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PART NO. : GG3224P3FUC1S

FOR MESSRS. : _____

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Accepted by : _____

Proposed by :  _____

Date : 12,30,2002

RECORD OF REVISION

DATE	PAGE	SUMMARY
2002.12.30	5	5. LOGIC CIRCUIT POWER SUPPLY CURRENT NOTE(2) → 25.0 27.0 MAX----- → 30.0 LCD DRIVER CIRCUIT POWER SUPPLY CURRENT → NOTE(MAX) 12.0
	6	6→ CONTRAST RATIO MIN 15 → TYP 25 THE BRIGHTNESS OF BRIGHTNESS SOURCE → DONS-ON MIN 1300
		→ DONS-OFF MIN 5.0
	9	9→ 165.11

3. GENERAL SPECIFICATIONS AND MECHANICAL DATA

3.1 GENERAL SPECIFICATIONS

PLEASE REFER TO:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (SP-10-000)”.

3.2 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS.

3.3 MECHANICAL DATA

- (1) NUMBER OF DOTS ----- 320W*240H DOTS
- (2) MODULE SIZE ----- 167.1W*109.0H*11.0T (MAX) mm
- (3) VIEWING AREA ----- 122.0W*92.0H mm
- (4) DISPLAY AREA ----- 115.17W*86.37H mm
- (5) DOT SIZE ----- 0.33W*0.33H mm
- (6) DOT PITCH ----- 0.36W*0.36H mm
- (7) VIEWING DIRECTION ----- 6 O'CLOCK
- (8) LCD TYPE ----- FSTN, NEGATIVE, TRANSMISSIVE
BLACK/WHITE
- (9) BACK LIGHT ----- CCFL

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
POWER SUPPLY FOR LOGIC	VDD-VSS	-0.3	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VDD-VEE	0	35.0	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 200PF CAPACITOR BY STATED VOLTAGE, THE CAPACITOR IS CONNECTED WITH INTERFACE-PINS OF THE MODULE.

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	0℃	50℃	-20℃	60℃	NOTE (2)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	-----	4.9 m/s ² (0.5G)	-----	19.6 m/s ² (2G)	10~300HZ XYZ DIRECTIONS 1 Hr.EACH
SHOCK	-----	29.4 m/s ² (3G)	-----	49.0 m/s ² (5G)	10 ms XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2): Ta AT -20℃ : 48HR MAX.
60℃ : 168HR MAX.

NOTE (3): Ta ≤ 40℃ : 85% RH MAX.
Ta > 40℃ : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE
HUMIDITY OF 85%RH AT 40℃ . (50%RH AT 50℃)

5. ELECTRICAL CHARACTERISTICS

VDD = 5.0 ± 0.5V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
LOGIC CIRCUIT POWER SUPPLY VOLTAGE	VDD-VSS	-----	4.5	5.0	5.5	V
LCD DRIVER CIRCUIT POWER SUPPLY VOLTAGE	VDD-VEE	-----	12	-----	32	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8VDD	-----	VDD	V
	VIL	L LEVEL	0	-----	0.2VDD	V
LOGIC CIRCUIT POWER SUPPLY CURRENT NOTE (2)	IDD	VDD-VSS=5.0V VEE-VSS =-16.0V	-----	25.0	30.0	mA
LCD DRIVER CIRCUIT POWER SUPPLY CURRENT NOTE (2)	IEE	VDD-VSS=5.0V VEE-VSS =-16.0V	-----	10.0	12.0	mA
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD - VO Φ=10° θ=0° DUTY = 1/240	Ta = 0°C	-----	-----	-----	V
		Ta = 25°C	-----	21.0	-----	V
		Ta = 50°C	-----	-----	-----	V
FLM FREQUENCY	fFLM	-----	70.0	75.0	80.0	Hz
THE POWER SUPPLY FOR CCFL	VCCFL	fCCFL = 30 KHz	-----	300.0	-----	Vrms
	ICCFL	-----	-----	5.0	-----	mA

