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CUSTOMER	ACCEPTANCE	SPECIFICATIONS
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MODEL NO. :

32F62(CCFL TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

EMERGING DISPLAY
TECHNOLOGIES CORPORATION

MODEL NO .
32F62(CCFL TYPES)

VERSION
2

RECORDS OF REVISION

DOC . FIRST ISSUE

NOV.14,2000

DATE	REVISED PAGE NO.	SUMMARY
MAY.06,2002	7	NOTE 1 : PIN4 → PIN1 PIN1 → PIN4
	9	TOP OF PANE → RIGHT OF PANE BOTTOM OF PANE → LEFT OF PANE LEFT OF PANE → BOTTOM OF PANE RIGHT OF PANE → TOP OF PANE
	10	11.1 Input Method and Activation Force Stylus < 30 grams → > 30 grams Finger < 50 grams → > 80 grams 11.3 Dlectrical Specifications 11.3.5 Linear Test Specification : Linearity Tolerance : 1.5 % max → Linear Test : ± 1.5 % or Less ADDING 11.3.6 Circuit Close Resistance : X = 650 ± 200 Ω , Y = 500 ± 200 Ω 11.4 Linearity 11.4.1 Linearity Tolerance : 1.5 % max → Direction X : ± 1.5 % OR LESS Direction Y : ± 1.5 % OR LESS 11.4.2 Line Test Circuit for X Coordinate → Line Test Circuit for Y Coordinate

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	CCFL	D
Transmissive	CCFL	C

Backlight Color	Code Value
White	W

E W 3 2 F 6 2 B C W

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

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS
PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 001A

1.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL
SPECIFICATIONS .

1.3 TOUCH PANEL SPECIFICATIONS PLEASE REFER TO :

EU - 300

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF DOTS ----- 320W * 240H DOTS
- (2) MODULE SIZE ----- 167.1W * 109.0H * 13.0D(max.) mm
- (3) EFFECTIVE AREA ----- 120.0W * 90.0H mm
- (4) ACTIVE AREA ----- 115.17W * 86.37H mm
- (5) DOT SIZE ----- 0.33W * 0.33H mm
- (6) DOT PITCH ----- 0.36W * 0.36H mm
- (7) LCD TYPE *
- (8) DRIVING METHOD ----- 1 / 240 DUTY MULTIPLEX DRIVE
- (9) BACKLIGHT ----- CCFL

* 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	6.0	V	
POWER SUPPLY FOR LCD DRIVING	VDD – VEE	0	27.0	V	
INPUT VOLTAGE	VI	VSS	VDD	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	60 °C	-20 °C	70 °C	NOTE (2),(3),(4)
HUMIDITY	—	85 % RH	—	85 % RH	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)	1 Mseconds XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -20°C : 48HR MAX .
70°C : 168HR 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

