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PART NO. : MCG1602D- SERIES

FOR MESSRS. : _____

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ACCEPTED BY : _____

PROPOSED BY : _____



RECORD OF REVISION

DATE	PAGE	SUMMARY

3. General specifications

3.1 General specifications

PLEASE REFER TO:

a. "CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)".

b. "CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (IC-SPLC782A)

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM

MCG1602D	-	S	Y	M	L	W	U
		(2)	(3)	(4)	(5)	(6)	(7)

(1). CHARACTER FONTS :

PLEASE REFER TO

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (IC-SPLC782A)"

(2). LCD TYPE :

"S" : STN TYPE

"F" : FSTN TYPE

(3). LCD COLOR :

"Y" : YELLOW-GREEN "B" : BLUE(STN/NEGATIVE)/BLACK(FSTN/NEGATIVE)

"G" : GRAY "W" : WHITE(FSTN/POSITIVE)

(4). LCD POLARIZER TYPE :

"nil" : TRANSFLECTIVE

"M" : TRANSMISSIVE

(5). BACKLIGHT TYPE :

"L" : LED BACKLIGHT

"T" : TRANSFLECTIVE

"R" : REFLECTIVE

(6). BACKLIGHT COLOR :

LED TYPE :

"nil" : YELLOW-GREEN "A" : AMBER "B" : BLUE

"G" : PURE GREEN "O" : ORANGE "R" : RED

"W" : WHITE

(7). VIEWING DIRECTION :

"nil" : 6 O'CLOCK

"U" : 12 O'CLOCK

4. *Mechanical data*

- (1) NUMBER OF CHARACTERS -----16 CH * 2 LINE
- (2) MODULE SIZE -----(a) WITH B/L 55.45 W * 25.9H * 5.8T mm
(b) WITHOUT B/L 51.3 W * 23.8H * 2.9 max mm
- (3) EFFECTIVE AREA-----48.3 W * 15.8 H mm
- (4) ACTIVE AREA -----44.06 W*10.34 H mm
- (5) CHARACTER PATTERN-----5 * 7 DOTS + CURSOR
- (6) CHARACTER SIZE-----2.36W * 4.92 H mm
- (7) CHARACTER PITCH-----2.78W * 5.42H mm
- (8) DOT SIZE-----0.44 W * 0.58 H mm
- (9) DOT PITCH-----0.48W * 0.62H mm
- (10) CONTROLLER/DRIVER IC -----SPLC782A(SUNPLUS)
- (11) PROCESS & MATERIALS -----RoHS COMPLIANT

5. Absolute maximum ratings

5.1 Electrical absolute maximum ratings

<i>I T E M</i>	<i>SYMBOL</i>	<i>MIN.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>COMMENT</i>
POWER SUPPLY FOR LOGIC	V _{DD} -V _{SS}	-0.3V	7.0	V	-----
INPUT VOLTAGE	V _{IN}	-0.3V	V _{DD} +0.3V	V	-----
STATIC ELECTRICITY	-----	-----	100	V	NOTE (1)
POWER SUPPLY FOR LED	V _{LED}	-----	NOTE(2)	V	-----

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A 200PF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A INTERFACE CONNECTOR PIN.

NOTE (2):

<i>SYMBOL</i>	<i>V_{LED} MAX.</i>	<i>LED TYPE</i>
V _{LED}	6.0V	YELLOW-GREEN,AMBER,ORANGE,RED
	5.0V	BLUE,PURE GREEN,WHITE

5.2 Environmental absolute maximum ratings

<i>I T E M</i>	<i>OPERATING</i>		<i>STORAGE</i>		<i>COMMENT</i>
	<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
AMBIENT TEMPERATURE	-20°C	70°C	-20°C	70°C	-----
HUMIDITY	NOTE (2)		NOTE (2)		NO CONDENSATION
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		-----

NOTE (2): Ta ≤ 70°C : 75% RH MAX.

