

# SPECIFICATION



## YMKFG-G480240AFSWSD

September 28, 2007  
Version 3.00

## RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
JULY,25.2005	1.00	FIRST ISSUE	JOHE HE	JOHE HE	
SEP,22.2005	2.00	SECOND ISSUE	JOHE HE	JOHE HE	2,10
September 28, 2007	3.00	Amend wrappage and address	ynn		



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**1. GENERAL SPECIFICATIONS :**

**1-1 SCOPE:**

This specification covers the delivery requirements for the liquid crystal display delivered by YAoyu TECHNOLOGY to Customer .

**1-2 PRODUCTS:**

Liquid Crystal Display Module (LCM)

**1-3 MODULE NAME:**

**YM480240A**

**2. FEATURES :**

**2-1 MAIN LCD (LARGE)**

Item	Standard Value
Display Type	480 *240 dots
LCD Type	FSTN, Transflective,Positive,,Extended TEMP
Driver Condition	LCD Module: 1/240 Duty, 1/16Bias
Viewing Direction	12 O'clock
Backlight Type	WHITE BLUE ORANGE GREEN LED EDGE B/L
Weight	TBD
Interface	6800/8080 MPU interface
Driver IC	Driver IC: NT7701 NT7702

**3. MACHANICAL SPECIFICATIONS :**

ITEM	SPECIFICATIONS	UNIT
OUTLINE DIMENSIONS	154.0(L) X80.0(W) X 14.5max(H)	mm
VIEWING AREA	122(L) x62.0(W)	mm
ACTIVE AREA	119.98(L) X59.98(W)	mm
DISP.CONSTRUCTION	480 * 240 dots	---
DOT SIZE	0.23(L) x 0.23(W)	mm
DOT PITCH	0.25(L) x 0.25(W)	mm



ASSY.TYPE	COG	---
WEIGHT	TBD	g

Note : For detailed information please refer to LCM drawing

#### 4. ABSOLUTE MAXIMUM RATING

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD	Ta=25°C	0.3	—	7.0	V
POWER SUPPLY FOR LCD DRIVING	Vlcd	Ta=25°C	0.3	—	30	V
INPUT VOLTAGE	VIN	Ta=25°C	-0.3	—	VDD+0.3	V
OPERATION TEMPERATURE	TOPR	---	-20	—	70	°C
STORAGE TEMPERATURE	TSTG	---	- 30	—	80	°C
Storage Humidity	H <sub>D</sub>	Ta < 40 °C	-		90	%RH

#### NOTES:

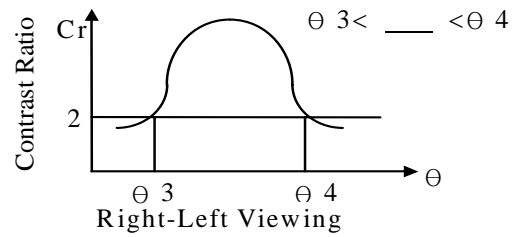
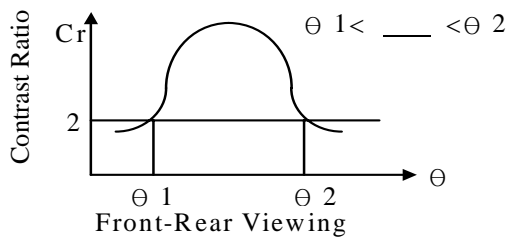
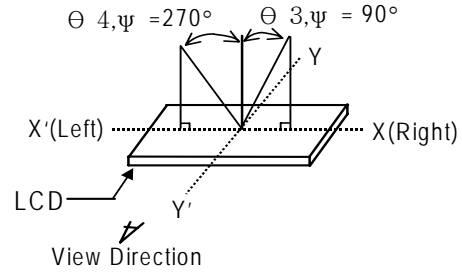
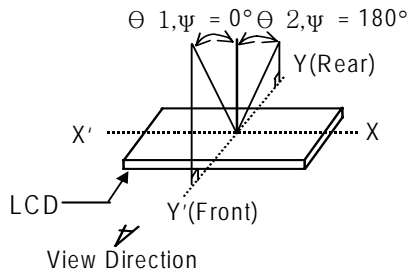
(1) LCM should be grounded during handling LCM.

