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| | | |
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| CUSTOMER | ACCEPTANCE | SPECIFICATIONS |
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MODEL NO. :

ER057005(CCFL TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE : _____

BY : _____

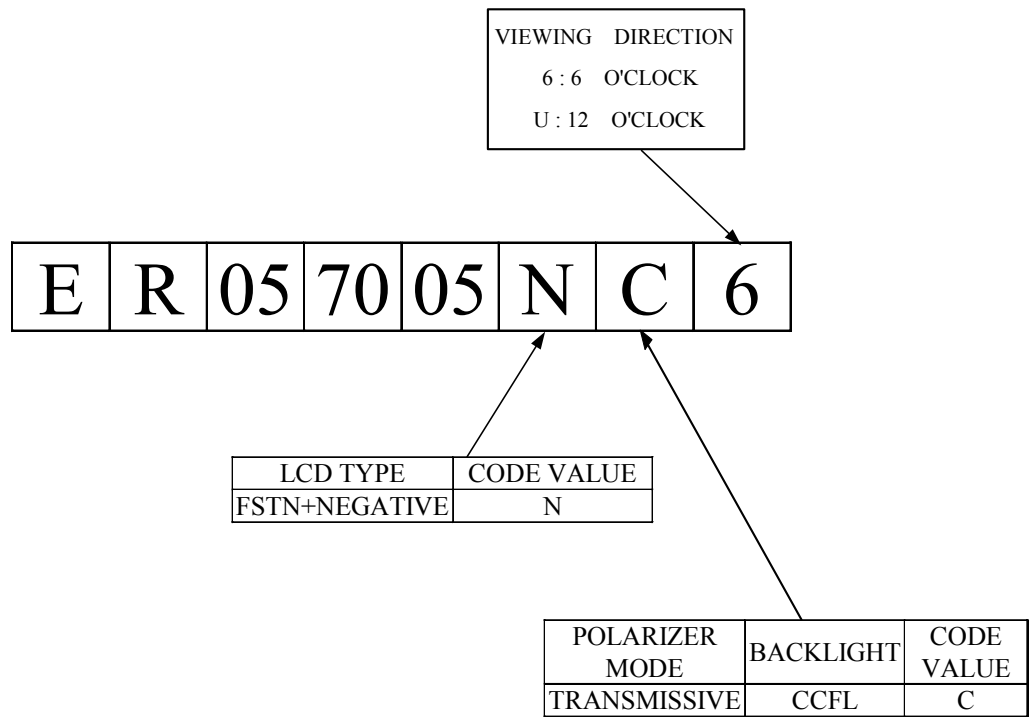
EMERGING DISPLAY
TECHNOLOGIES CORPORATION

| | | |
|------------------------------------|--------------|-------------|
| MODEL NO . ER057005(CCFL TYPES) | VERSION 1 | PAGE 0-1 |
|------------------------------------|--------------|-------------|

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| RECORDS OF REVISION | DOC . FIRST ISSUE AUG.16,2004 |
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| DATE | REVISED DRAWING NO. | SUMMARY |
|------|---------------------------|---------|
| | | |

NUMBERING SYSTEM



| | | |
|----------------------|---------|------|
| MODEL NO . | VERSION | PAGE |
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1 . GENERAL SPECIFICATIONS

1 . 1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 6 A

1 . 2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2 . MECHANICAL SPECIFICATION

- (1) DISPLAY SIZE ----- 5.7 inches
- (2) NUMBER OF DOTS ----- 320W * (RGB) * 240H pixels
- (3) MODULE SIZE ----- 167W * 109H * 8.9D mm
- (4) VIEWING AREA ----- 118.18W * 89.38H mm
- (5) ACTIVE AREA ----- 115.17W * 86.37H mm
- (6) PIXEL SIZE ----- 0.09Wmm * 0.33H mm
- (7) PIXEL PITCH ----- 0.12Wmm * 0.36H mm
- (8) LCD TYPE *
- (9) DRIVING METHOD ----- 1 / 240 DUTY MULTIPLEX DRIVE
- (10) BACKLIGHT*
- (11) VIEWING DIRECTION *

* PLEASE REFER TO NUMBERING SYSTEM

3. ABSOLUTE MAXIMUM RATINGS

3.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS . (AT Ta=25°C)

| PARAMETER | SYMBOL | MIN . | MAX . | UNIT | REMARK |
|------------------------|-----------|-------|---------|------|----------|
| POWER SUPPLY FOR LOGIC | VDD – VSS | 0 | 7.0 | 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 | 0 °C | 60 °C | -20 °C | 70 °C | NOTE (2),(3),(4) |
| HUMIDITY | — | — | — | — | WITHOUT CONDENSATION NOTE (5) |
| 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 .
 70 °C : 120HR MAX .

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

NOTE (4) : CCFL BACKLIGHT IS NOT AVAILABLE TO FUNCTION BELOW 0 °C

NOTE (5) : Ta ≤ 50°C : 85%RH MAX.

Ta > 50°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY
 OF 85%RH AT 50°C.