NOTE (1): APPEND TO TERMINALS: FLM, CL1, CL2, D0~D3

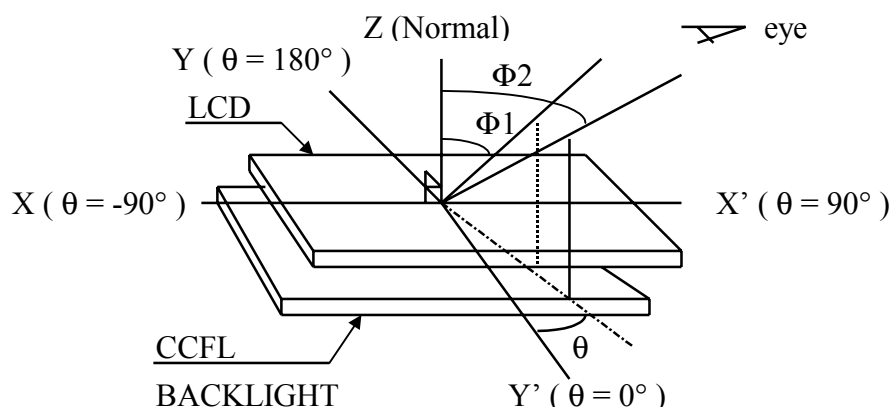
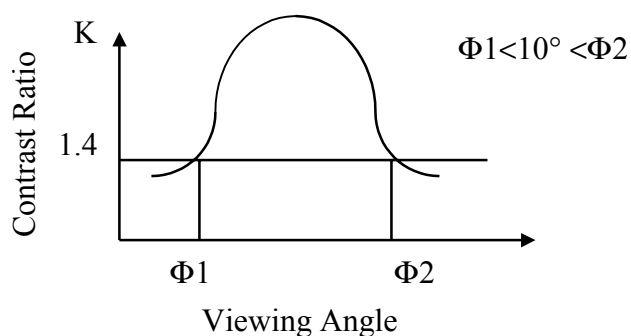
NOTE (2): THE DISPLAY PATTERN IS ALL "Q"

NOTE (3): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE
ABOUT ± 0.5V BY EACH MODULE.

6. OPTICAL CHARACTERISTICS

Ta = 25°C

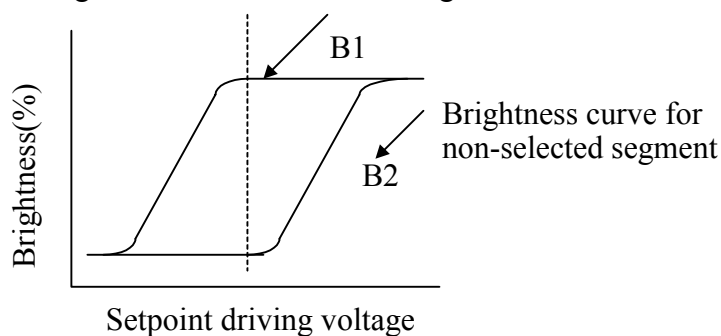
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING AREA	$\Phi 2-\Phi 1$	$K \geq 1.4$	-----	40	-----	deg.	1,2
CONTRAST RATIO	K	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	15	-----	-----	3
RESPONSE TIME	tr (rise)	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	250	400	ms	4
	tf (fall)	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	350	450	ms	4
THE BRIGHTNESS OF BRIGHTNESS SOURCE	B	DOTS ON $\Phi = 10^\circ \theta = 0^\circ$	-----	80	-----	-----	5
		DOTS OFF $\Phi = 10^\circ \theta = 0^\circ$	-----	5.0	-----	-----	5

NOTE (1): DEFINITION OF θ AND Φ NOTE (2): DEFINITION OF VIEWING ANGLE $\Phi 1$ AND $\Phi 2$ 

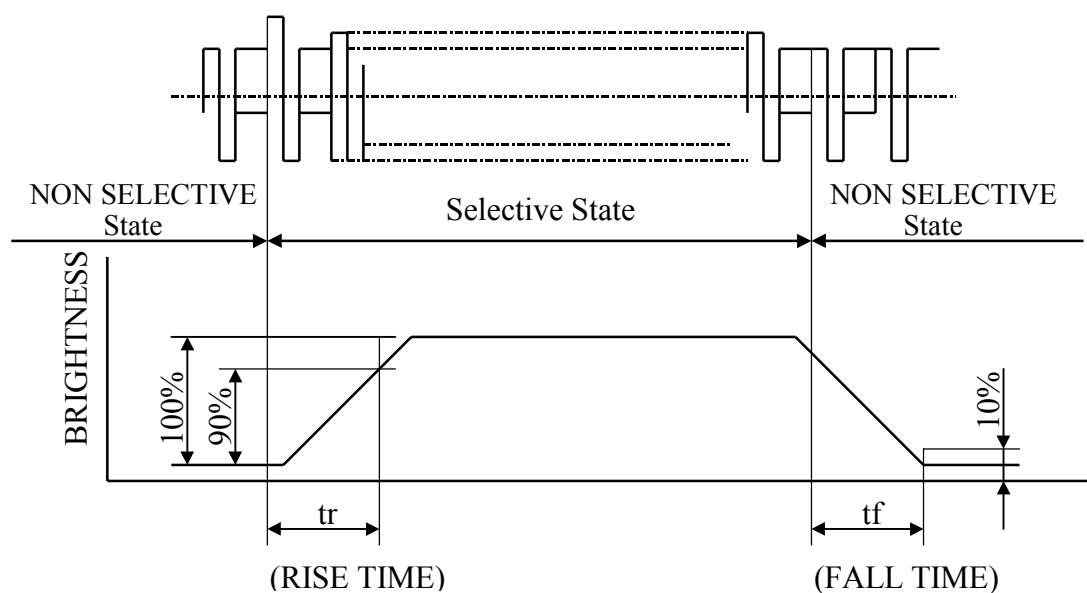
NOTE (3): DEFINITION OF CONTRAST RATIO “K”