#### 5. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY VOLTAGE	VDD—VSS	Ta= +25°C	3.0	3.3	3.6	V
POWER SUPPLY FOR LCD DRIVING	Vlcd	Ta= +25°C	-	24.0	-	V
INPUT VOLTAGE "H" LEVEL	VIH	—	0.8VDD	—	VDD	V
INPUT VOLTAGE "L" LEVEL	VIL	—	VSS	—	0.2VDD	V
OUTPUT VOLTAGE "H" LEVEL	VOH	IOH=-0.5mA	0.8VDD	—	VDD	V
OUTPUT VOLTAGE "L" LEVEL	VOL	IOL=0.5mA	VSS	—	0.2VDD	V
Supply Current	I <sub>DD</sub>	V <sub>DD</sub> = 3.3 V	-	3	5	mA
LCM Driver Voltage	V <sub>OP</sub>	V <sub>0</sub> -V <sub>ss</sub> (-20°C)	-	-	-	V
		V <sub>0</sub> -V <sub>ss</sub> (25°C)	-	24.0	-	
		V <sub>0</sub> -V <sub>ss</sub> (70°C)	-	-	-	

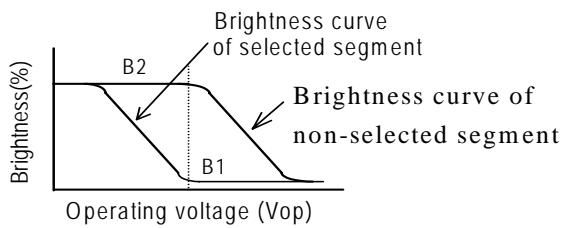
6.OPTICAL CHARACTERISTICS

(1) DEFINITION OF VIEWING ANGLE

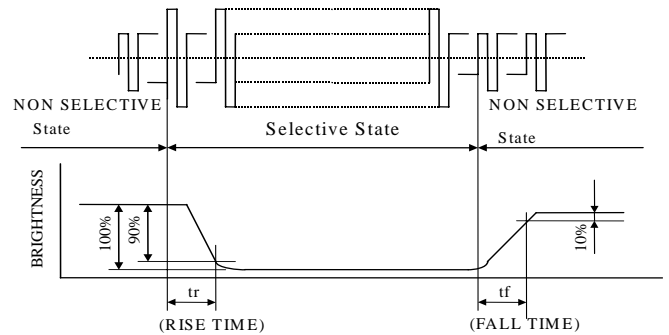


(2) DEFINITION OF CONTRAST

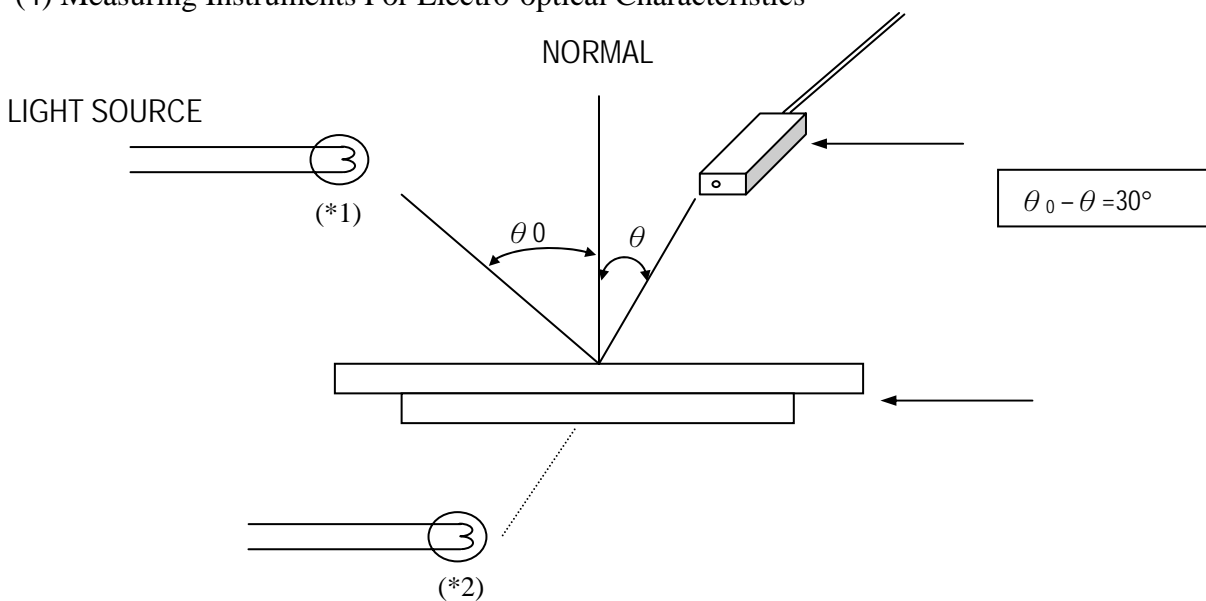
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment (B1)}}$$