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 | — | 3.15 | 3.3 | 3.45 | V | |
| INPUT VOLTAGE NOTE(1) | | V _{IH} | H LEVEL | 0.8VDD | — | VDD | V | |
| | | V _{IL} | L LEVEL | 0 | — | 0.2VDD | | |
| OUTPUT VOLTAGE NOTE(1) | | V _{OH} | H LEVEL | VDD-0.4 | — | — | V | |
| | | V _{OL} | L LEVEL | — | — | +0.4 | V | |
| CONTRAST ADJUSTMENT VOLTAGE | | VCON | θ=0°,∅=10° DUTY=1/240 VDD=3.3V | 0 °C | (1.5) | (2.0) | — | V |
| | | | | 25°C | — | (2.0) | — | |
| | | | | 60°C | — | (2.0) | (2.5) | |
| SUPPLY CURRENT FOR LOGIC NOTE(2) | | IDD | VDD-VSS=3.3V | — | (35) | (50) | mA | |
| INPUT LEAK CURRENT | | ICON | VCON=(2.0)V | — | — | (20) | μA | |
| | | I _{IN} NOTE (3) | VIN=VDD OR VSS | — | (±10) | — | | |
| LCM | SURFACE LUMINANCE | L | PATTERN : (PIXELS ALL ON OF WHITE COLOR) | — | (150) | — | cd/m ² | |
| | | | PATTERN : (PIXELS ALL OFF) | — | (5) | — | | |
| RECOMMENDED FRAME FREQUENCY FOR OPTIMUM CONTRAST | | FLM | — | 110 | 120 | 130 | Hz | |

NOTE(1) : APPLIED TO TERMINALS FLM , CL1 , CL2 , D7~D0 , DISPOFF.

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

NOTE(3) : DISPOFF , FLM , CL1 , CL2 , D7~D0.

