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APPROVED BY:		TOTAL PAGE : 8
<i>Roger Yang</i>		VERSION : 2

CUSTOMER

ACCEPTANCE

SPECIFICATIONS

MODEL NO . :

32F4A (LED TYPES)

FOR MESSRS :

CUSTOMER'S APPROVAL

DATE :

BY :

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MODEL NO . 32F4A(LED TYPES)	VERSION 2
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DATE	REVISED PAGE NO.	SUMMARY																																								
JUL.10,2002	4	5. OPTICAL CHARACTERISTICS <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN .</th> <th>TYP .</th> <th>MAX.</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">BRIGHTNESS OF BACKLIGHT</td> <td rowspan="2">B</td> <td rowspan="2">VLED - VLSS = 5.0 V</td> <td>(7)</td> <td>—</td> <td>—</td> <td rowspan="2">cd / m²</td> <td>1, 2 →</td> </tr> <tr> <td>(5)</td> <td>—</td> <td>—</td> <td>1, 3</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>I T E M</th> <th>SYMBOL</th> <th>CONDITION</th> <th>MIN .</th> <th>TYP .</th> <th>MAX.</th> <th>UNIT</th> <th>NOTE</th> </tr> </thead> <tbody> <tr> <td rowspan="2">BRIGHTNESS OF BACKLIGHT</td> <td rowspan="2">B</td> <td rowspan="2">VLED - VLSS = 5.0 V</td> <td>55</td> <td>60</td> <td>65</td> <td rowspan="2">cd / m²</td> <td>1, 2</td> </tr> <tr> <td>22</td> <td>24</td> <td>26</td> <td>1, 3</td> </tr> </tbody> </table>	I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE	BRIGHTNESS OF BACKLIGHT	B	VLED - VLSS = 5.0 V	(7)	—	—	cd / m ²	1, 2 →	(5)	—	—	1, 3	I T E M	SYMBOL	CONDITION	MIN .	TYP .	MAX.	UNIT	NOTE	BRIGHTNESS OF BACKLIGHT	B	VLED - VLSS = 5.0 V	55	60	65	cd / m ²	1, 2	22	24	26	1, 3
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NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

Backlight Color	Code Value
White	W

E W 3 2 F 4 A B M W R

Viewing direction
NIL : 6 o'clock
R : 3 o'clock

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

TABLE OF CONTENTS

NO.	ITEM	PAGE
1.	GENERAL SPECIFICATIONS -----	1
2.	MECHANICAL SPECIFICATIONS -----	1
3.	ABSOLUTE MAXIMUM RATINGS -----	2
4.	ELECTRICAL CHARACTERISTICS -----	3
5.	OPTICAL CHARACTERISTICS -----	4
6.	OUTLINE DIMENSION -----	5
7.	BLOCK DIAGRAM -----	6
8.	DETAIL DRAWING OF DOT MATRIX -----	7
9.	INTERFACE SIGNALS -----	7
10.	POWER SUPPLY -----	8

1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - 001A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER :

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

EU - SED1335

1.3 THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF DOTS ----- 320W * 240H DOTS
- (2) MODULE SIZE ----- 167.1W * 109.0H * 11.0D 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 ----- LED , WHITE , WITH BEF

* 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	7.0	V	
POWER SUPPLY FOR LCD DRIVING	VDD – VEE	0	30.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
LED POWER VOLTAGE	VLED	—	6	V	

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	-20 °C	70 °C	-30 °C	80 °C	NOTE (2) , (3)
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 -30°C : 48HR MAX .

80°C : 168HR MAX .

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

4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

VDD-VSS = 5.0 V

VEE-VSS = -22.0V

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY VOLTAGE FOR LOGIC	VDD – VSS	—	4.5	5.0	5.5	V
POWER SUPPLY VOLTAGE FOR LCD DRIVE	VEE – VSS	—	-21.5	-22.0	-22.5	V
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.5*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	—	40.0	—	mA
POWER SUPPLY CURRENT FOR LCD DRIVE NOTE (2)	IEE	VDD – VO = 2.5V	—	2.5	—	mA
RECOMMENDED LCD DRIVING VOLTAGE	VDD – VO ∅ = 10° θ = ** DUTY =1/240	Ta = - 20 °C	22.7	23.7	24.7	V
		Ta = 25 °C	21.5	22.5	23.5	V
		Ta = 70 °C	19.7	20.7	21.7	V
CLOCK OSCILLATION FREQUENCY	f OSC	—	—	8	—	MHz
LED FORWARD VOLTAGE	VLED – VLSS	—	—	5.0	—	V
LED FORWARD CURRENT	IF	VLED-VLSS	—	140	—	mA

** θ = 0° WHEN VIEWING DIRECTION IS 6 O’CLOCK

θ = 90° WHEN VIEWING DIRECTION IS 3 O’CLOCK

NOTE (1): APPLIED TO TERMINALS D0 TO D7, A0, \overline{CS} , $R/\overline{W}(\overline{WR})$, $E(\overline{RD})$.