(3) DEFINITION OF RESPONSE



(4) Measuring Instruments For Electro-optical Characteristics



## 7.0 Backlight Characteristics

LCD Module with LED Backlight

### Maximum Ratings

Item	Symbol	Conditions	Min.	Max.	Unit
Forward Current	IF	Ta =25°C	-	60	mA
Reverse Voltage	VR	Ta =25°C	-	5	V
Power Dissipation	PO	Ta =25°C	-	0.9	W
Operating Temperature	T <sub>OP</sub>	-	-20	70	°C
Storage Temperature	T <sub>ST</sub>	-	-30	80	°C

### Electrical / Optical Characteristics

Ta =25°C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	IF=60 mA	3.0	3.1	3.2	V
Reverse Current	IR	VR=8V	-	-	0.2	mA
Average Brightness (with LCD) *1	IV	IF=60 mA	-	-	-	cd/m <sup>2</sup>
Uniformity *1 (with LCD) *1	△B	IF=60mA	70%	-	-	*2
Color	WHITE GREEN BLUE					

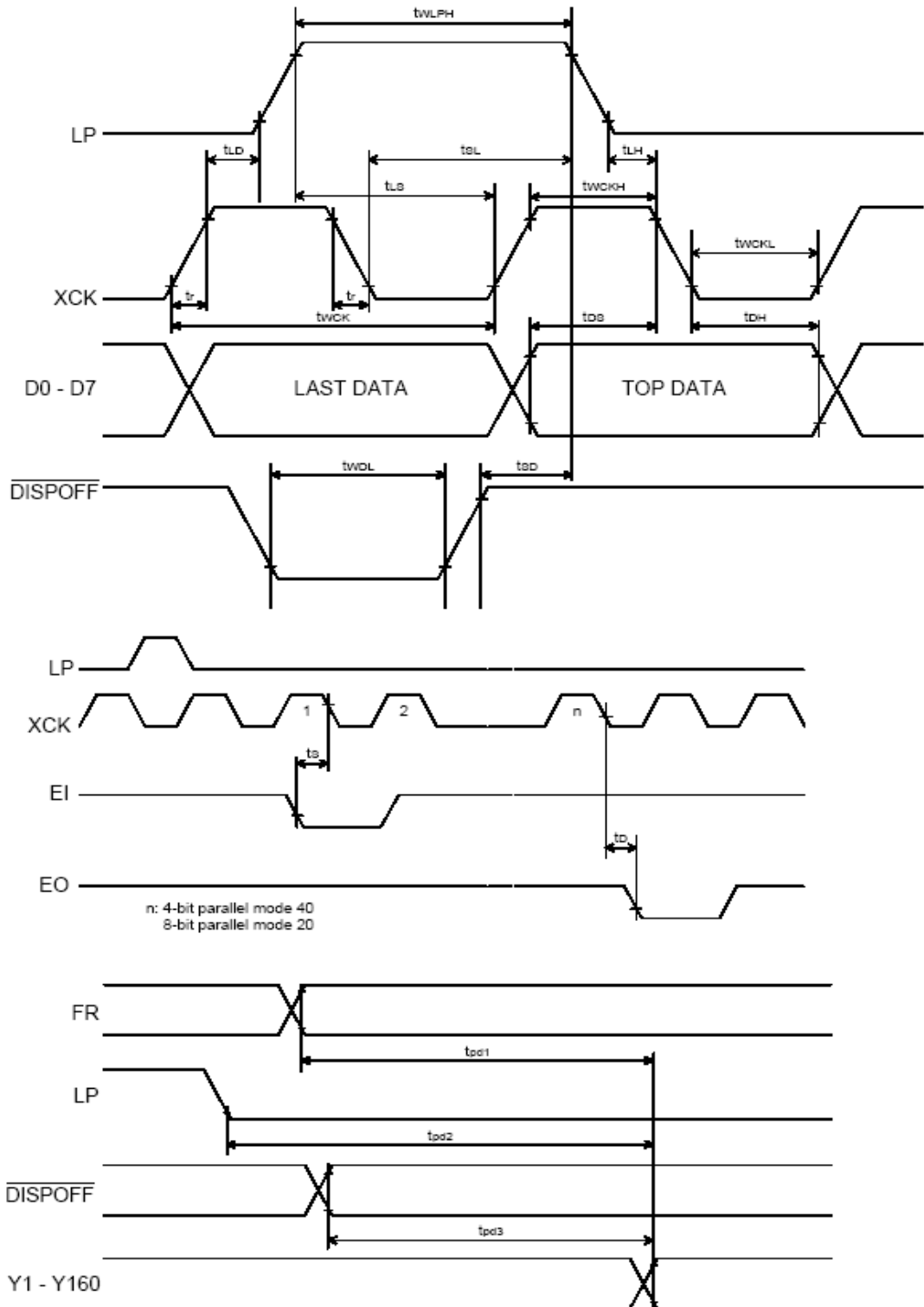
\*1 This vaule will be changed while mass production . testing by BM7

\*2:  $\Delta B = B(\text{min}) / B(\text{max})$

**8. TIMING CHARACTERISTICS**

**(1). NT7701 TIMING CHARACTERISTICS**

Timing waveform of the Segment Mode