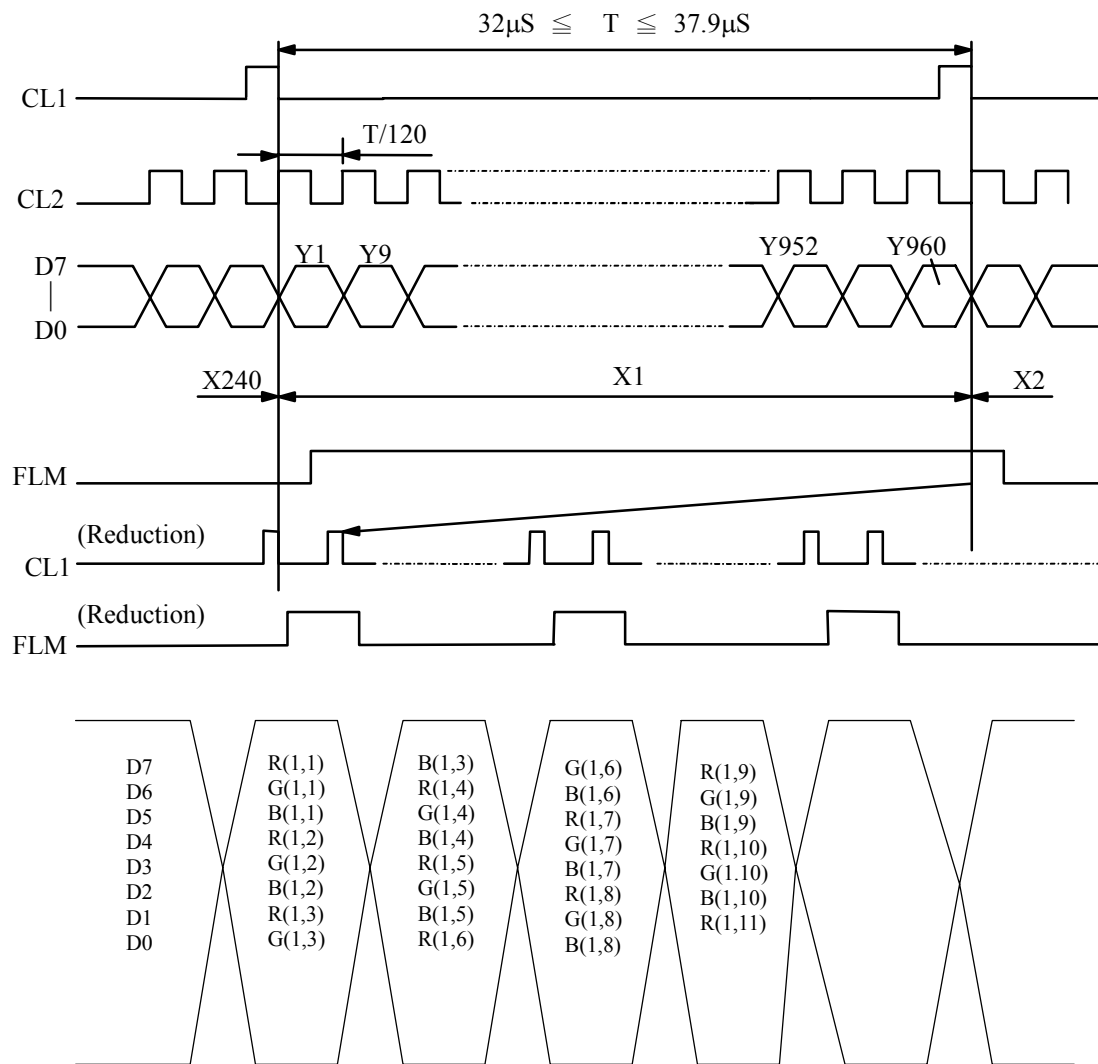
4.2 ELECTRICAL CHARACTERISTICS OF BACKLIGHT

| PARAMETER | | SYMBOL | MIN. | TYP. | MAX . | UNIT | REMARK |
|-----------------------------|---------------------------|--------|-------|--------|-------------------------|-------|--------------------------|
| POWER SUPPLY FOR CCFL | LAMP VOLTAGE | V_L | — | (550) | — | Vrms | — |
| | LAMP CURRENT | I_L | (4.5) | 5.0 | (6.0) | mArms | NOTE(1) |
| | LAMP POWER CONSUMPTION | P_L | — | (3.71) | — | W | NOTE(2) |
| | LAMP FREQUENCY | F_L | (35) | (50) | (80) | KHz | |
| | LAMP LIFE TIME | L_L | (40K) | (50K) | — | hrs | $I_L = 5 \text{ mArms}$ |
| | STARTING VOLTAGE | V_s | — | — | (780) | Vrms | $T_a = 25^\circ\text{C}$ |
| | | — | — | (1010) | $T_a = 0^\circ\text{C}$ | | |

NOTE (1) : IT IS RECOMMENDED THAT THE LAMP CURRENT WILL NOT BE HIGHER THAN 5mArms TO MINIMIZE HEAT RADIATION SINCE THIS CAN AFFECT THE DISPLAY QUALITY.

NOTE (1) : POWER CONSUMPTION EXCLUDED INVERTER LOSS.