4. ELECTRICAL CHARACTERISTICS

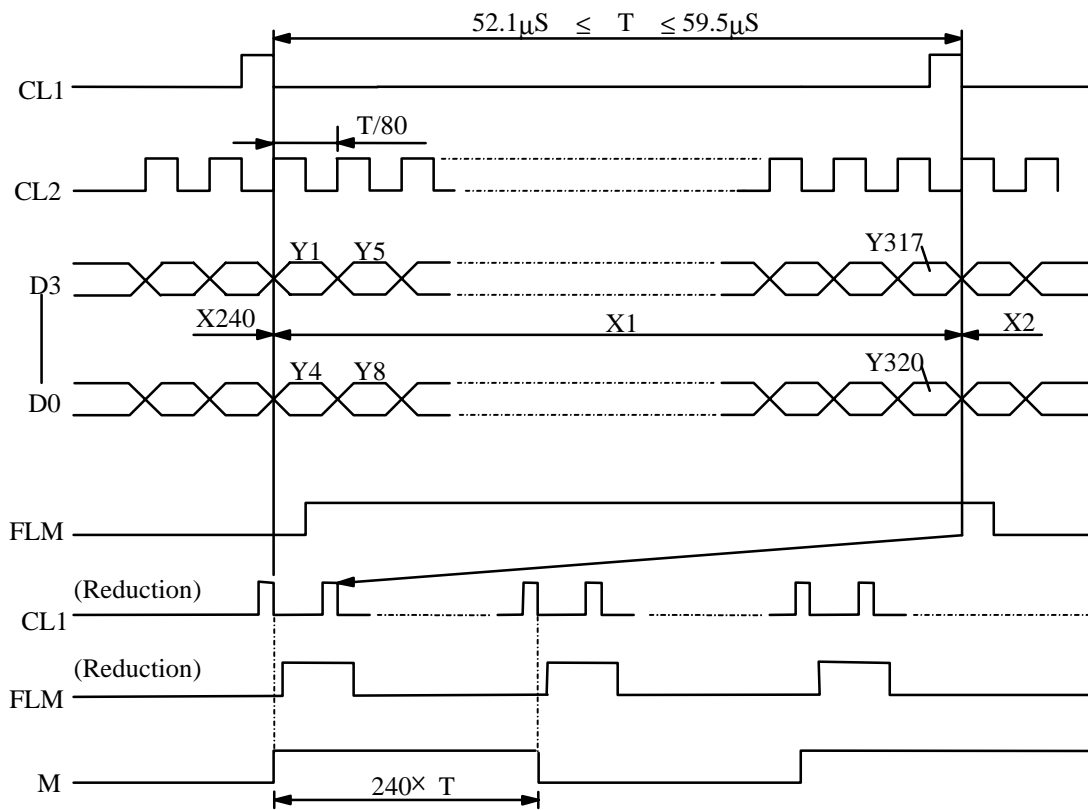
PARAMETER		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC		VDD - VSS	—	4.75	5.0	5.25	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE		VEE - VSS	—	-21.5	-22.0	-22.5	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8*VDD	—	—	—	V
	VIL	L LEVEL	—	—	0.2*VDD	—	V
OUTPUT VOLTAGE NOTE (1)	VOH	H LEVEL	2.4	—	—	—	V
	VOL	L LEVEL	—	—	VSS+0.4	—	V
POWER SUPPLY CURRENT FOR LOGIC NOTE (2)		IDD	VDD-VSS = 5.0 V VDD-VEE = 22.0 V	—	3.0	—	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)		IEE	VDD-VSS = 5.0 V VDD-VEE = 22.0 V	—	2.8	—	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD - VO ∅ = 10° , θ = 0° DUTY = 1/240	Ta = -10 °C	—	25.4	—	—	V
		Ta = 25 °C	—	23	—	—	V
		Ta = 60 °C	—	20.2	—	—	V
CLOCK OSCILLATION FREQUENCY		f FLM	—	70	75	80	HZ
POWER SUPPLY FOR CCFL	VOLTAGE	VCCFL	—	—	300	—	Vrms
	FREQUENCY	f CCFL	—	—	30K	—	HZ
	CURRENT	IL	—	—	5	—	mA
	LIFE TIME	L	IL = 5.0mA	15000	20000	—	Hrs

NOTE (1): APPLIED TO TERMINALS M, FLM, CL1, CL2, D0-D3, DISPOFF.

NOTE (2): THE DISPLAY PATTERN IS ALL "Q".