Ta > 70°C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70°C.

6. Electrical characteristics

$T_a = 25\text{ }^{\circ}\text{C}$

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>		<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>
POWER SUPPLY VOLTAGE	$V_{DD}-V_{SS}$	-----		4.5	5.0	5.5	V
POWER SUPPLY CURRENT	I_{DD}	-----		-----	0.45	0.7	mA
INPUT VOLTAGE	V_{IH}	-----		$0.7V_{DD}$	-----	V_{DD}	V
	V_{IL}	-----		-0.3	-----	0.6	V
OUTPUT VOLTAGE	V_{OH}	-----		2.4	-----	V_{DD}	V
	V_{OL}	-----		-----	-----	0.4	V
RECOMMENDED LCD DRIVING VOLTAGE	V_o-V_{ss}	DUTY =1/16 BIAS =1/4 $\Phi=10^{\circ}$ NOTE(2)	$T_a=-20^{\circ}\text{C}$	-----	-----	-----	V
			$T_a=25^{\circ}\text{C}$	-----	(4.5)	-----	V
			$T_a=70^{\circ}\text{C}$	-----	-----	-----	V
POWER SUPPLY CURRENT FOR NOTE(3)	I_{LED}	V_{LED}	NOTE(3)	-----	15	20	mA

NOTE : (1) RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 0.5\text{V}$ BY EACH MODULE

- (2) $\theta = 0^{\circ}$: VIEWING ANGLE AT 6 O'CLOCK
 $\theta = 180^{\circ}$: VIEWING ANGLE AT 12 O'CLOCK

(3).LED CURRENT OF DIFFERENT LED TYPE

<i>LED B.L TYPE</i>	V_{LED}	I_{LED}				<i>LED COLOR</i>
		<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT.</i>	
A	5.0V	-----	15	20	mA	YELLOW-GREEN、AMBER、ORANGE、RED
B	4.0V	-----	15	20	mA	BLUE、WHITE、PURE GREEN

7. Optical characteristics

STN TYPE LCD

$T_a = 25\text{ }^{\circ}\text{C}$ $V_O - V_{SS} = 4.5\text{V}$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	$\Phi 2\text{-}\Phi 1$	$K = 2.0$ NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	$\Phi = 10^{\circ}$ NOTE(1)	3.0	4.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	$\Phi = 10^{\circ}$ NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	$\Phi = 10^{\circ}$ NOTE(1)	----	300	400	ms	NOTE(2)

FSTN/STN BLUE TYPE LCD

$T_a = 25\text{ }^{\circ}\text{C}$ $V_O - V_{SS} = 4.5\text{V}$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	$\Phi 2\text{-}\Phi 1$	$K = 2.0$ NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	$\Phi = 10^{\circ}$ NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	$\Phi = 10^{\circ}$ NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	$\Phi = 10^{\circ}$ NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for LCM

SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	LED TYPE	NOTE
B	$\Phi = 0^{\circ}$ $\theta = 0^{\circ}$	4.0	----	----	cd/m^2	YELLOW-GREEN, ORANGE, RED, AMBER	NOTE(2)
		6.0	----	----		BLUE, PURE GREEN, WHITE	NOTE(3)