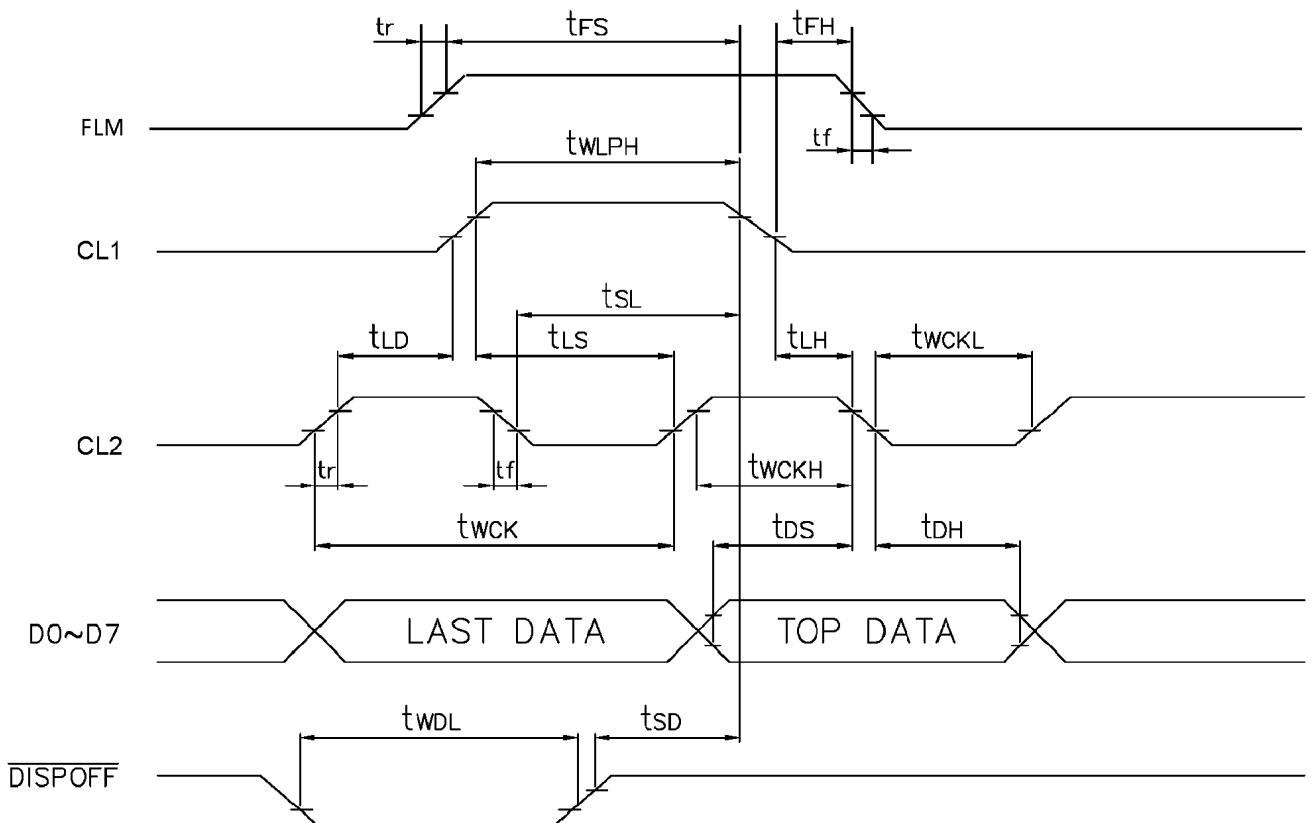
5. TIMING CHARACTERISTICS
5.1 INTERFACE TIMING



5.2 SWITCHING CHARACTERISTICS

5.2.1 SWITCHING CHARACTERISTICS OF VDD=3.3V

| 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 | t_r, t_f | — | 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 |

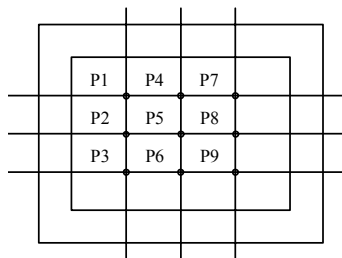


6. OPTICAL CHARACTERISTICS
6.1 OPTICAL CHARACTERISTICS OF NORMAL TEMPERATURE MODE

Ta=25°C

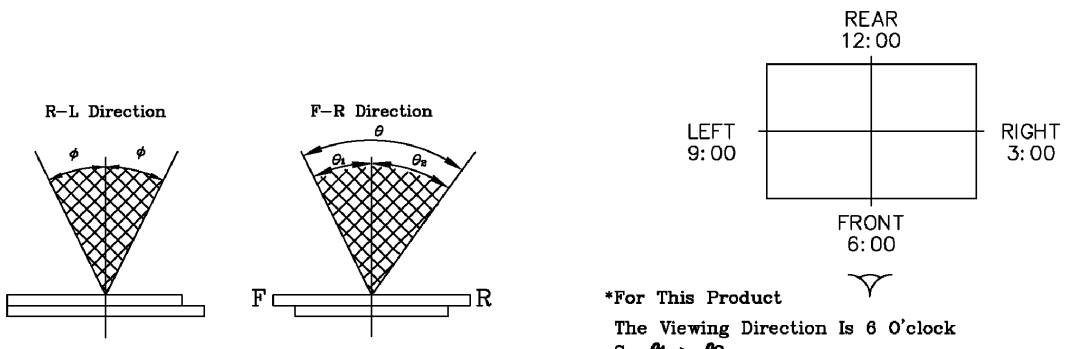
| I T E M | | SYMBOL | CONDITION | MIN . | TYP . | MAX. | UNIT | REMARK | |
|--------------------------|------|---------------|---|---------|-------|-------|-------------------|--------|---|
| VIEWING ANGLE RANGE | | θ | $K \geq 2$ | — | (90) | — | degree | 4 | |
| | | \varnothing | | — | (±58) | — | | | |
| CONTRAST RATIO | | K | $\theta = 0^\circ$ $\varnothing = 0^\circ$ | (35) | (50) | — | — | 1 | |
| RESPONSE TIME | RISE | Tr | $\theta = 0^\circ$ $\varnothing = 0^\circ$ | Ta=0°C | — | 700 | 1400 | ms | 1 |
| | | | | Ta=25°C | — | 310 | 620 | | |
| | | | | Ta=60°C | — | (150) | (300) | | |
| | FALL | Tf | | Ta=0°C | — | 450 | 900 | | |
| | | | | Ta=25°C | — | 110 | 220 | | |
| | | | | Ta=60°C | — | (80) | (160) | | |
| THE BRIGHTNESS OF MODULE | | B | IL=5mArms | — | (150) | — | cd/m ² | 2 | |
| THE UNIFORMITY OF MODULE | | — | | (70) | (75) | — | % | 3 | |

- NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU – 006A)
- NOTE (2) : POLARIZER MODE : TRANSMISSIVE
- NOTE (3) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE .



$$\text{UNIFORMITY} : \left[1 - \frac{\text{MAXIMUM BRIGHTNESS} - \text{MINIMUM BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

NOTE (4) : DEFINITION OF VIEWING ANGLE.



*For This Product
The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$
 $\theta = \theta_1 + \theta_2$
*Conditions
Operating Voltage : VLCD-VSS
Frame Frequency : 120Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