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

5. OPTICAL CHARACTERISTICS

Ta = 25 °C

VDD = 5.0 V

VDD-V0 = (22.5V)

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 = **	Ta = -20 °C	—	3816	—	ms	1
			Ta = 25 °C	—	310	—		
			Ta = 70 °C	—	96	—		
	tf (fall)		Ta = -20 °C	—	2411	—		
			Ta = 25 °C	—	158	—		
			Ta = 70 °C	—	89	—		
BRIGHTNESS OF BACKLIGHT	B	VLED - VLSS = 5.0 V	55	60	65	cd / m ²	1, 2	
			22	24	26		1, 3	
CHROMATICITY COORDINATES	X	IF = 140 mA	0.267	0.322	0.337	—	—	
	Y		0.324	0.339	0.354			

** θ = 0° WHEN VIEWING DIRECTION IS 6 O'CLOCK .

θ = 90° WHEN VIEWING DIRECTION IS 3 O'CLOCK .

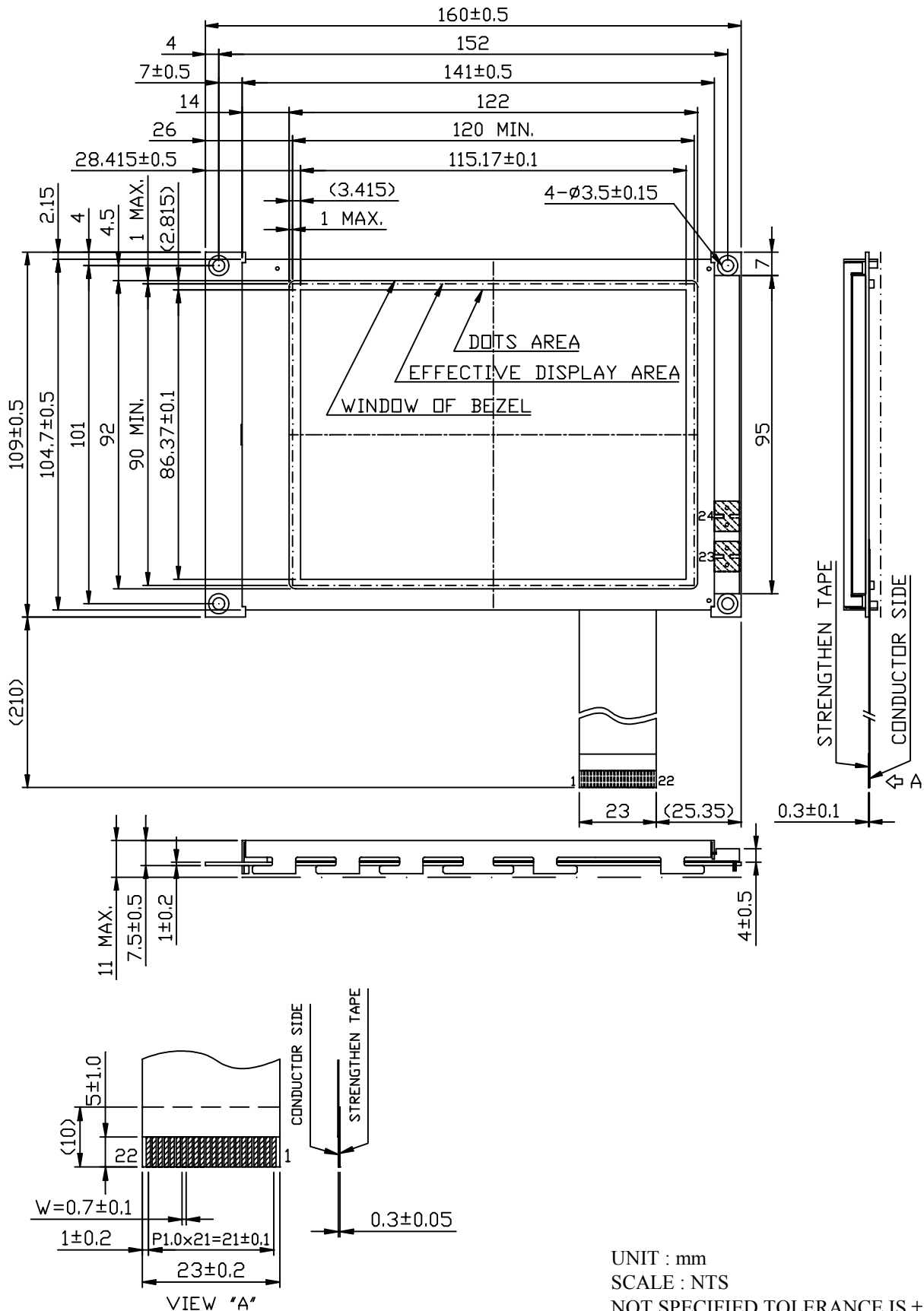
NOTE (1) : PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS. (EU - 001A)