NOTE (1): $\theta = 0^{\circ}$ WHEN VIEWING DIRECTION AT 6 O'CLOCK

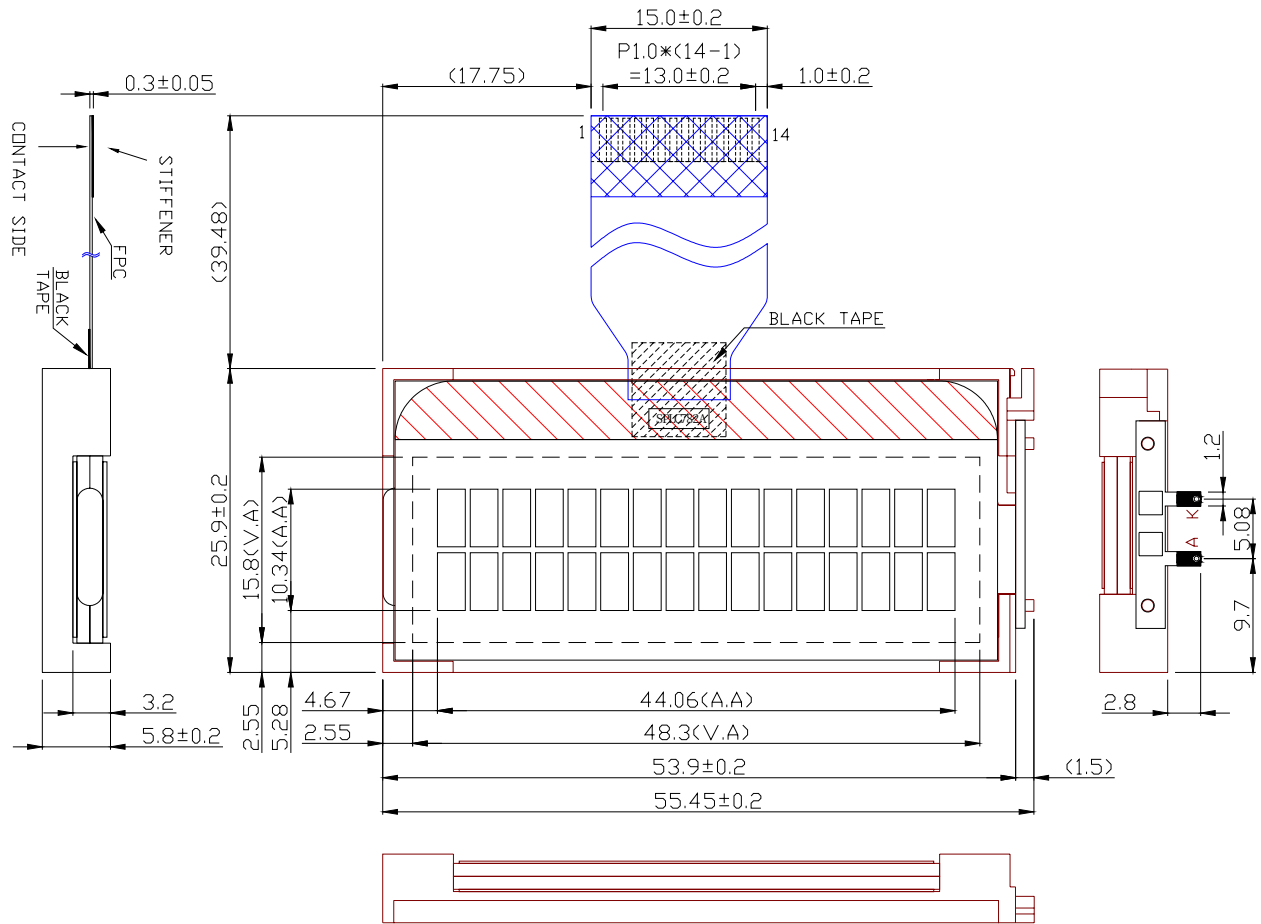
$\theta = 180^{\circ}$ WHEN VIEWING DIRECTION AT 12 O'CLOCK

(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

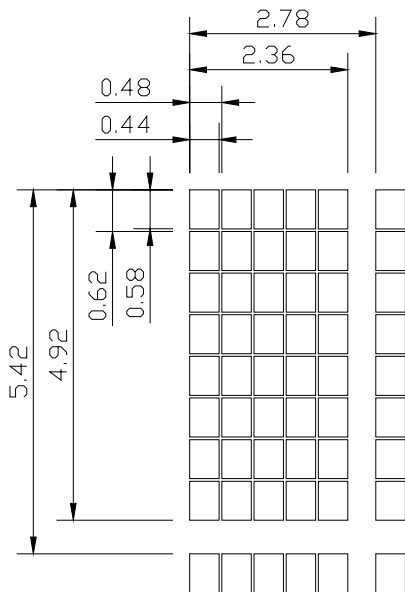
(3): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.