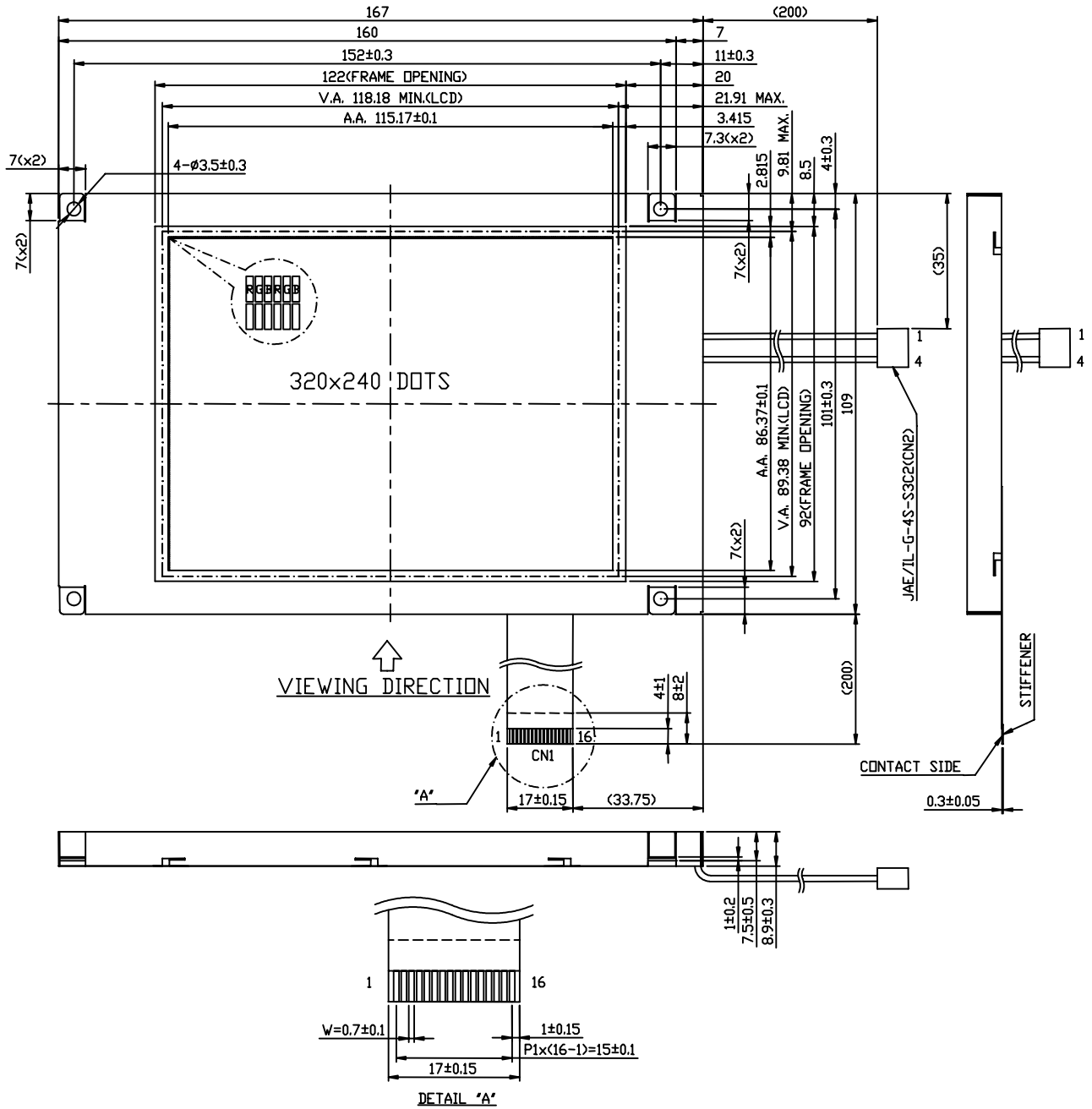
6.2 COLOR OF CIE COORDINATE

Ta=25°C

| ITEM | SYMBOL | CONDITION | MIN | TYP | MAX | REMARK |
|----------------------------|--------|---|---|--------|--------|--------|
| COLOR OF CIE COORDINATE | RED | x | — | (0.57) | — | |
| | | y | $\theta = 0^\circ, \varnothing = 0^\circ$ | — | (0.34) | |
| | GREEN | x | | — | (0.28) | |
| | | y | $\theta = 0^\circ, \varnothing = 0^\circ$ | — | (0.54) | |
| | BLUE | x | | — | (0.15) | |
| | | y | $\theta = 0^\circ, \varnothing = 0^\circ$ | — | (0.10) | |
| WHITE | x | — | | (0.30) | — | |
| | y | $\theta = 0^\circ, \varnothing = 0^\circ$ | — | (0.31) | — | |