Segment Mode 2 ( $V_{SS} = V_5 = 0V$ ,  $V_{DD} = 2.5 - 4.5V$ ,  $V_0 = 15$  to  $30$ , and  $T_A = -30$  to  $+85^\circ C$ , unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Shift clock period	$t_{wck}$	125	-		ns	$t_r, t_f \leq 11ns$ , Note 1
Shift clock "H" pulse width	$t_{wckH}$	51	-		ns	
Shift clock "L" pulse width	$t_{wckL}$	51	-		ns	
Data setup time	$t_{ds}$	30	-		ns	
Data hole time	$t_{dH}$	40	-		ns	
Latch pulse "H" pulse width	$t_{wLPH}$	51	-		ns	
Shift clock rise to Latch pulse rise time	$t_{LD}$	0	-		ns	
Shift clock fall to Latch pulse fall time	$t_{sL}$	51	-		ns	
Latch pulse rise to Shift clock rise time	$t_{Ls}$	51	-		ns	
Latch pulse fall to Shift clock fall time	$t_{LH}$	51	-		ns	
Input signal rise time	$t_r$		-	50	ns	Note 2
Input signal fall time	$t_f$		-	50	ns	Note 2
Enable setup time	$t_s$	36	-		ns	
$\overline{DISPOFF}$ Removal time	$t_{sd}$	100	-		ns	
$\overline{DISPOFF}$ enable pulse width	$t_{wDL}$	1.2	-		$\mu s$	
Output delay time (1)	$t_D$		-	78	ns	$CL = 15pF$
Output delay time (2)	$t_{pd1}, t_{pd2}$		-	1.2	$\mu s$	$CL = 15pF$
Output delay time (3)	$t_{pd3}$		-	1.2	$\mu s$	$CL = 15pF$

