

EXAMINED BY :  <i>Vincent Wh</i>	<b>EMERGING DISPLAY</b>  TECHNOLOGIES CORPORATION	FILE NO . CAS-10251
APPROVED BY:  <i>MS Huang</i>		ISSUE : MAR.07,2003
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		VERSION : 3

CUSTOMER                      ACCEPTANCE                      SPECIFICATIONS

MODEL NO. :

16290(LED TYPES)

FOR MESSRS :

\_\_\_\_\_

CUSTOMER'S APPROVAL

DATE :

\_\_\_\_\_

BY :

\_\_\_\_\_

RECORDS OF REVISION

DOC . FIRST ISSUE

JUL.03,2001

DATE

REVISED  
PAGE  
NO.

SUMMARY

NOV.26,2002

3

4. ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
H LEVEL INPUT VOLTAGE	VIH	—	2.2	—	—	V
L LEVEL INPUT VOLTAGE	VIL	—	—	—	0.6	V
H LEVEL OUTPUT VOLTAGE	VOH	-IOH = 0.2 mA	2.4	—	—	V
L LEVEL OUTPUT VOLTAGE	VOL	IOL = 1.2 mA	—	—	0.4	V
POWER SUPPLY CURRENT (LOGIC)	IDD	VDD = 5.0 V	—	2.0	5.0	mA
RECOMMENDED LCD DRIVING VOLTAGE $\theta = 0^\circ \varnothing = 10^\circ$ DUTY = 1/16	VDD - VO	Ta = -20 °C	—	4.5	—	V
		Ta = 25 °C	—	4.5	—	V
		Ta = 70 °C	—	4.5	—	V
CLOCK OSCILLATION FREQUENCY	FOSC	Ta = 25 °C	—	270	—	KHZ
LED FORWARD VOLTAGE	VF	IF = 360 mA	—	4.2	4.6	V
LED FORWARD CURRENT	IF	—	—	360	—	mA
LED REVERSE CURRENT	IR	VR = 8 V	—	—	200	uA

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
H LEVEL INPUT VOLTAGE NOTE (1)	VIH	VDD=5V	—	2.2	—	VDD
L LEVEL INPUT VOLTAGE NOTE (1)	VIL	VDD=5V	—	0.7VDD	—	VDD
H LEVEL OUTPUT VOLTAGE NOTE (2)	VOH	VDD=5V IOH = -0.2 mA	—	2.4	—	V
L LEVEL OUTPUT VOLTAGE NOTE (2)	VOL	VDD=5V IOL = 1.2 mA	—	—	0.4	V
POWER SUPPLY CURRENT (LOGIC)	IDD	VDD = 5.0 V	—	2.0	5.0	mA
		VDD = 3.3 V	—	2.0	5.0	mA
RECOMMENDED LCD DRIVING VOLTAGE $\theta = 0^\circ \varnothing = 10^\circ$ DUTY = 1/16	VDD - VO	Ta = 20°C	4.4	4.7	5.0	V
		Ta = 25°C	4.2	4.5	4.8	V
		Ta = 70°C	4.0	4.3	4.6	V
CLOCK OSCILLATION FREQUENCY	FOSC	Ta = 25 °C	—	270	—	KHZ
LED FORWARD VOLTAGE	VF	IF = 360 mA	—	4.2	4.6	V
LED FORWARD CURRENT	IF	—	—	360	—	mA
LED REVERSE CURRENT	IR	VR = 8 V	—	—	200	uA

NOTE (1) : EXCEPT OSC1

NOTE (2) : APPLIED TO TERMINALS DB0-DB7

NOTE (3) : NT3881DH-01/ ST7066U-0A-B / S6A006 (VDD=5.0V) ST7066U-0A-B / S6A0069

5. OPTICAL CHARACTERISTICS

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
THE BRIGHTNESS OF BACK- LIGHT	L	IF = 360 mA	—	15	—	cd/m <sup>2</sup>	1, 2
			—	35	—		1, 3

I T E M	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
THE BRIGHTNESS OF MODULE	L	IF = 360 mA	15	25	—	cd/m <sup>2</sup>	1, 2
			22	35	—		1, 3