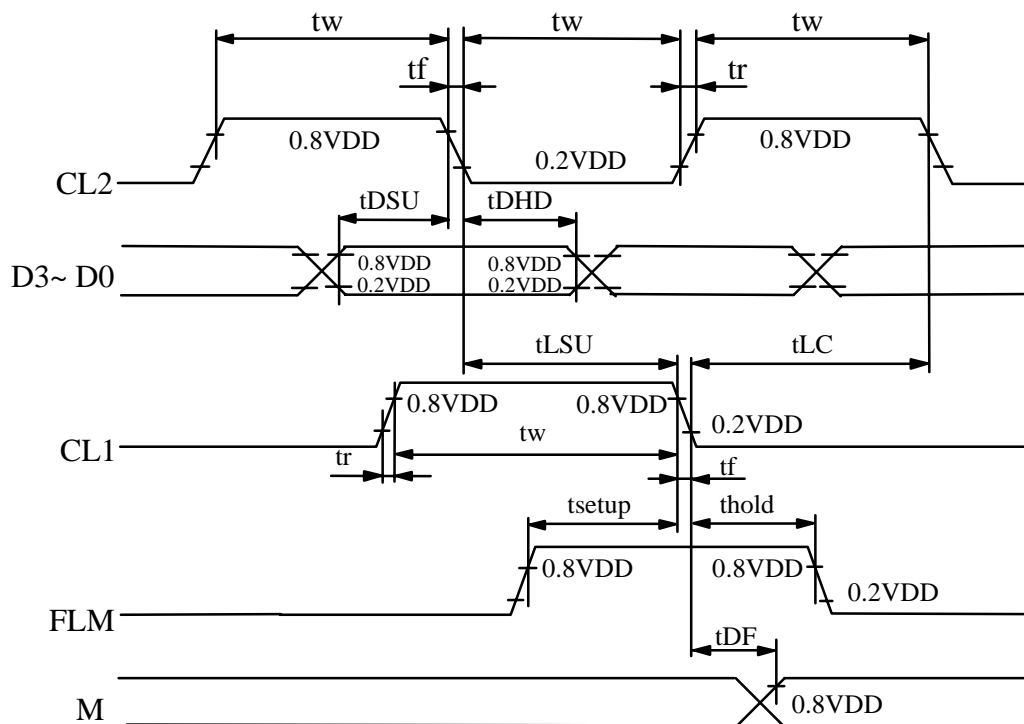
NOTE (3): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ± 1.0V BY EACH MODULE.

5. TIMING CHARACTERISTICS
5.1 INTERFACE TIMING



5.2 SWITCHING CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Frequency of maximum	f_{cp}	—	—	8	MHZ
CL1 , CL2 , pulse	t_w	45	—	—	ns
Rise , fall	t_r , t_f	—	—	15	ns
Data setup	t_{DSU}	20	—	—	ns
Data hold	t_{DHD}	20	—	—	ns
CL1 setup	t_{LSU}	80	—	—	ns
CL1 → CL2 time	t_{LC}	80	—	—	ns
FLM setup	t_{setup}	100	—	—	ns
FLM hold	t_{hold}	100	—	—	ns
M delay	t_{DF}	—	—	300	ns



6. OPTICAL CHARACTERISTICS

Ta = 25 °C

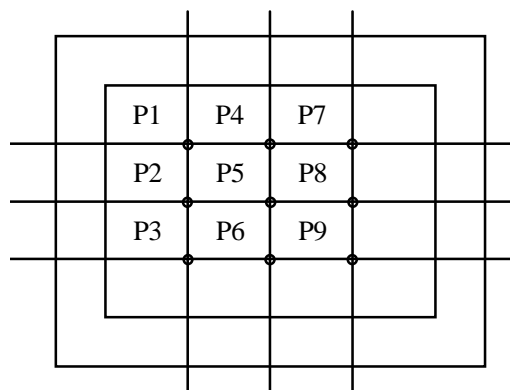
VDD = 5.0 V

I T E M		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	STN	∅2 - ∅1	K ≥ 2.0	—	40	—	deg.	1
	FSTN			—	50	—	deg.	1
CONTRAST RATIO	STN	K	∅ = 10° θ = 0°	—	10	—	—	1
	FSTN			—	20	—	—	1
RESPONSE TIME	tr (rise)	∅=10° θ = 0°	Ta = -10 °C	—	2149	—	ms	1
			Ta = 25 °C	—	228	—		
			Ta = 60 °C	—	124	—		
	tf (fall)		Ta = -10 °C	—	1709	—		
			Ta = 25 °C	—	191	—		
			Ta = 60 °C	—	96	—		
BRIGHTNESS OF BACKLIGHT		B	—	300	—	—	cd / m ²	2
RISE TIME OF BACKLIGHT		TC	—	—	5	—	MINUTE	
BRIGHTNESS UNIFORMITY		—	—	—	—	20	%	3, 4