Note

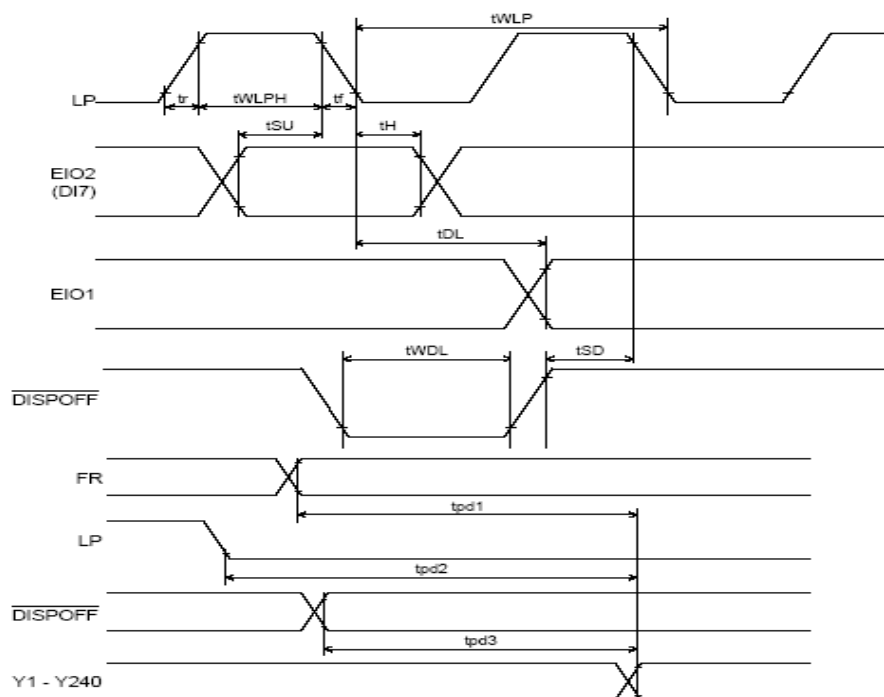
1. Take the cascade connection into consideration.
2.  $(t_{ck} - t_{wckH} - t_{wckL})/2$  is the maximum in the case of high speed operation.

(2).NT7702 TIMING CHARACTERISTICS

Common Mode ( $V_{SS} = V_5 = 0V$ ,  $V_{DD} = 2.5 - 5.5V$ ,  $V_0 = 15$  to  $30V$  and  $T_A = -30$  to  $+85^\circ C$ , unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Shift clock period	$t_{WLP}$	250	-	-	ns	$t_r, t_f \leq 20ns$
Shift clock "H" pulse width	$t_{WLPH}$	15	-	-	ns	$V_{DD} = +5.0V \pm 10\%$
		30	-	-	ns	$V_{DD} = +2.5 - +4.5V$
Data setup time	$t_{SU}$	30	-	-	ns	
Data hole time	$t_H$	50	-	-	ns	
Input signal rise time	$t_r$		-	50	ns	
Input signal fall time	$t_f$		-	50	ns	
$\overline{DISPOFF}$ Removal time	$t_{SD}$	100	-	-	ns	
$\overline{DISPOFF}$ enable pulse width	$t_{WDL}$	1.2	-	-	$\mu s$	
Output delay time (1)	$t_{DL}$	-	-	200	ns	$C_L = 15pF$
Output delay time (2)	$t_{pd1}, t_{pd2}$	-	-	1.2	$\mu s$	$C_L = 15pF$
Output delay time (3)	$t_{pd3}$	-	-	1.2	$\mu s$	$C_L = 15pF$