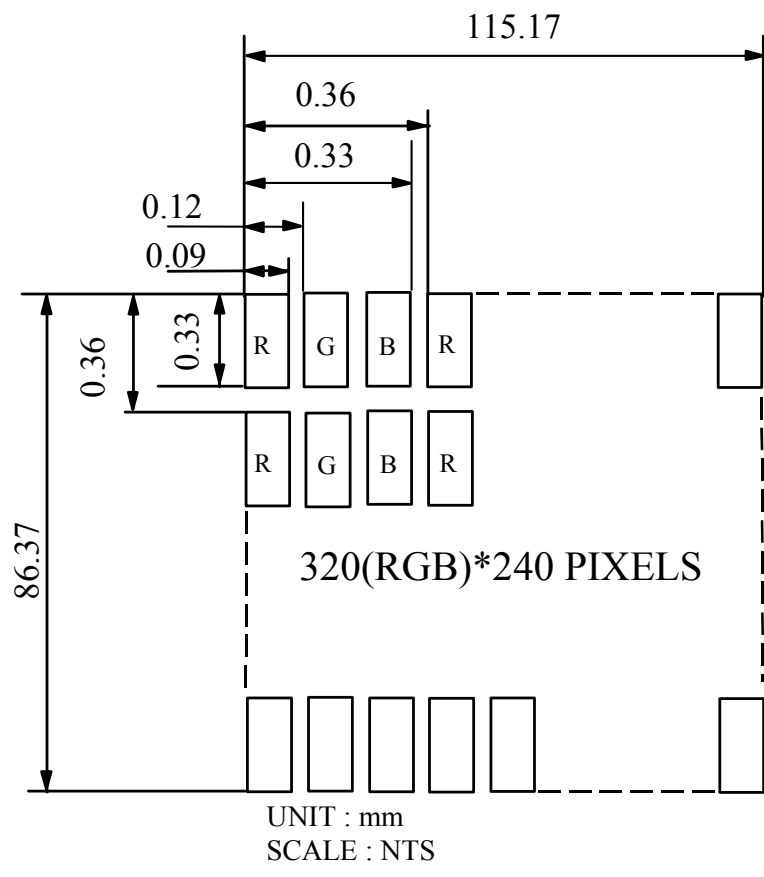
TOLERANCE : ±0.05

7. OUTLINE DIMENSIONS

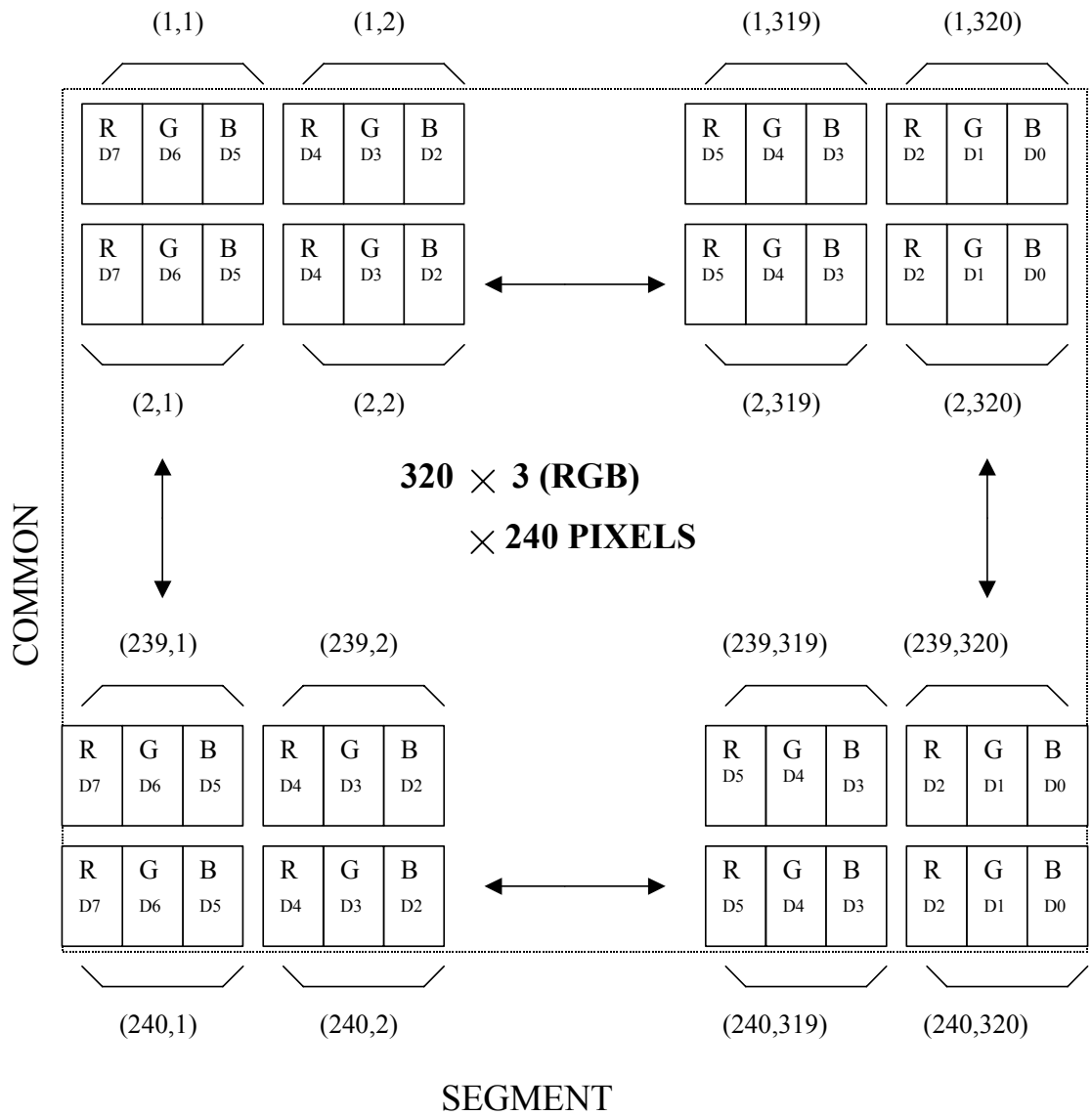


UNIT : mm
 SCALE : NTS
 NOT SPECIFIED TOLERANCE IS ± 0.5

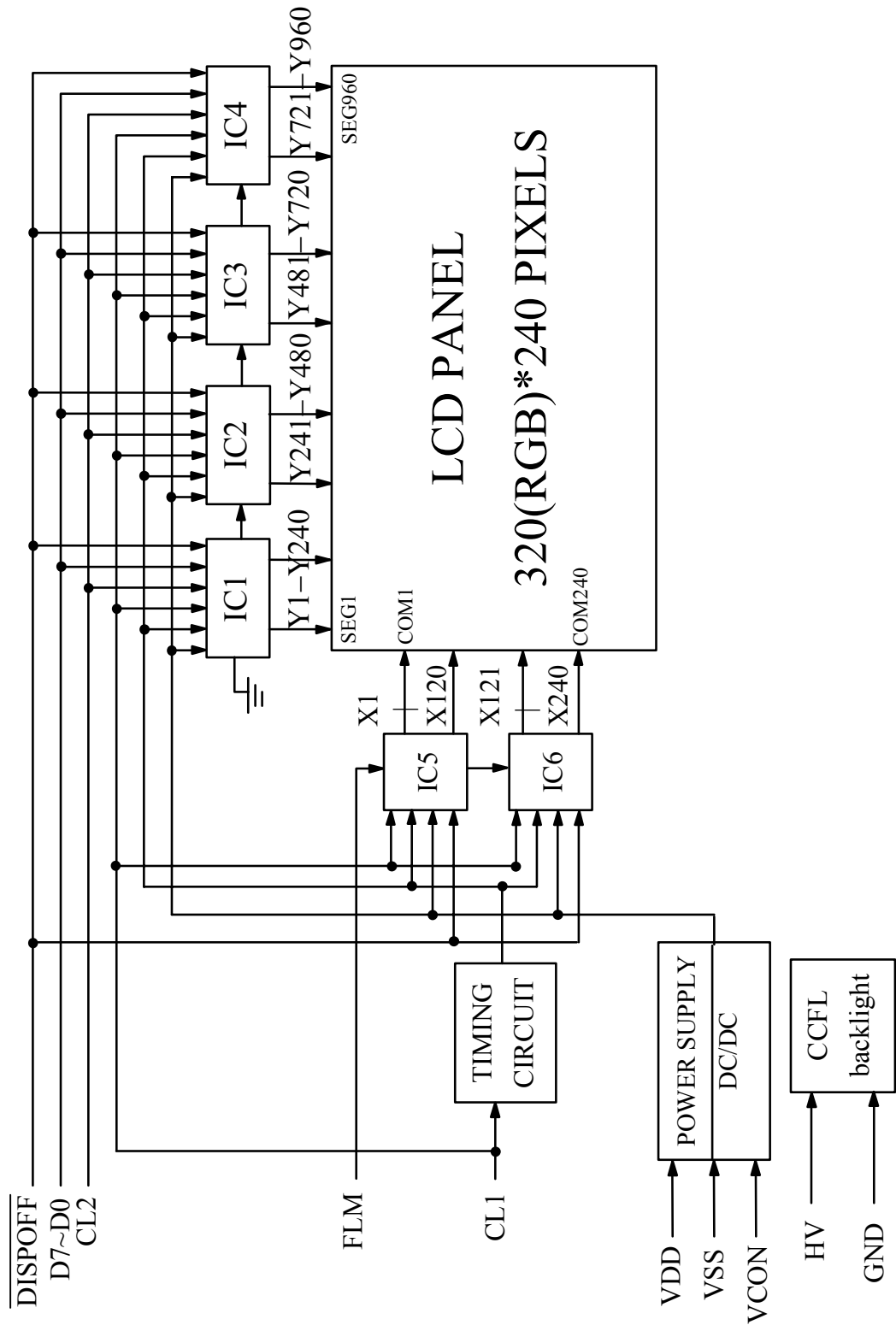
8 . DETAIL DRAWING
8 . 1 DETAIL DRAWING OF PIXEL MATRIX



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 | VCON | — | CONTRAST ADJUSTMENT |
| 8 | D0 | H/L | DISPLAY DATA |
| 9 | D1 | | |
| 10 | D2 | | |
| 11 | D3 | | |
| 12 | D4 | | |
| 13 | D5 | | |
| 14 | D6 | | |
| 15 | D7 | | |
| 16 | VSS | — | GND |

IF2 :