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

Brightness curve for selected segment

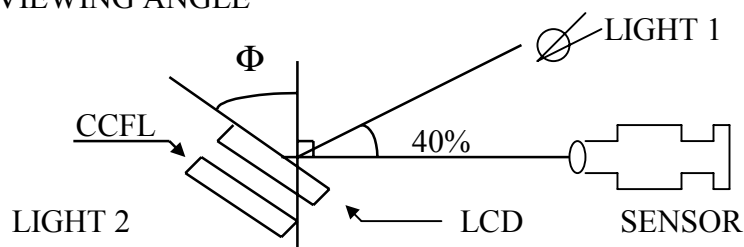


NOTE (4): DEFINITION OF OPTICAL RESPONSE

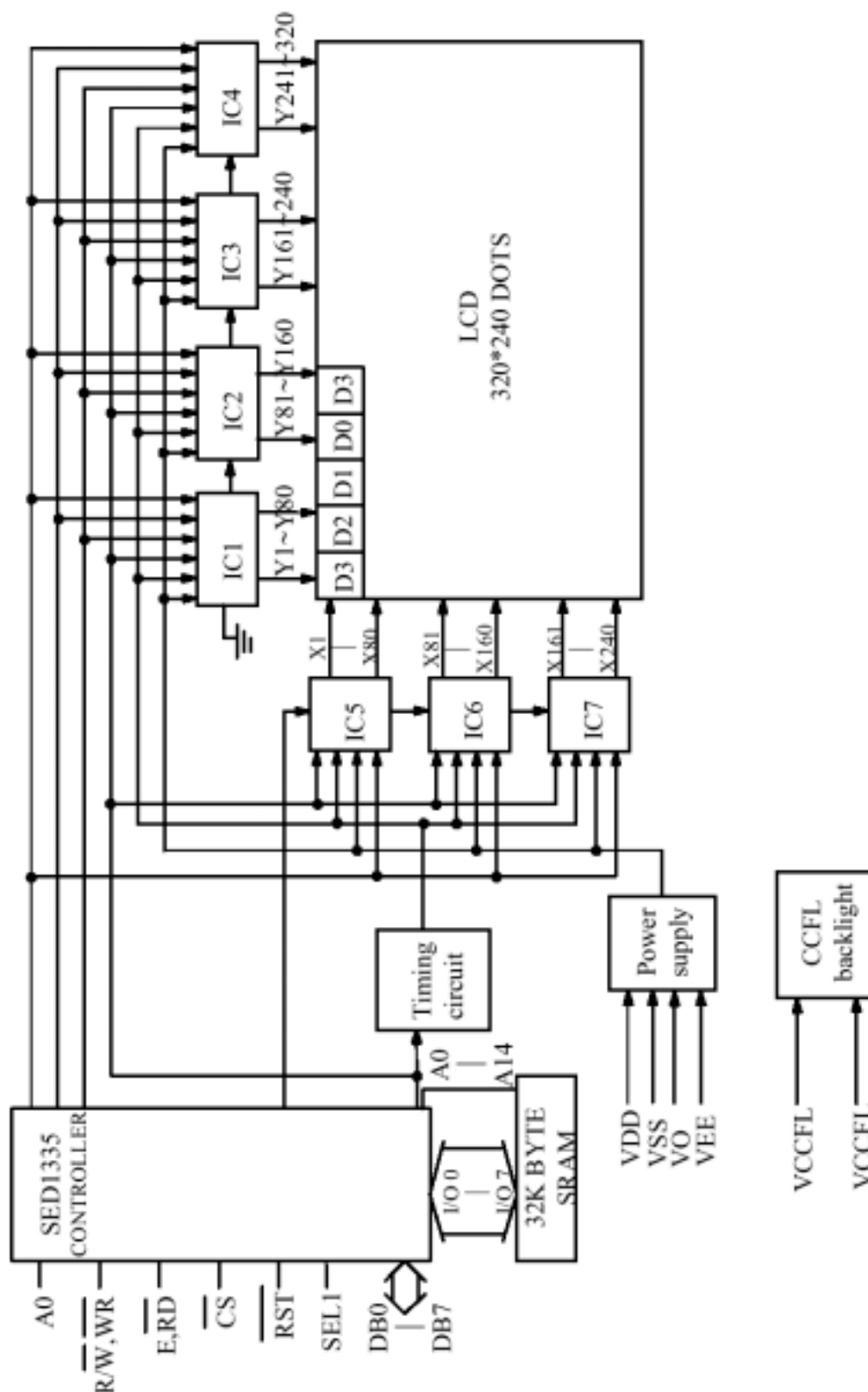


NOTE (5): OPTICAL OF LIGHT

VIEWING ANGLE

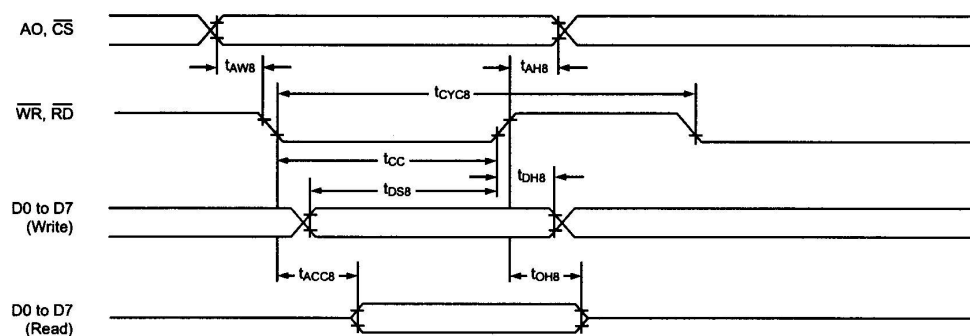


7. BLOCK DIAGRAM



8. TIMING CHARACTERISTICS

8.1 8080 FAMILY INTERFACE TIMING



$T_a = -20 \text{ to } 75^\circ\text{C}$

Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			Min.	Max.	Min.	Max.		
$A0, \overline{CS}$	t_{AH8}	Address hold time	10	—	10	—	ns	CL = 100pF
	t_{AW8}	Address setup time	0	—	0	—	ns	