#### Timing Characteristics of Common Mode

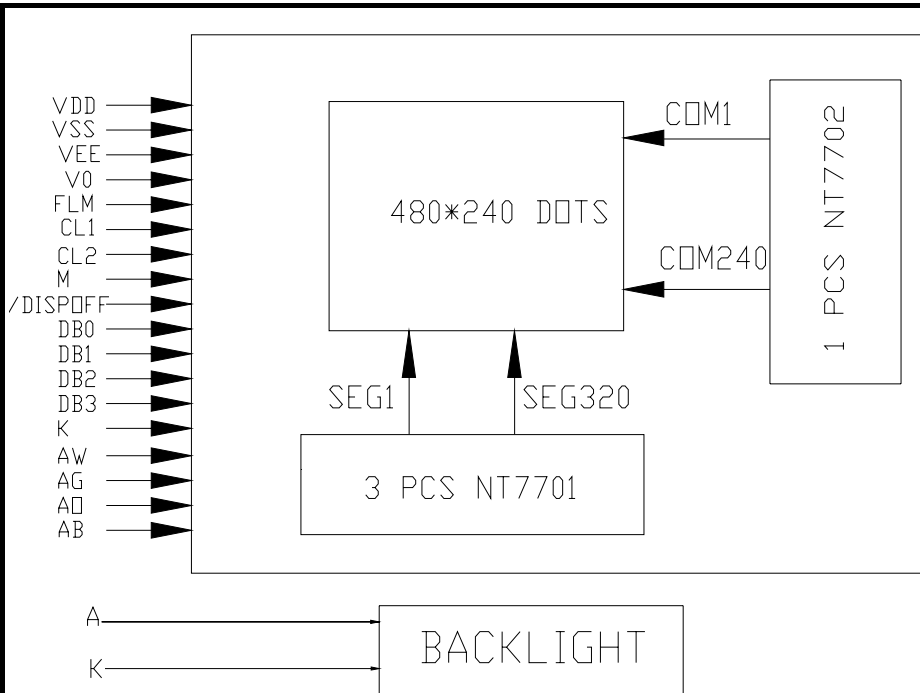




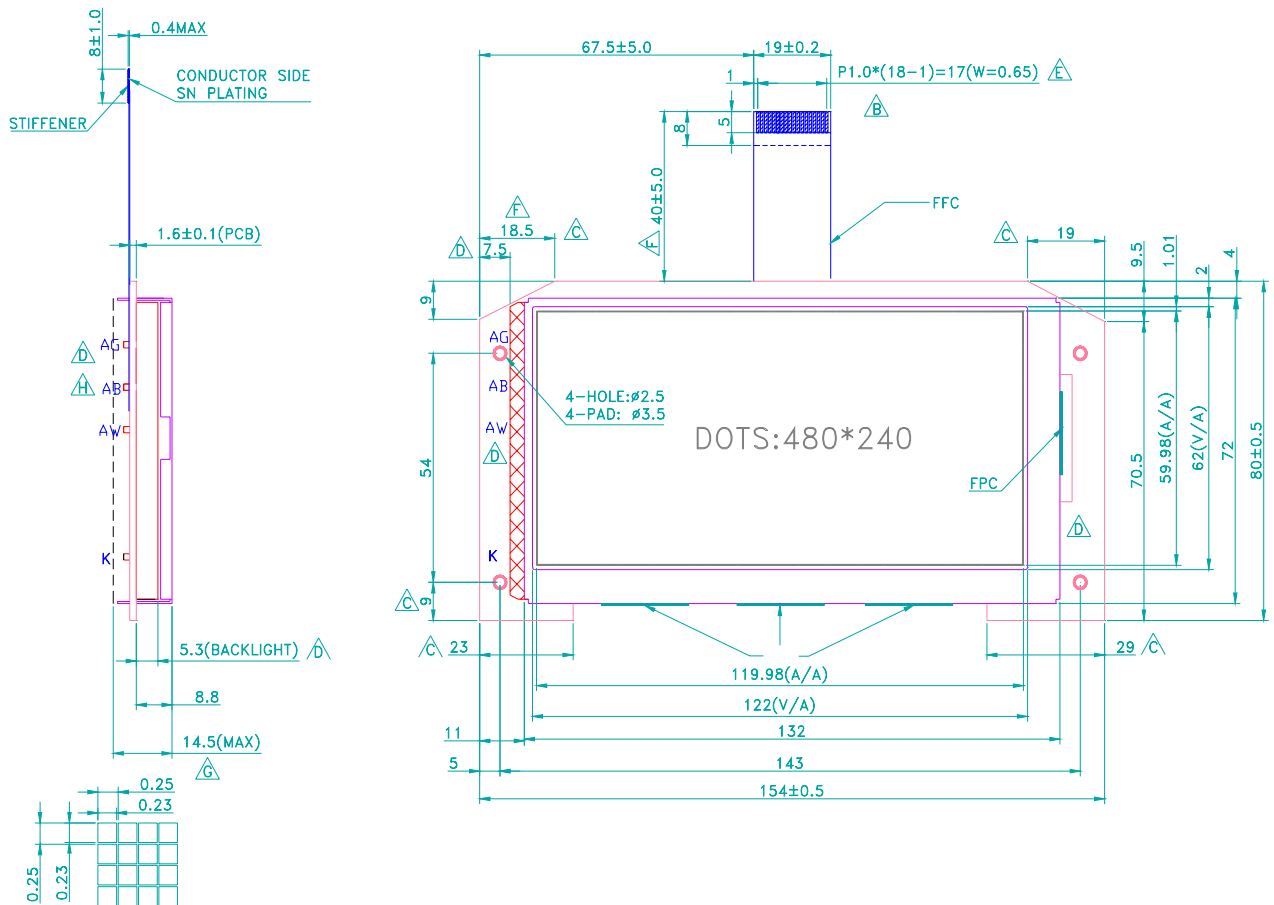
9. PIN ASSIGNMENT

Pin NO.	Symbol	Input/Output	Description
1	VDD	I	SUPPLY LOGIC VOLTAGE
2	VSS	I	POWER Ground
3	VEE	O	BOOSTER OUTPUT TERMINAL
4	V0	I	POWER SUPPLEY FOR LCD DRIVER
5	FLM	I	Scan start pulse
6	CL1	I	Dot data latch pulse
7	CL2	I	Dot data shift clock for X driver
8	M	I	Frame signal
9	/DISPOFF	I	Power down signal when display OFF
10~13	DB0~DB3	I/O	Dot data output bus to X driver
14	K	I	BACKLIGHT NEGATIVE
15	AW	I	BACKLIGHT WHITE POSITIVE
16	AG	I	BACKLIGHT GREEN POSITIVE
17	AO	O	BACKLIGHT ORANGE POSITIVE
18	AB	I	BACKLIGHT BLUE POSITIVE

10. BLOCK DIAGRAM



11. OUTLINE DIMENSIONS





12. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20°C ~ +70°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30°C ~ +80°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	—	See Note	WITHOUT CONDENSATION

13. RELIABILITY

13-1 RELIABILITY TEST

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERATURE +70°C 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE -20°C 240HRS	
STORAGE TEMPERATURE	HIGH TEMPERATURE +80°C 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE - 30°C 240HRS	
HUMIDITY	40°C 90%RH 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	<ul style="list-style-type: none"> <li>• Operating Time: thirty minutes exposure for each direction (X,Y,Z)</li> <li>• Sweep Frequency: 10~55Hz (1 min)</li> <li>• Amplitude: 1.5mm</li> </ul>	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20°C (30mins) ←→70°C (30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

\*NOTE: TEST CONDITION

(1) TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2°C, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN "OPERATING" CONDITION



14. Precaution for Use

The following precautions should be followed, since this module contains precise parts.

- (1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.
- (2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.
- (3) Use protective finger covers when handling the module to avoid scratching or staining the module.
- (4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.
- (5) The LSI is sensitive to light.  
The user's product should be designed so that LSI is not exposed to any light during operation.
- (6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.
- (7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.  
Do not use a module, which has experienced strong mechanical shock.
- (8) Care should be taken when the power supply turns on as following.
  - (a) Do not apply any input signals before the supplying voltage is applied.
  - (b) Do not turn off the power supply while any input signals are applied.

## Caution

- (1) Dangerous. Do not shock glass because glass can break.
- (2) If module breaks, do not touch it directly.  
(Glass could stick or cut skin.)
- (3) Do not swallow Liquid Crystal.  
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)
- (4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
- (5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
- (6) In case of injury, give immediate treatment and consult with a doctor.
- (7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials