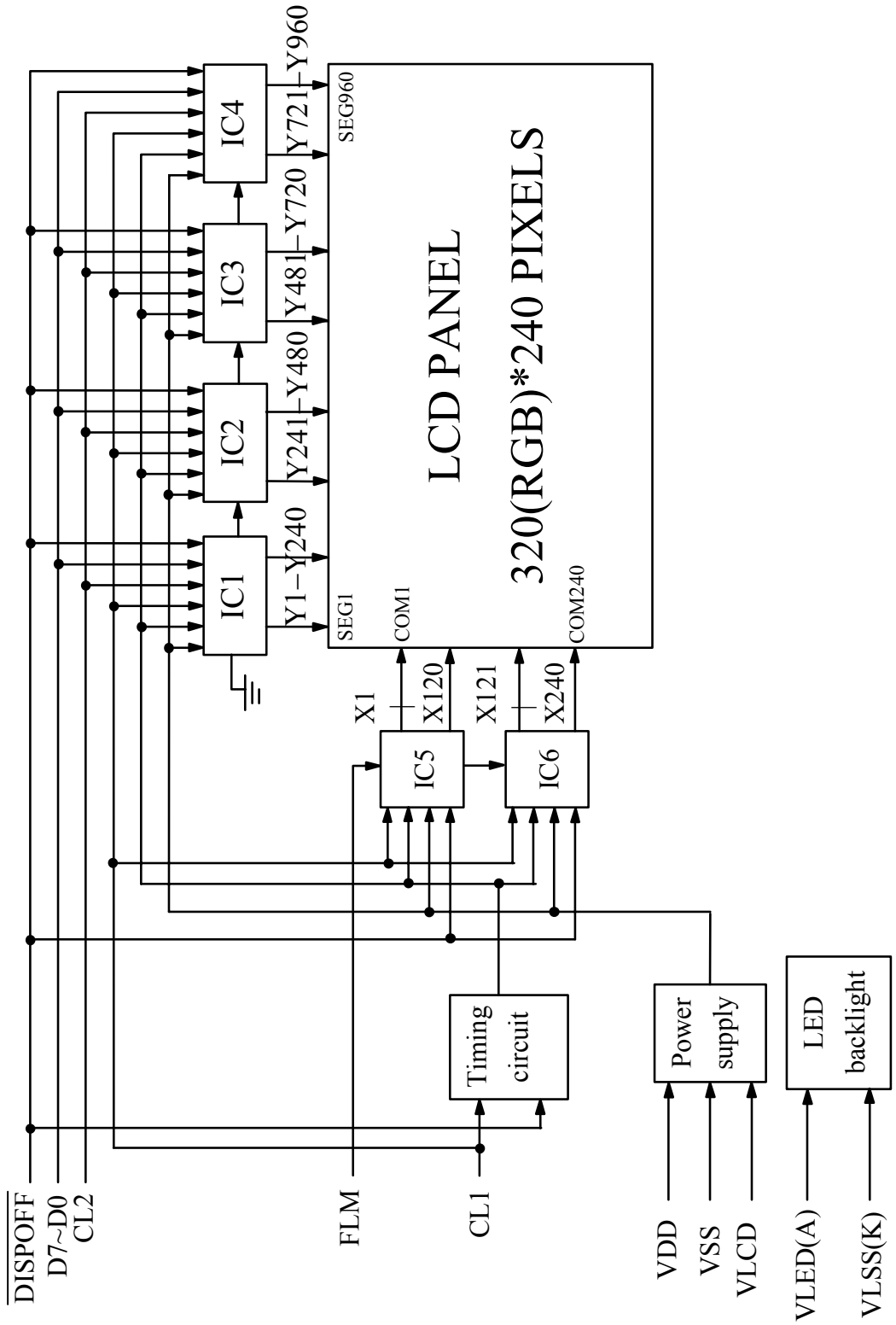


UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ±0.1
DOTS MATRIX TOLERANCE IS ±0.01

8 . 2 DETAIL DRAWING OF BLOCK DIAGRAM



9. BLOCK DIAGRAM



10 . INTERFACE SIGNALS

IF1 :