$\overline{WR}, \overline{RD}$	t_{CYC8}	System cycle time	See note.	—	See note.	—	ns	
	t_{CC}	Strobe pulsewidth	120	—	150	—	ns	
D0 to D7	t_{DS8}	Data setup time	120	—	120	—	ns	
	t_{DH8}	Data hold time	5	—	5	—	ns	
	t_{ACC8}	$\overline{RD}$ access time	—	50	—	80	ns	
	t_{OH8}	Output disable time	10	50	10	55	ns	

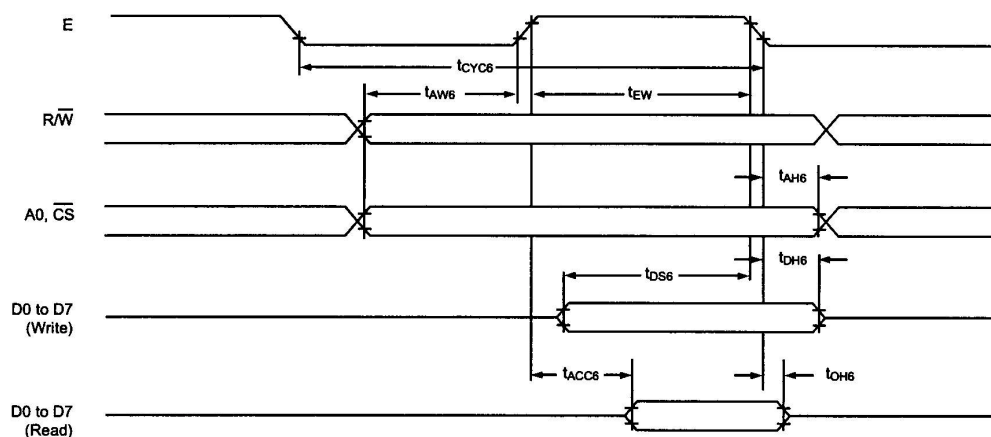
Note: For memory control and system control commands:

$$t_{CYC8} = 2t_C + t_{CC} + t_{CEA} + 75 > t_{ACV} + 245$$

For all other commands:

$$t_{CYC8} = 4t_C + t_{CC} + 30$$

8.2 6800 FAMILY INTERFACE TIMING



Note: t_{CYC6} indicates the interval during which CS is LOW and E is HIGH.