DATE	REVISED PAGE NO.	SUMMARY
NOV.26,2002	7	<p><b>10.1 POWER SUPPLY FOR LCD MODULE</b></p> <p>VDD - VO: LCD DRIVING VOLTAGE VR: 10KΩ ~ 20KΩ RECOMMENDED RESISTOR R : <math>VDD - VO \geq 1.5 V</math></p> <p><b>10.1.1 NT3881DH-01/ ST7066U-0A-B/ S6A0069</b></p> <p>VDD - VO: LCD DRIVING VOLTAGE VR: 20KΩ RECOMMENDED RESISTOR R : <math>VDD - VO \geq 1.5 V</math></p> <p><b>10.1.2 ST7066U-0A-B/ S6A0069</b></p> <p>VDD - VO: LCD DRIVING VOLTAGE VR: 20KΩ</p>
MAR.07,2003	7	<p><b>10.2 POWER SUPPLY FOR LED BACK-LIGHT</b></p> <p>RECOMMENDED RESISTOR RL : 4.5Ω, 1/2 WATT (CONTROLLED BY USER) → RECOMMENDED RESISTOR RL : 2.0~3.5Ω, 1/2 WATT (CONTROLLED BY USER) *THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF RL</p>

NUMBERING SYSTEM

Polarizer Mode	Backlight	Code value
Transflective	LED	L
Transmissive	LED	M

Backlight Color	Code Value
Yellow-Green	Y
RED	R

E W 1 6 2 9 0 Y L Y

LCD type + LCD color	Code Value
STN + Yellow-Green	Y
STN + Gray	G
STN + Blue	B

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1. GENERAL SPECIFICATIONS

1.1 GENERAL SPECIFICATIONS

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - 0 0 2 A

1.2 APPLICATION NOTES FOR CONTROLLER / DRIVER : KS0066

PLEASE REFER TO :

CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS :

E U - C S 0 0 6 6

1.3 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS .

2. MECHANICAL SPECIFICATIONS

- (1) NUMBER OF CHARACTER ----- 16 CH \* 2 LINES
- (2) MODULE SIZE ----- 122.0W \* 44.0H \* 14.0D (max.) mm
- (3) EFFECTIVE AREA ----- 99.0W \* 24.0H mm
- (4) CHARACTER FONT ----- 5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE ----- 4.84W \* 9.66H mm
- (6) CHARACTER PITCH ----- 6.0W \* 10.34H mm
- (7) DOT SIZE ----- 0.92W \* 1.10H mm
- (8) DOT PITCH ----- 0.98W \* 1.16H mm
- (9) LCD TYPE\*
- (10) DRIVING METHOD ----- 1 / 16 DUTY MULTIPLEX DRIVE
- (11) VIEWING DIRECTION ----- 6 O'CLOCK
- (12) BACK - LIGHT\*

\* 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	
POWER SUPPLY FOR LCD DRIVE	VDD – VO	0	13.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	NOTE (1)
LED POWER DISSIPATION	PD	—	4.14	W	
LED FORWARD CURRENT	IF	—	900	mA	
LED REVERSE VOLTAGE	VR	—	8	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	—	90 % RH	—	90 % RH	WITHOUT CONDENSATION
VIBRATION	—	4.9 m/s <sup>2</sup> (0.5 G)	—	19.6 m/s <sup>2</sup> (2 G)	
SHOCK	—	29.4 m/s <sup>2</sup> (3 G)	—	490.0 m/s <sup>2</sup> (50 G)	XYZ DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE (2) : Ta AT -20°C (-30°C FOR W.T.) : 48HR MAX .

70°C (80°C FOR W.T.) : 168HR MAX .