NOTE (1) : PLEASE REFER TO :
CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 001A)

NOTE (2) : POLARIZER MODE : TRANSMISSIVE

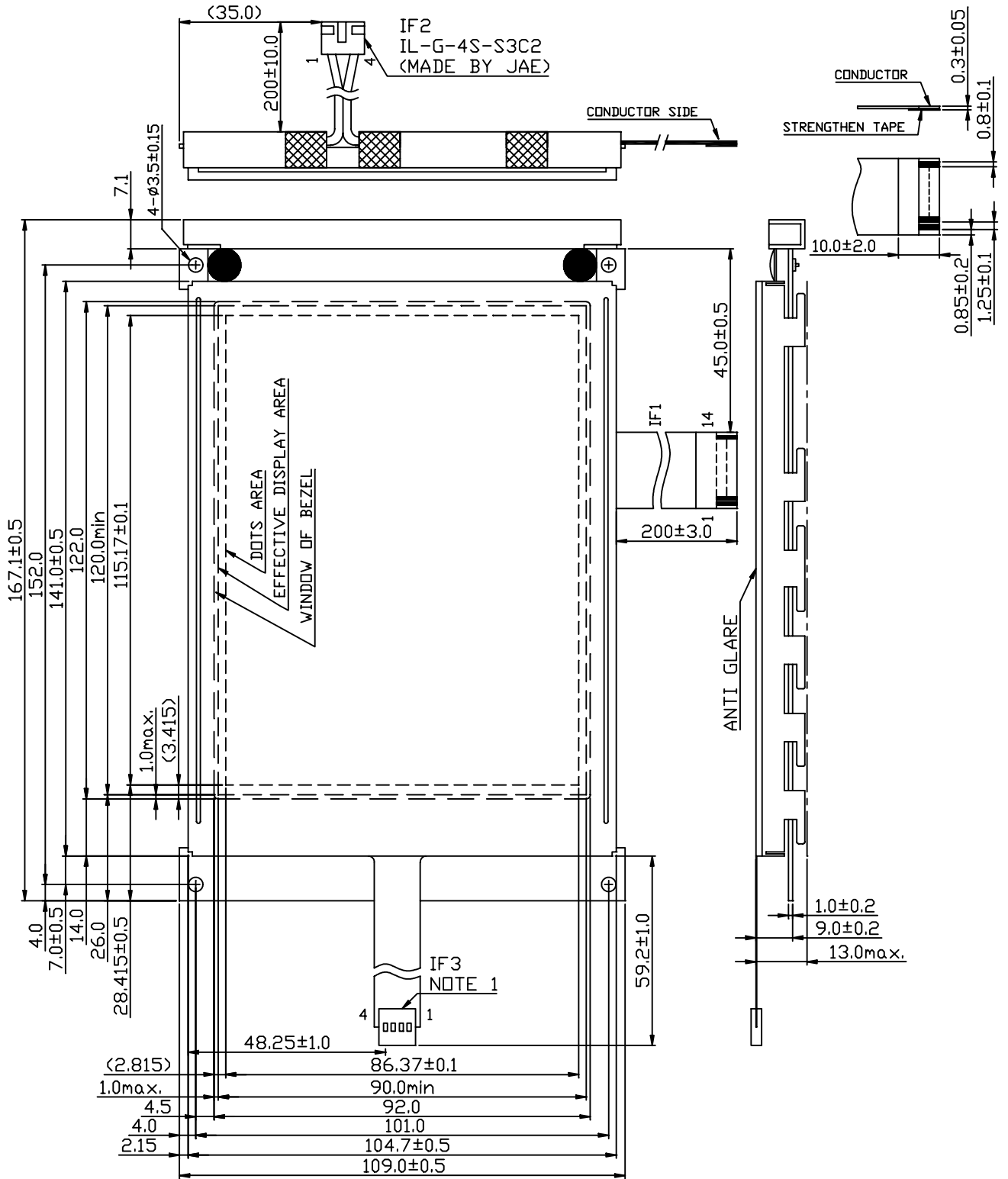
NOTE (3) : MEASUREMENT OF THE FOLLOWING 9 PLACES ON THE DISPLAY.
DEFINITION OF THE BRIGHTNESS TOLERANCE .