$T_a = -20$ to 75°C

Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			Min.	Max.	Min.	Max.		
A0, $\overline{\text{CS}}$, R/W	t_{CYC6}	System cycle time	See note.	—	See note.	—	ns	CL = 100 pF
	t_{AW6}	Address setup time	0	—	10	—	ns	
	t_{AH6}	Address hold time	0	—	0	—	ns	
D0 to D7	t_{DS6}	Data setup time	100	—	120	—	ns	
	t_{DH6}	Data hold time	0	—	0	—	ns	
	t_{OH6}	Output disable time	10	50	10	75	ns	
	t_{ACC6}	Access time	—	85	—	130	ns	
E	t_{EW}	Enable pulsewidth	120	—	150	—	ns	

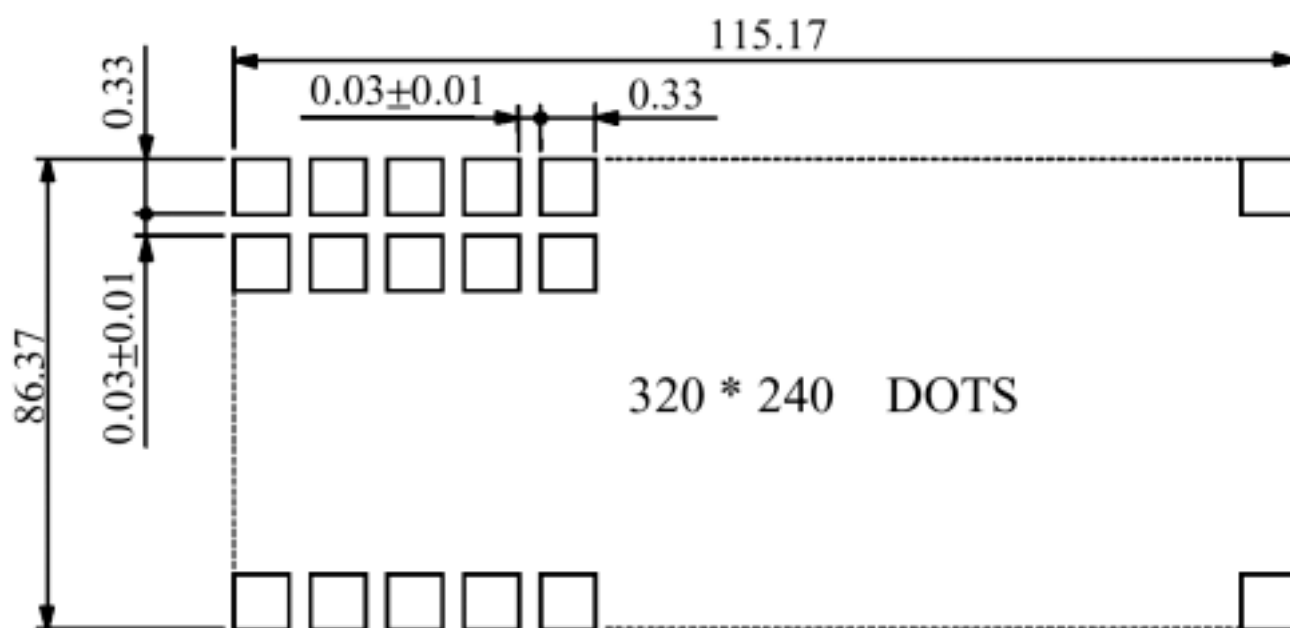
Note: For memory control and system control commands:

$$t_{CYC6} = 2t_C + t_{EW} + t_{CEA} + 75 > t_{ACV} + 245$$

For all other commands:

$$t_{CYC6} = 4t_C + t_{EW} + 30$$

9.1 DTAILED DRAWING OF DOTS MATRIX



UNIT: mm

NON-SPECIFIED TOLERANCE: ± 0.1 mm

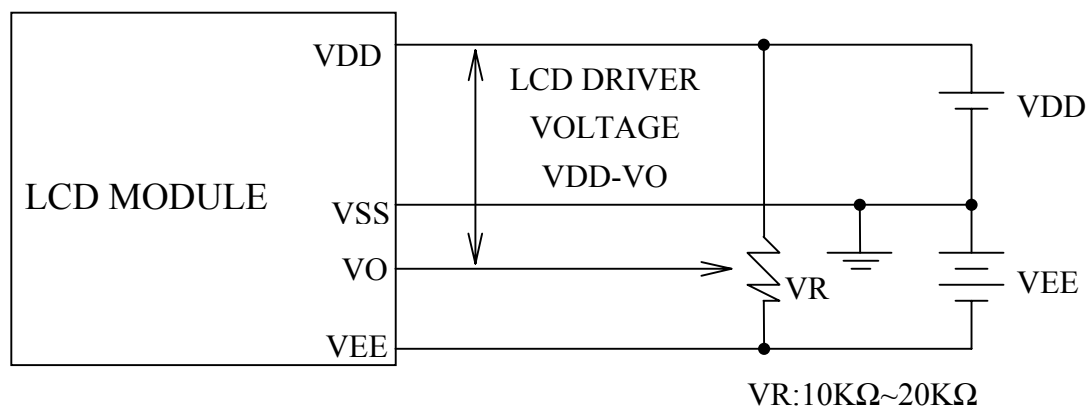
9.2 INTERFACE PIN CONNECTION

PIN NO	SYMBOL	LEVEL	FUNCTION
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
4	A0	—	8080 FAMILY INTERFACE
			AO RD WR FUNCTION
			0 0 1 STATUS FLAG READ
			1 0 1 DISPLAY DATA AND CURSOR ADDRESS READ
			0 1 0 DISPLAY DATA AND PARAMETER WRITE
			1 1 0 COMMAND WRITE
			6800 FAMILY INTERFACE
			AO R/W E FUNCTION
			0 1 1 STATUS FLAG READ
			1 1 1 DISPLAY DATA AND CURSOR ADDRESS READ
5	$\overline{\text{WR}}, \overline{\text{R/W}}$	H/L	8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW WRITE STROBE .
			6800 FAMILY INTERFACE ACTS AS THE READ/ WRITE CONTROL SIGNAL .
6	$\overline{\text{RD}}, \text{E}$	H/L	8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW READ STROBE .
			6800 FAMILY INTERFACE ACTS AS THE ACTIVE-HIGH ENABLE CLOCK .
7 /	DB0 /	H/L	DISPLAY DATA
14	DB7		
15	$\overline{\text{CS}}$	H/L	CHIP SELECT
16	$\overline{\text{RES}}$	H/L	RESET
17	VEE	—	POWER SUPPLY FOR LCD DRIVING
18	SEL1	H/L	8080 OR 6800 FAMILY INTERFACE SELECT , H:6800 , L:8080
19	FGND	—	FRAME GROUND
20	NC	—	NON-CONNECTION

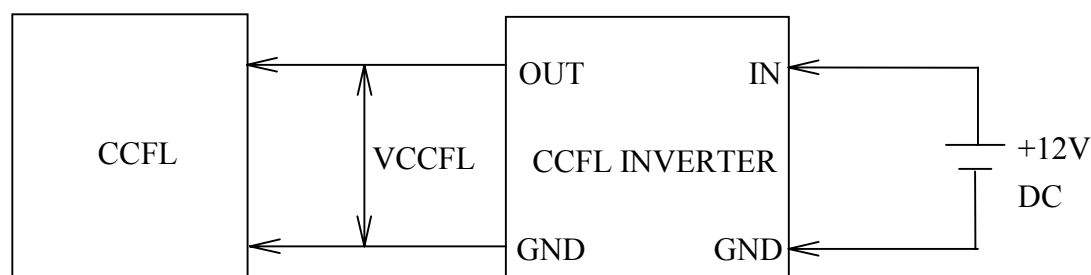
INTERFACE PIN CONNECTION OF CCFL BACKLIGHT				
PIN NO	1	2	3	4
SYMBOL	VCCFL	NC	NC	VCCFL

10. POWER SUPPLY FOR LCD MODULE

10.1 POWER SUPPLY FOR LCM



10.2 POWER SUPPLY FOR CCFL



10.3 POWER AND INTERFACE TIMING SEQUENCE