8. Outline dimension

(a) With Backlight



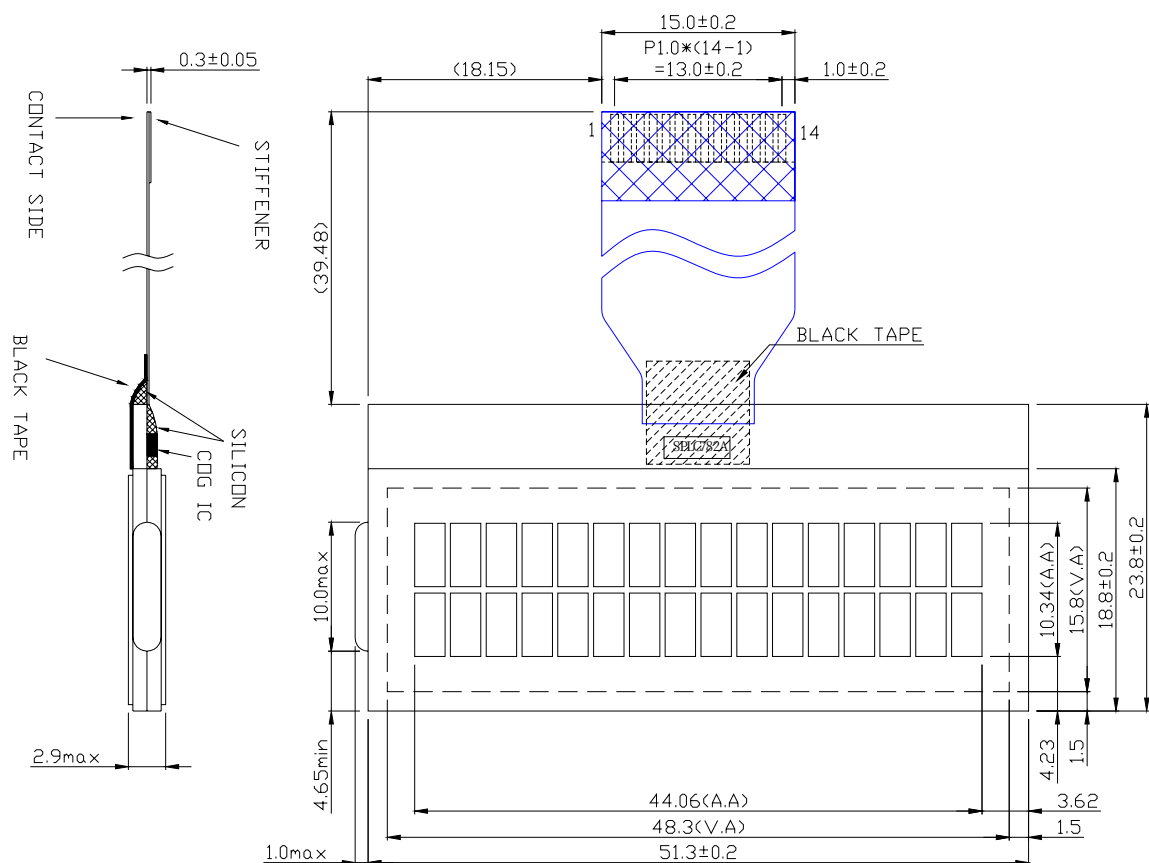
Detail of Dots :



NOTE :

- 1.UNIT : mm
2.SCALE : NTS
3.NOT SPECIFIED TOLERANCE : ± 0.3

(b) Without Backlight



NOTE :