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

#### 4. ELECTRICAL CHARACTERISTICS

Ta = 25 °C

PARAMETER	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	
H LEVEL INPUT VOLTAGE NOTE ( 1 )	VIH	VDD=5V	—	2.2	—	VDD	V
		VDD=3.3V	—	0.7VDD	—	VDD	
L LEVEL INPUT VOLTAGE NOTE ( 1 )	VIL	VDD=5V	—	-0.3	—	0.6	V
		VDD=3.3V	—	-0.3	—	0.55	
H LEVEL OUTPUT VOLTAGE NOTE ( 2 )	VOH	VDD=5V	IOH = -0.2 mA	2.4	—	—	V
		VDD=3.3V	IOH = -0.1 mA	0.75VDD	—	—	
L LEVEL OUTPUT VOLTAGE NOTE ( 2 )	VOL	VDD=5V	IOL = 1.2 mA	—	—	0.4	V
		VDD=3.3V	IOL = 0.1 mA	—	—	0.2VDD	
POWER SUPPLY CURRENT (LOGIC)	IDD	VDD = 5.0 V	—	2.0	5.0	mA	
		VDD = 3.3 V	—	2.0	5.0		
RECOMMENDED LCD DRIVING VOLTAGE	VDD - VO $\theta = 0^\circ \varnothing = 10^\circ$ DUTY = 1/16	Ta = -20°C	4.4	4.7	5.0	V	
		Ta = 25°C	4.2	4.5	4.8	V	
		Ta = 70°C	4.0	4.3	4.6	V	
CLOCK OSCILLATION FREQUENCY	FOSC	Ta = 25 °C	—	270	—	KHZ	
LED FORWARD VOLTAGE	VF	IF = 360 mA	—	4.2	4.6	V	
LED FORWARD CURRENT	IF	—	—	360	—	mA	
LED REVERSE CURRENT	IR	VR = 8 V	—	—	200	uA	

NOTE ( 1 ) : EXCEPT OSC1

NOTE ( 2 ) : APPLIED TO TERMINALS DB0~DB7

NOTE ( 3 ) : NT3881DH-01 / ST7066U-0A-B / S6A0069 ( VDD=5.0V ) , ST7066U-0A-B / S6A0069 ( VDD=3.3V )

#### 5. OPTICAL CHARACTERISTICS .

Ta = 25 °C

ITEM	SYMBOL	CONDITION	MIN .	TYP .	MAX .	UNIT	NOTE	
VIEWING AREA	$\varnothing 2 - \varnothing 1$	$K \geq 1.4$	30	—	—	deg.	1	
CONTRAST RATIO	K	$\varnothing = 10^\circ \theta = 0^\circ$	5	—	—		1	
RESPONSE TIME	tr ( rise )	$\varnothing = 10^\circ$ $\theta = 0^\circ$	Ta = -20°C	—	1790	—	ms	1
			Ta = 25°C	—	110	—		
			Ta = 70°C	—	50	—		
	tf ( fall )		Ta = -20°C	—	1770	—		
			Ta = 25°C	—	100	—		
			Ta = 70°C	—	40	—		
THE BRIGHTNESS OF MODULE	L	IF = 360 mA	15	25	—	cd/m <sup>2</sup>	1, 2	
			22	35	—		1, 3	
PEAK EMISSION WAVELENGTH	$\lambda P$	IF = 360 mA	—	570	—	nm	1	

NOTE ( 1 ) : PLEASE REFER TO :