NOTE (4) : BRIGHTNESS UNIFORMITY IS DEFINED AS FOLLOWING

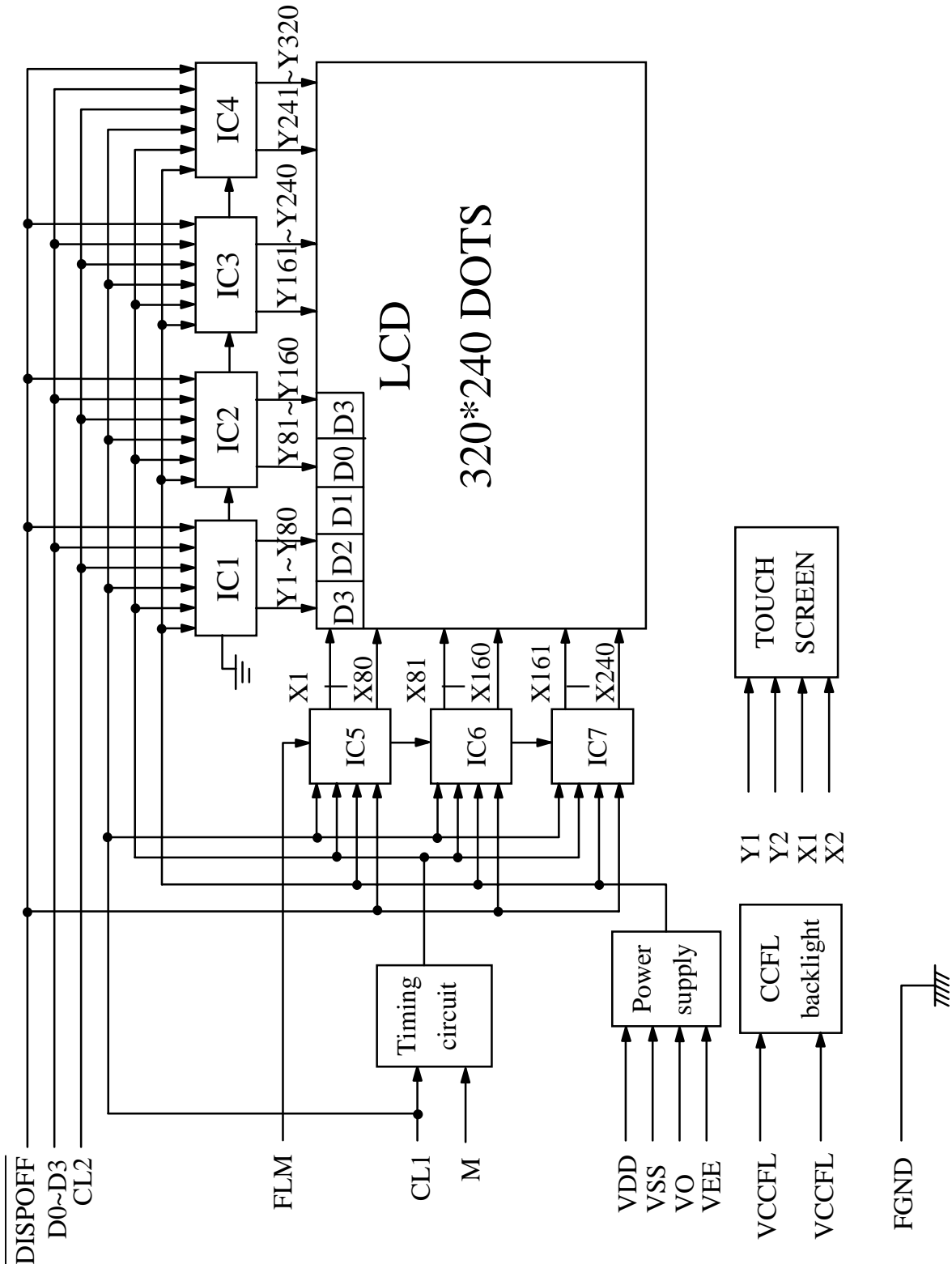
$$\sum_X = \left[\frac{(\text{MAXIMUN BRIGHTNESS OR MINIMUN BRIGHTESS}) - \text{AVERAGE BRIGHTNESS}}{\text{AVERAGE BRIGHTNESS}} \right] \times 100\%$$