1. UNIT : mm
2. SCALE : NTS
3. NOT SPECIFIED TOLERANCE : ± 0.3

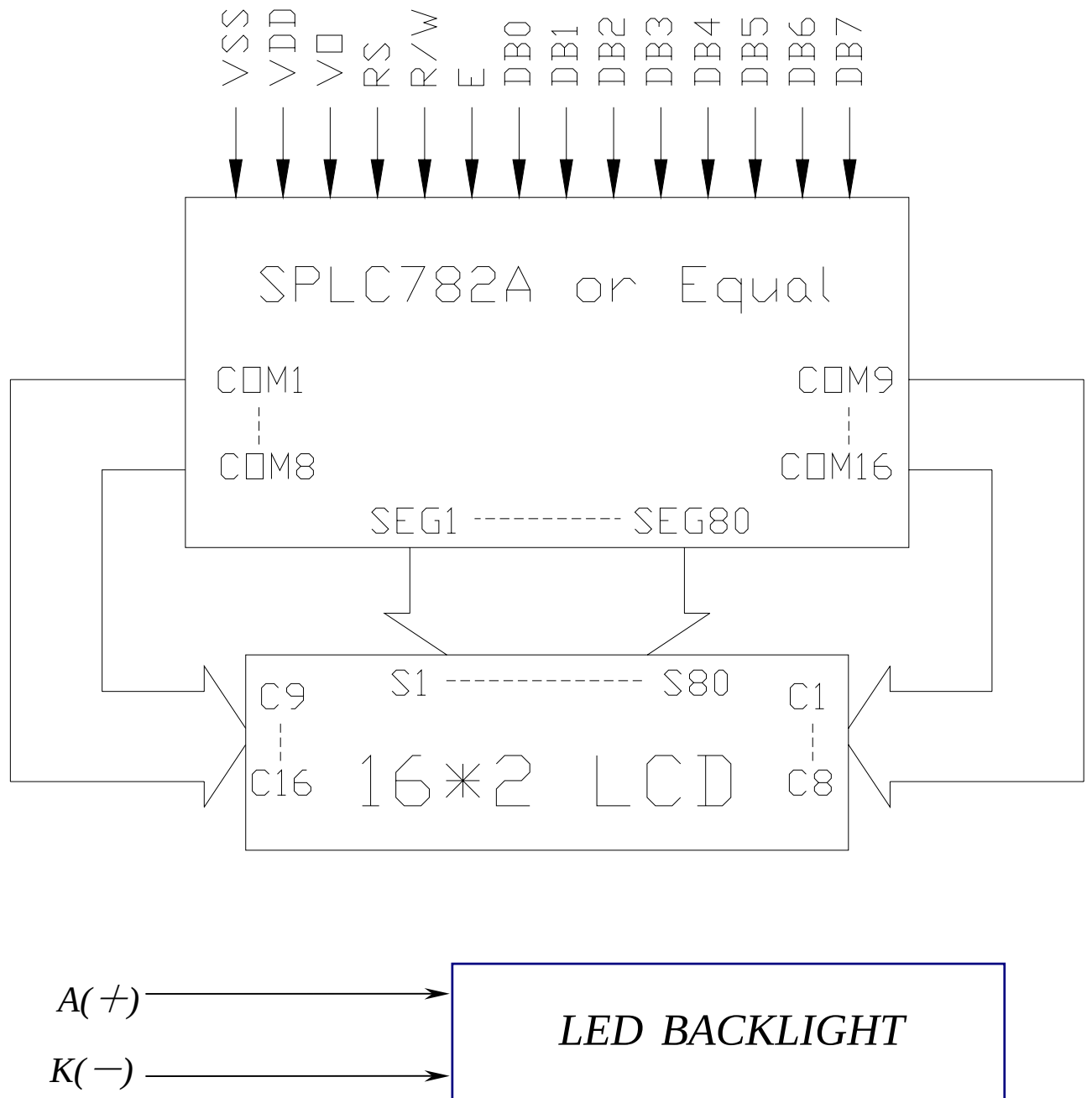
8.1 Interface pin connection

<i>PIN NO.</i>	<i>SYMBOL</i>	<i>FUNCTION</i>
1	VSS	GROUND
2	VDD	POWER SUPPLY PIN
3	V0	LCD DRIVING VOLTAGE
4	RS	REGISTER SELECTION INPUT PIN : H : DATA REGISTER L : INSTRUCTION REGISTER
5	R/W	SIGNAL TO READ OR WRITE H : READ L : WRITE
6	E	START SIGNAL TO READ OR WRITE
7	DB0	DATA INPUT SIGNAL
8	DB1	DATA INPUT SIGNAL
9	DB2	DATA INPUT SIGNAL
10	DB3	DATA INPUT SIGNAL
11	DB4	DATA INPUT SIGNAL
12	DB5	DATA INPUT SIGNAL
13	DB6	DATA INPUT SIGNAL
14	DB7	DATA INPUT SIGNAL