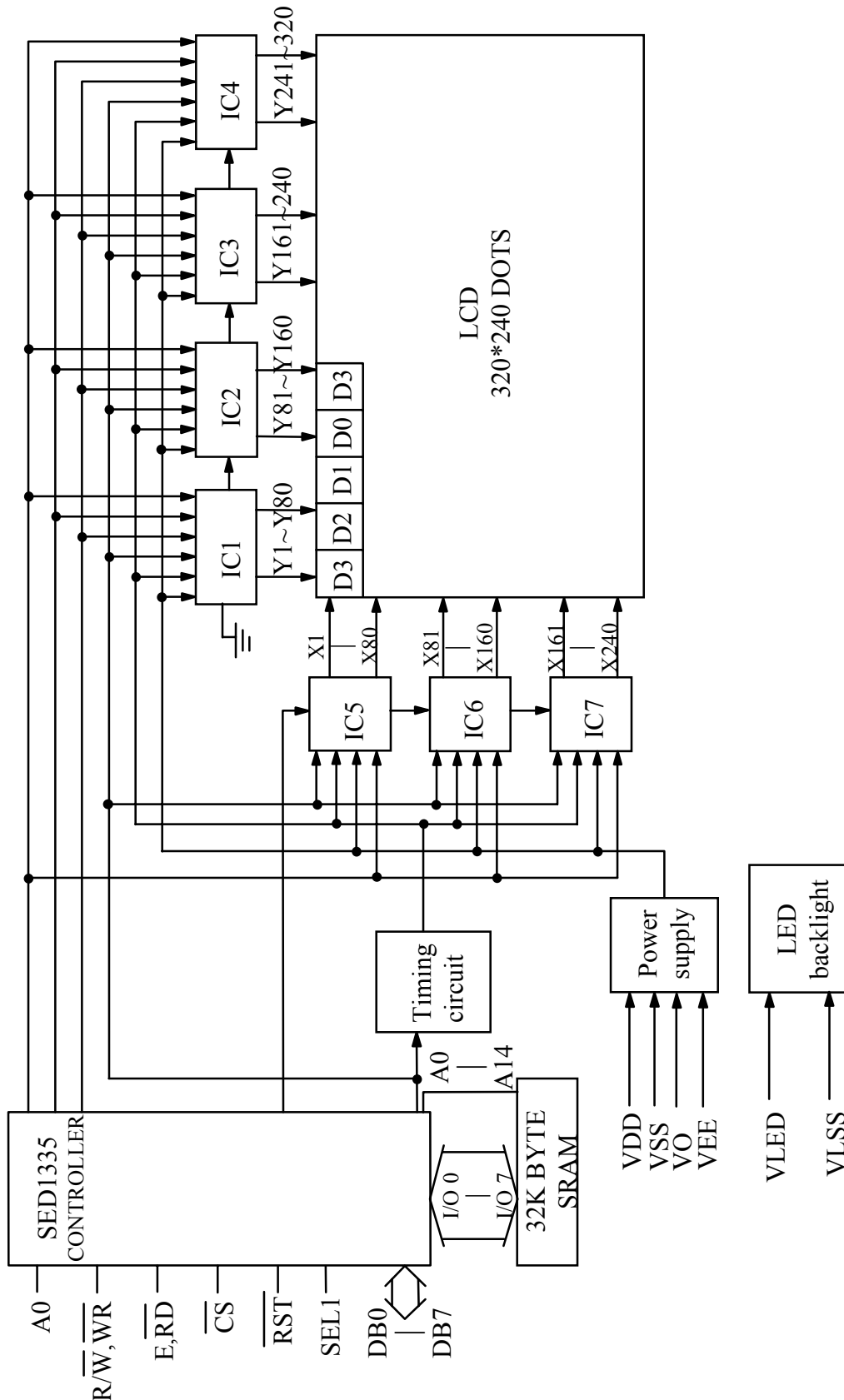
NOTE (2) : POLARIZER MODE : TRANSMISSIVE