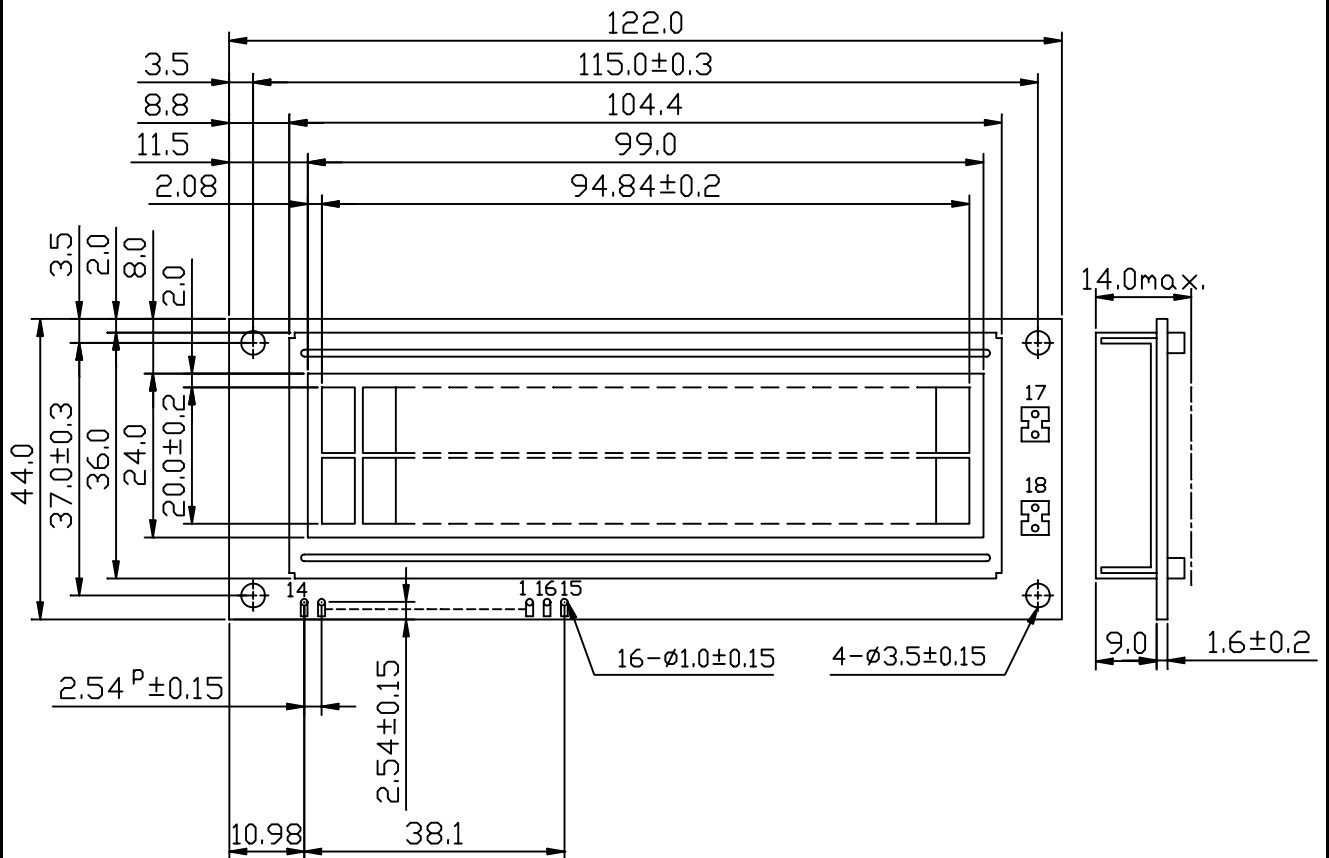
CUSTOMER ACCEPTANCE STANDARD SPECIFICATION : EU-002A

NOTE ( 2 ) : POLARIZER MODE : TRANSFLECTIVE

NOTE ( 3 ) : POLARIZER MODE : TRANSMISSIVE