7. OUTLINE DIMENSION

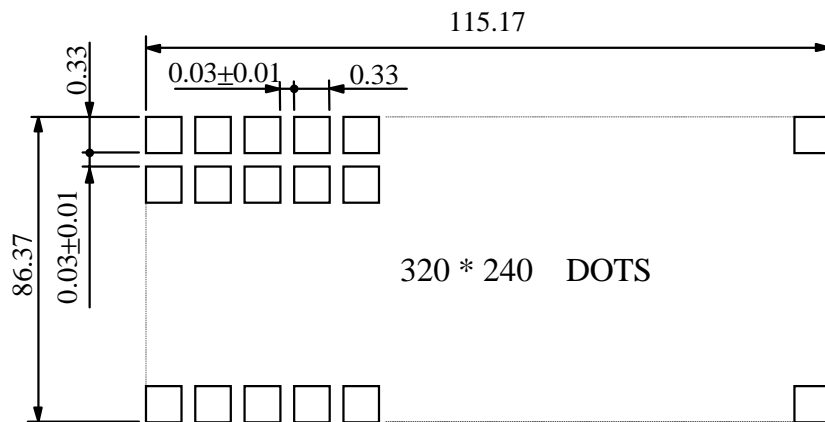


NOTE 1 : AMP COMPATIBLE (PITCH:2.54mm)
UNIT : mm
SCALE : NTS
NOT SPECIFIED TOLERANCE IS ± 0.3

8. BLOCK DIAGRAM



9. DETAIL DRAWING OF DOT MATRIX



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

10. INTERFACE SIGNALS

IF1:

DISPLAY DATA

PIN NO	SYMBOL	LEVEL	FUNCTION
1	D0	H / L	
2	D1	H / L	
3	D2	H / L	
4	D3	H / L	
5	$\overline{\text{DISPOFF}}$	H / L	H: DISPLAY ON ,L : DISPLAY OFF
6	FLM	H	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
7	NC	—	NO CONNECTION
8	CL1	H → L	DISPLAY DATA LATCH
9	CL2	H → L	DISPLAY DATA SHIFT
10	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
11	VSS	—	GROUND
12	VEE	—	POWER SUPPLY FOR LCD DRIVING
13	V0	—	OPERATING VOLTAGE FOR LCD DRIVING
14	FGND	—	FRONT PANEL GROUND

IF2 :