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	FLM	H	SYNCHRONOUS SIGNAL FOR DRIVING SCANNING LINE
2	CL1	H→L	DATA SIGNAL LATCH CLOCK(LOAD)
3	CL2	H→L	DATA SIGNAL SHIFT CLOCK(CP)
4	$\overline{\text{DISPOFF}}$	H/L	DISPLAY CONTROL SIGNAL , H:DISPLAY ON L:DISPLAY OFF
5	VDD	—	POWER SUPPLY FOR LOGIC
6	VSS	—	POWER SUPPLY (0V , GND)
7	VLCD	—	POWER SUPPLY FOR LCD DRIVE
8	D7	H/L	DISPLAY DATA
9	D6		
10	D5		
11	D4		
12	D3		
13	D2		
14	D1		
15	D0		

CN1 : 53261-1590(MOLEX)
RECOMMENDED MATCHING CONNECTOR : 51021-1500(MOLEX) OR COMPATIBLE

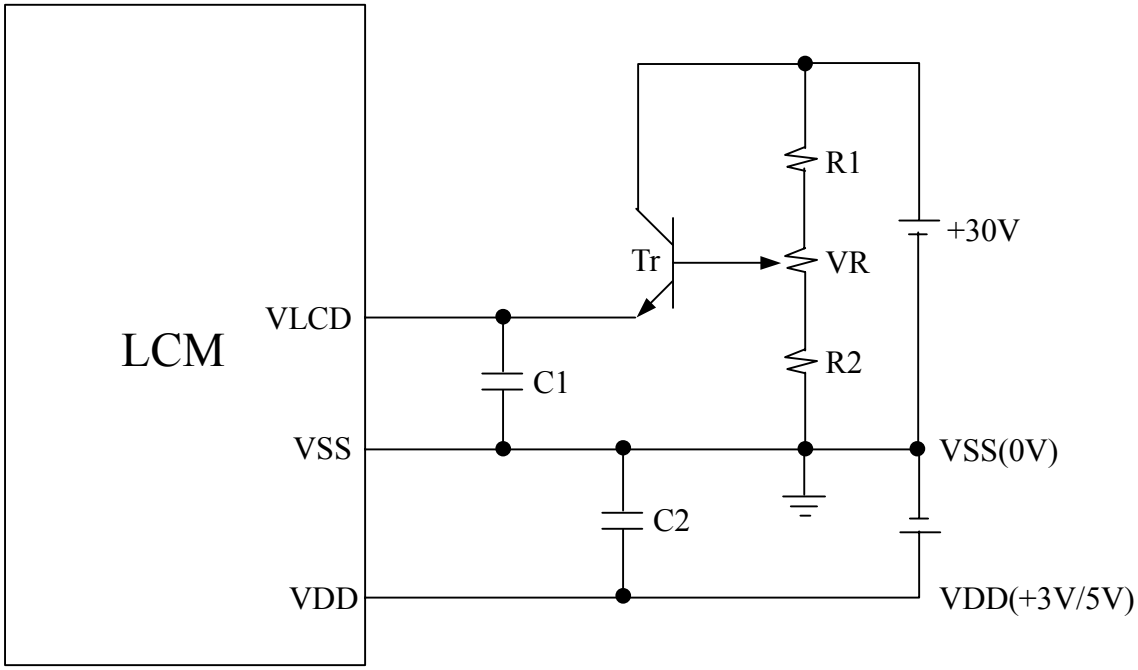
IF2 :

PIN NO.	SIGNAL	LEVEL	FUNCTION
1	VLED	H	THE POSITIVE VOLTAGE OF LED BACKLIGHT(A)
2	NC	—	NON-CONNECTION
3	VLSS	L	THE NEGATIVE VOLTAGE OF LED BACKLIGHT(K)

CN2 : BHR-03VS-1(JST)
RECOMMENDED MATCHING CONNECTOR : SM02-(8.0)B-BHS-1(JST) OR COMPATIBLE

11 . POWER SUPPLY

11.1 POWER SUPPLY FOR LCM



RECOMMENDED : R1+R2+VR= 10 ~ 20KΩ ; (C1,C2 = 10μF)

11.2 POWER SUPPLY FOR LED BACK-LIGHT