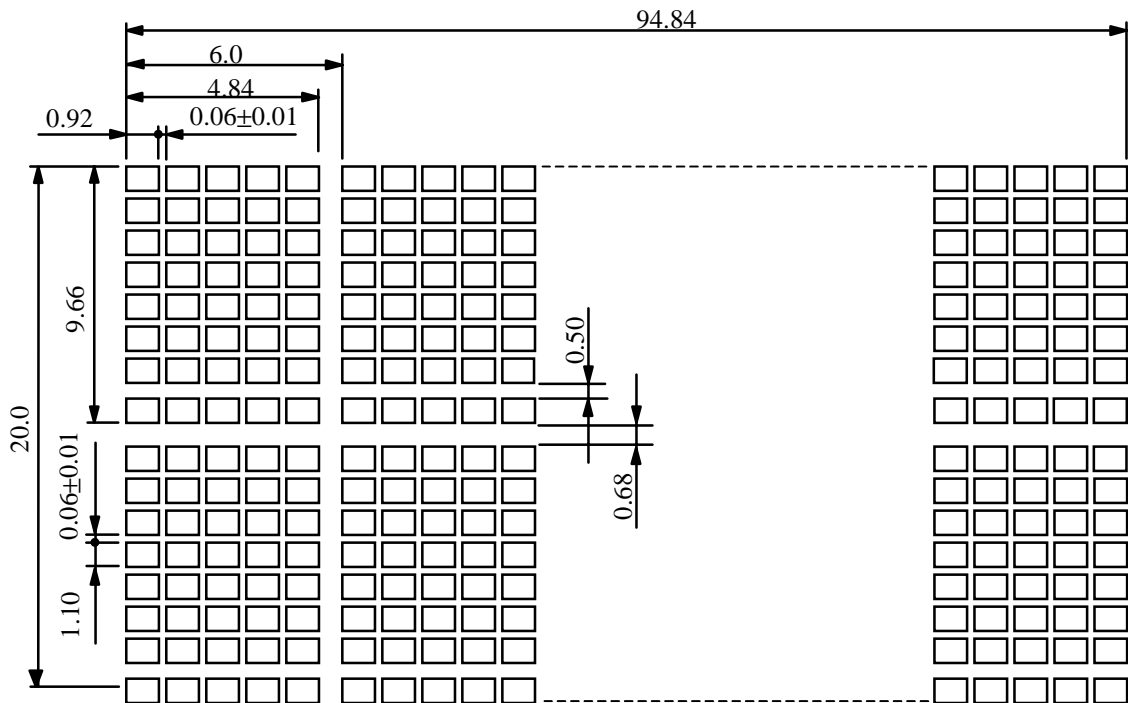


6. OUTLINE DIMENSION



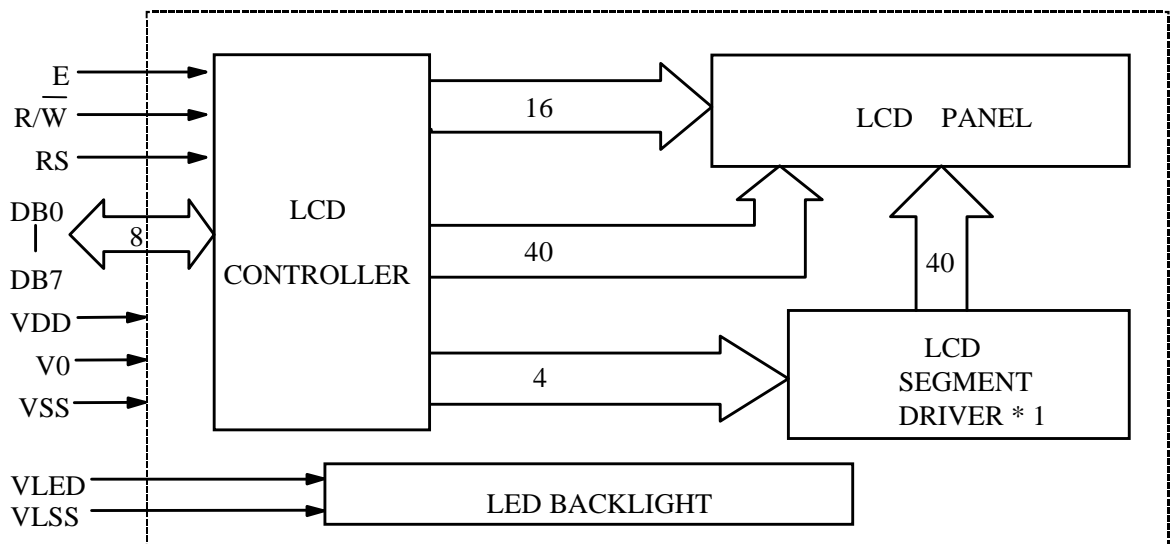
UNIT : mm  
SCALE : NTS  
NOT SPECIFIED TOLERANCE IS ± 0.5mm