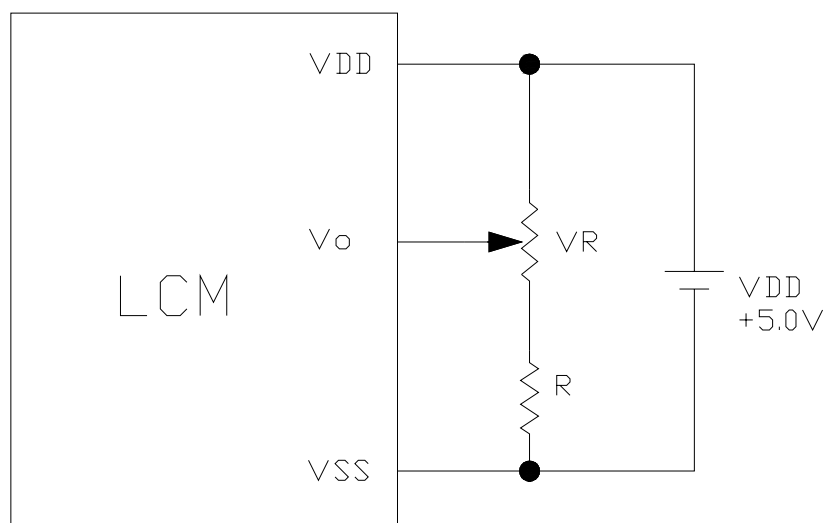
8.2 LED Backlight Interface connection

<i>PIN NO.</i>	<i>SYMBOL</i>	<i>FUNCTION</i>
-----	A(+)	POWER SUPPLY FOR LED ANODE
-----	K(-)	POWER SUPPLY FOR LED CATHODE

9. Block diagram



10. Power supply for LCM

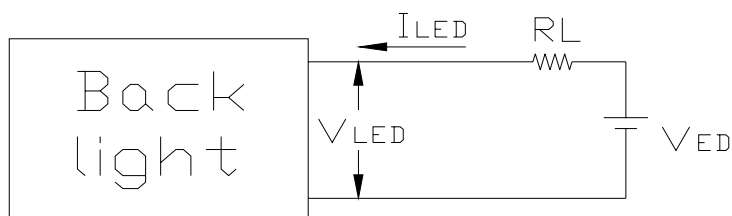


RECOMMENDED RESISTOR R : $V_o - V_{ss} \div 1.5V$

$V_o - V_{ss}$: LCD DRIVING VOLTAGE

VR : $10K\Omega \sim 20K\Omega$

10.1 POWER SUPPLY FOR BACKLIGHT



ITEM	LED TYPE	CONDITION
Limit resister of LED (RL)	A	$RL \geq ((V_{ED} - 5.0V) / I_{LED})$, $I_{LED} \leq 20mA$
	B	$RL \geq ((V_{ED} - 4.0V) / I_{LED})$, $I_{LED} \leq 20mA$