NOTE (3) : POLARIZER MODE : TRANSFLECTIVE

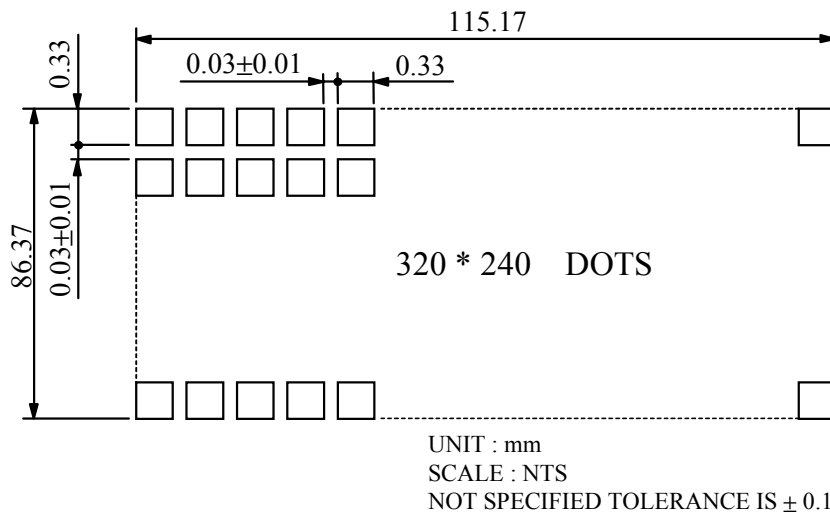
6. OUTLINE DIMENSION



7. BLOCK DIAGRAM



8. DETAIL DRAWING OF DOT MATRIX

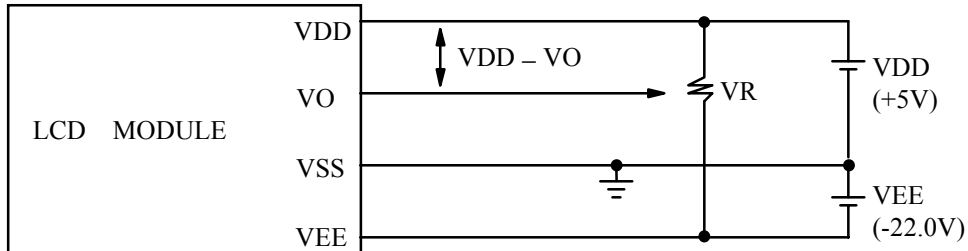


9. INTERFACE SIGNALS

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																				
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5	$\overline{WR}, R/\overline{W}$	H/L	8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW WRITE STROBE . 6800 FAMILY INTERFACE ACTS AS THE READ/ WRITE CONTROL SIGNAL .																				
6	\overline{RD}, E	H/L	8080 FAMILY INTERFACE ACTS AS THE ACTIVE-LOW READ STROBE . 6800 FAMILY INTERFACE ACTS AS THE ACTIVE-HIGH ENABLE CLOCK .																				
7 ∧ 14	D0 ∧ D7	H/L	DISPLAY DATA																				
15	\overline{CS}	H/L	CHIP SELECT																				
16	\overline{RST}	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 20	NC	—	NOT USE																				
21,23	VLED	—	POWER SUPPLY FOR LED BACKLIGHT (A)																				
22,24	VLSS	—	POWER SUPPLY FOR LED BACKLIGHT (K)																				

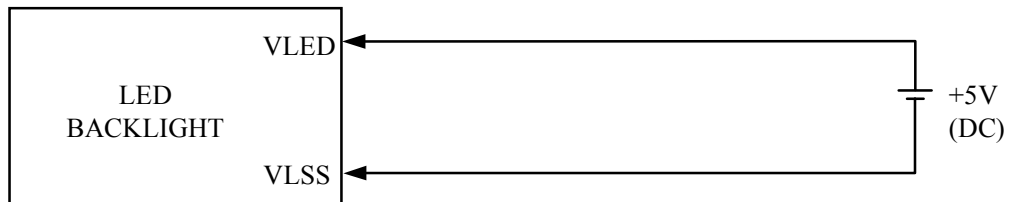
10. POWER SUPPLY

10.1 POWER SUPPLY FOR LCM



VDD - VO : LCD DRIVING VOLTAGE
VR : 20K Ω

10.2 POWER SUPPLY FOR LED BACK - LIGHT



10.3 TIMING OF POWER SUPPLY AND INTERFACE SIGNAL