7. DETAIL DRAWING OF DOT MATRIX



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

8. BLOCK DIAGRAM



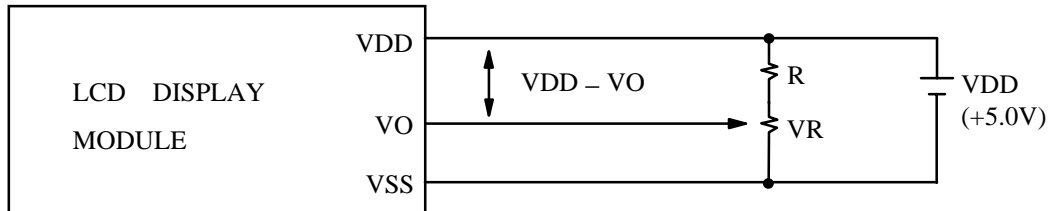
9. INTERFACE SIGNALS

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1	VSS	GROUND	0V (GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT	
3	VO	LCD CONTRAST ADJUSTMENT	
4	RS	INSTRUCTION/DATA REGISTER SELECTION	RS = 0 : INSTRUCTION REGISTER RS = 1 : DATA REGISTER
5	R/ $\overline{W}$	READ/WRITE SELECTION	R/ $\overline{W}$ = 0 : REGISTER WRITE R/ $\overline{W}$ = 1 : REGISTER READ
6	E	ENABLE INPUT	
7	DB0	DATA INPUT/OUTPUT LINES	4 BIT/8BIT SELECTABLE 4 BIT : DB4 - DB7 8 BIT : DB0 - DB7
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6		
14	DB7		
15	VLED	POWER SUPPLY FOR LED BACKLIGHT ( ANODE )	
16	VLSS	POWER SUPPLY FOR LED BACKLIGHT ( CATHODE )	0V ( GND )
17	VLED	POWER SUPPLY FOR LED BACKLIGHT ( ANODE )	
18	VLSS	POWER SUPPLY FOR LED BACKLIGHT ( CATHODE )	0V ( GND )

## 10. POWER SUPPLY

### 10.1 POWER SUPPLY FOR LCD MODULE

#### 10.1.1 NT3881DH-01 / ST7066U-0A-B/ S6A0069

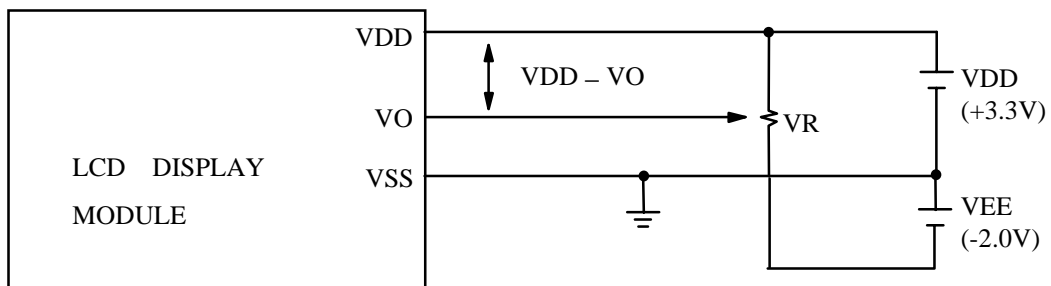


VDD - VO: LCD DRIVING VOLTAGE

VR: 20K $\Omega$

RECOMMENDED RESISTOR R :  $VDD - VO \geq 1.5 V$

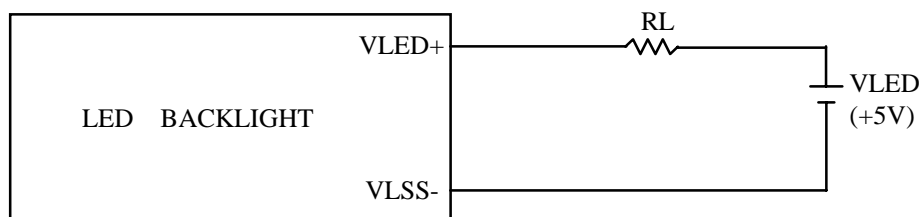
#### 10.1.2 ST7066U-0A-B/ S6A0069



VDD - VO: LCD DRIVING VOLTAGE

VR: 20K $\Omega$

### 10.2 POWER SUPPLY FOR LED BACK-LIGHT



RECOMMENDED RESISTOR RL : 2.0~3.5 $\Omega$ , 1/2 WATT (CONTROLLED BY USER)

\*THE BRIGHTNESS WOULD BE ALTERED SUBJECT TO DIFFERENT VALUES OF RL

## 11. DISPLAY DATA RAM ADDRESS

CHARACTER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LINE 1	80	81	82	83	84	85	86	87	88	89	8A	8B	8C	8D	8E	8F
LINE 2	C0	C1	C2	C3	C4	C5	C6	C7	C8	C9	CA	CB	CC	CD	CE	CF