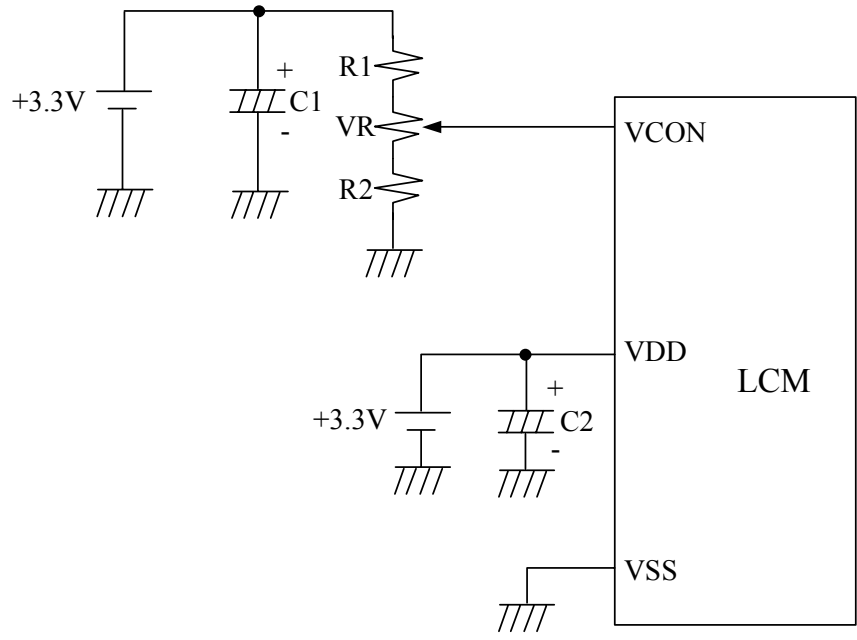
| INTERFACE | PIN NO. | SIGNAL | LEVEL | FUNCTION |
|-----------|---------|--------|-------|----------------------------|
| CCFL | 1 | HV | AC | POWER SUPPLY FOR CCFL(HOT) |
| | 2~3 | NC | — | NON-CONNECTION |
| | 4 | GND | — | POWER SUPPLY FOR CCFL(GND) |

CN2 : IL-G-4S-S3C2(JAE)

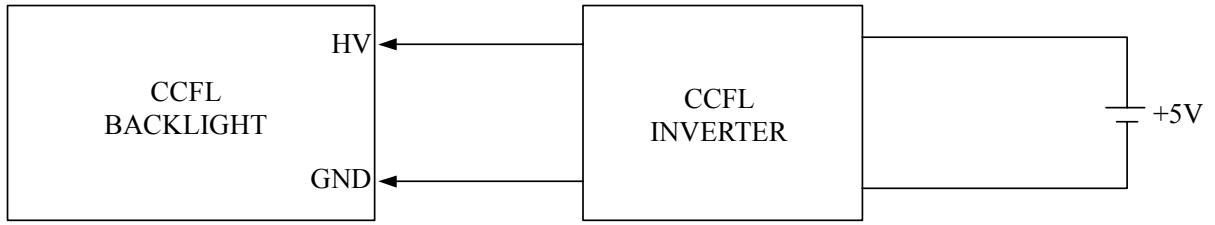
RECOMMENDED MATCHING CONNECTOR : IL-G-4P-S3L2-E(JAE) OR COMPATIBLE

11 . POWER SUPPLY

11.1 POWER SUPPLY FOR LCM

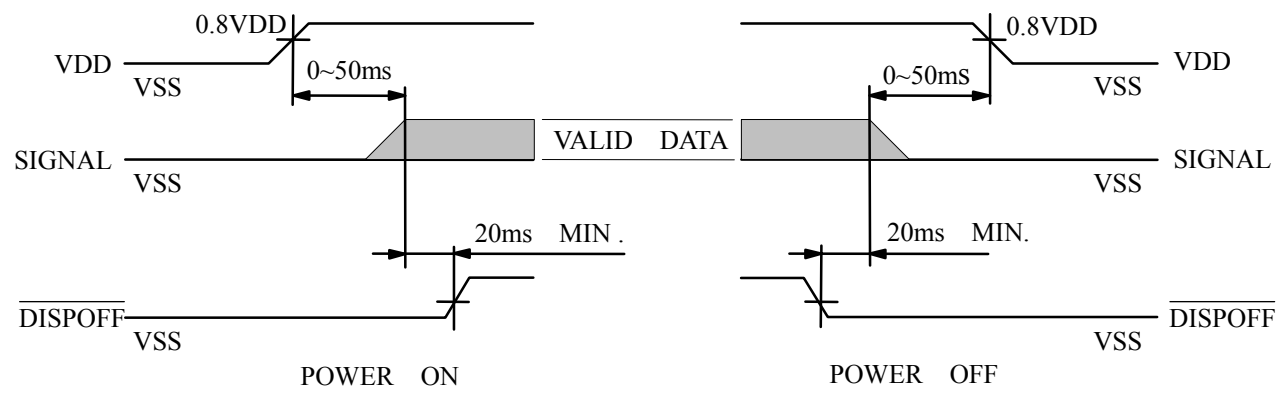


11.2 POWER SUPPLY FOR CCFL BACK-LIGHT



RECOMMENDED CCFL INVERTER : IA-EM02A1(51300005)

11.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL



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