INTERFACE	PIN	SINGAL	LEVEL	FUNCTION
CCFL	1	VCCFL	—	POWER SUPPLY FOR CCFL DRIVING
	2~3	NC	—	NO CONNECTION
	4	VCCFL	—	POWER SUPPLY FOR CCFL DRIVING

IF3 :

PIN NO	SYMBOL	FUNCTION
1	X2	RIGHT OF PANE
2	X1	LEFT OF PANE
3	Y2	TOP OF PANE
4	Y1	BOTTOM OF PANE

11 . SPECIFICATIONS FOR TOUCH PANEL

11 . 1 Input Method and Activation Force

Input Method	Average Activation Force
Stylus	> 30 grams
Finger	> 80 grams

11 . 2 Typical Optical Characteristics

11.2.1 Visible Light Transmission : > 80 % @ 550 nm .

11.2.2 Haze : 5 % \pm 2 % through hard coated PET only

11 . 3 Electrical Specifications

11.3.1 Operating Voltage : 5.5V or less

11.3.2 Contact current : 20mA (maximum)

11.3.3 Circuit open resistance : > 20M Ω at 25 VDC

11.3.4 Contact bounce : < 15 ms

11.3.5 Linear Test : \pm 1.5 % or less

11.3.6 Circuit Close Resistance : X = 650 \pm 200 Ω

Y = 500 \pm 200 Ω

11 . 4 Linearity

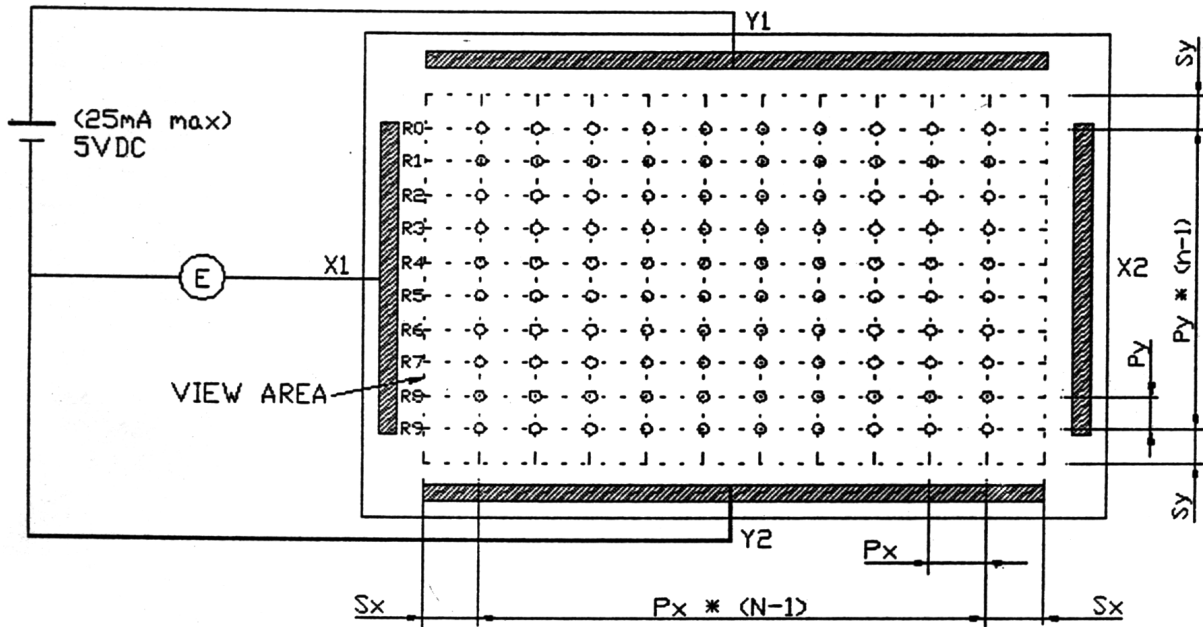
11.4.1 Linear Test Specification

DIRECTION X : \pm 1.5 % or less

DIRECTION Y : \pm 1.5 % or less

11.4.2 Line Test Circuit for Y Coordinate

Add 5V between Y1 and Y2 , touch the point C0R0 TO C9R9 separately , and measure the voltage from X1 as the following drawing .



11.4.3 Calculate Linearity : For the First Row ϕ

$$R\phi_{avg} = (VC\phi + VC1 + VC2 + \dots + VC9) \div 10$$

$R\phi_{max}$ = The maximum voltage in Row ϕ

$R\phi_{min}$ = The minimum voltage in Row ϕ

$$R\phi_{linear1} = | R\phi_{max} - R\phi_{avg} | \div R\phi_{avg} * 100\%$$

$$R\phi_{linear2} = | R\phi_{min} - R\phi_{avg} | \div R\phi_{avg} * 100\%$$

$$R\phi_{linear} = \max (R\phi_{linear1}, R\phi_{linear2})$$

11.4.4 For Y Coordinate Test

Add 5 voltage between X1 and X2 touch the point $C\phi R\phi$ to $C9R9$ separately and measure the voltage from Y1 as the above drawing

11.4.5 Calculate Linearity : For the First Column ϕ

$$C\phi_{avg} = (VR\phi + \bar{VR}1 + VR2 + \dots + VR9) \div 10$$

$C\phi_{max}$ = The maximum voltage in Column ϕ

$C\phi_{min}$ = The minimum voltage in Column ϕ

$$C\phi_{linear1} = | C\phi_{max} - C\phi_{avg} | \div C\phi_{avg} * 100\%$$

$$C\phi_{linear2} = | C\phi_{min} - C\phi_{avg} | \div C\phi_{avg} * 100\%$$

$$C\phi_{linear} = \max (C\phi_{linear1} , C\phi_{linear2})$$

11.5. Environment Specification

11.5.1 Operating Temperature - 10° C ~ + 60° C

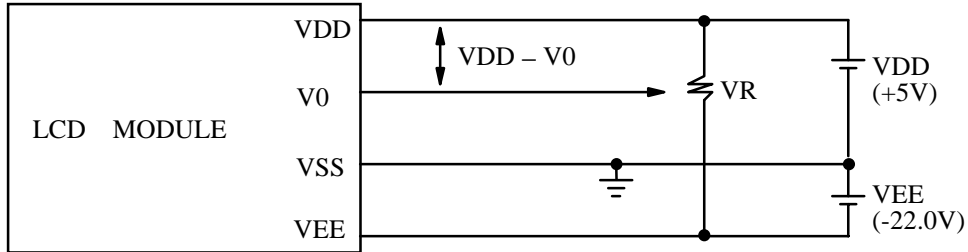
Humidity less than 90% RH

11.5.2 Storage Temperature - 20° C ~ + 70° C

at Ambient Humidity

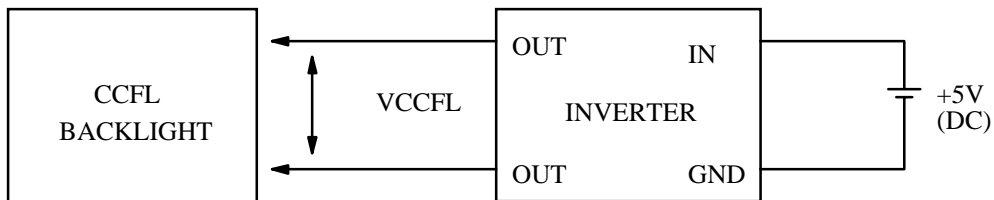
1 1 . POWER SUPPLY

1 1 . 1 POWER SUPPLY FOR LCM



VDD - V0 : LCD DRIVING VOLTAGE
VR : 20KΩ

1 1 . 2 POWER SUPPLY FOR CCFL BACK - LIGHT



RECOMMENDED INVERTER : IA-EM02A1

1 1 . 3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

