勝華科技®
WINTEK CORP.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	Elektronica
MODEL	WM-C1602M-1YNNb VER. 4
CUSTOMER APPROVED	
DATE	

APPROVED BY	CHECKED BY	ORGANIZED BY
LCM 產品部 MAY 7 2001 吳武雄	LCM 產品部 MAY 7 2001 林士偉	LCM 產品部 MAY 7 2001 黃思韻

☐ APPROVAL FOR SPECIFICATIONS ONLY

☑ APPROVAL FOR SPECIFICATIONS AND SAMPLE

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History of Version

Version	Contents	Page	Date	Note
1	New Revision		'96,04,18	
2	Modifyied Spec Style		'96,11,30	
3	Modify IC KS0066U-00CC→ST7066-0A		'00,07,11	
4	Modifyied IC ST7066-0A→ST7066U-0A		'01,05,07	

Contents Page

1.Precautions in Use of LCM

1.1 Handling of LCM

- Don't give external shock.
- Don't apply excessive force on the surface.
- Liquid in LCD is hazardous substance. Must not lick and swallow. when the liquid is attach to your hand, skin, cloth etc. Wash it out thoroughly and immediately.
- Don't operate it above the absolute maximum rating.
- Don't disassemble the LCM.

1.2 Storage

- Store in an ambient temperature of 5 to 45 C, and in a relative humidity of 40% to 60%. Don't expose to sunlight or fluorescent light.
- Storage in a clean environment, free from dust, active gas, and solvent.
- Store in anti-static electricity container.
- Store without any physical load.

1.3 Soldering

- Use the high quality solder. (60-63% tin mixed with lead)
- Iron: no higher than 260C and less than 3-4 sec during soldering.
- Soldering: only to the I/O terminals.
- Rewiring: no more than 3 times.

2. Introduction

Liquid Crystal Displays (LCDs) have widely used in many applications such as industrial measurements, office mechanisms, and household electronic-equipment, etc. LCM (LCD Module) integrates with LCD and driving circuit that is easily to be interfaced by user. This LCM contains a standard built-in dot-matrix font set.

2.1 Applications of LCM

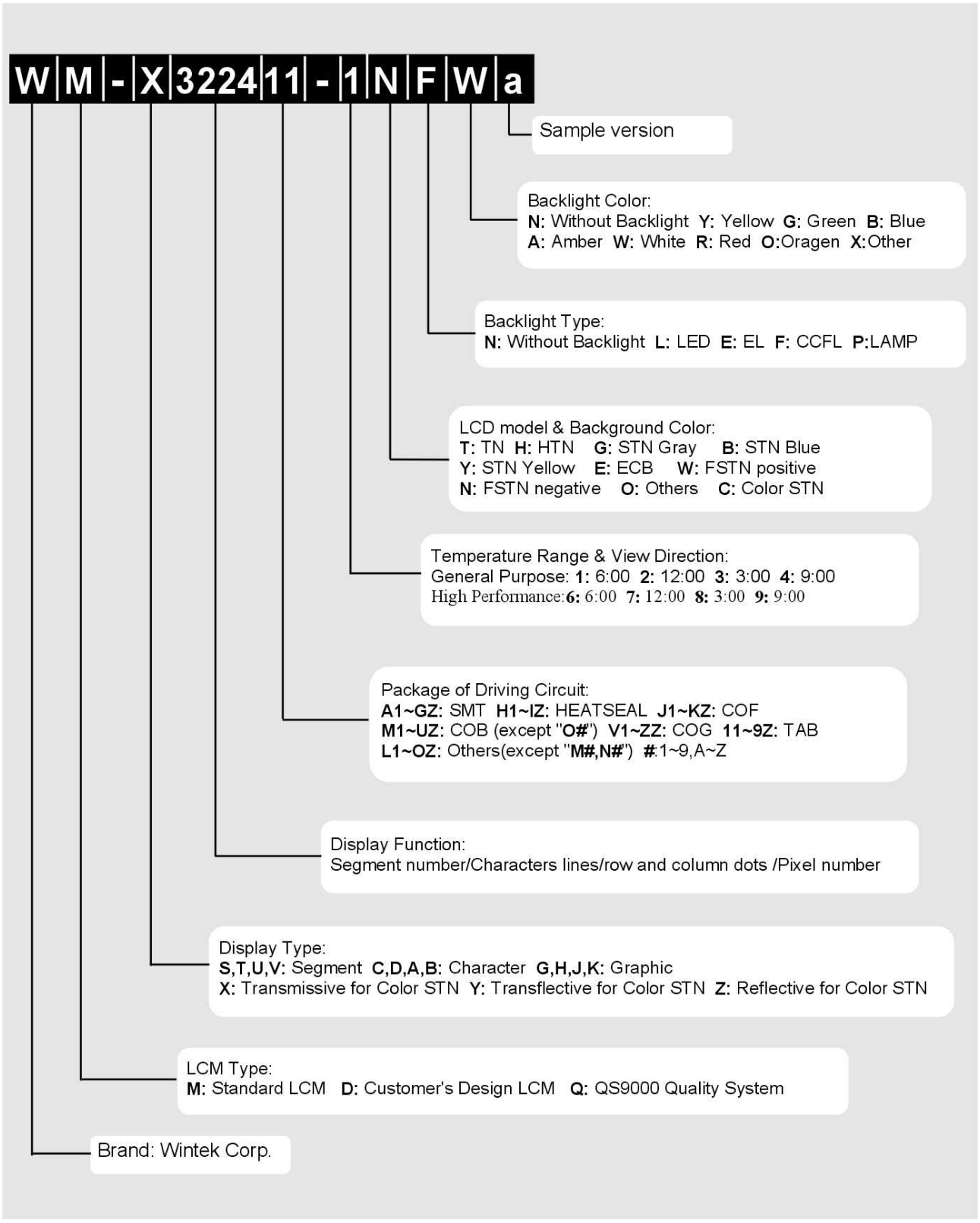
- Telephone.
- Facsimile Mechanism.
- Electronic Typewriter.
- Word Processor.
- Electronic Memo Pads.
- Remote Controller.
- Other Electronic Equipment.

2.2 Features of LCM

- Compact, Thin, and Light.
- Wide View Angle.
- Low Power Consumption.
- High Contrast Image.
- Wide Operating Temperature.
- Various Backlight Available.
- High Reliability.
- Easy interface control.

3.Module Classification Information

EXAMPLE:

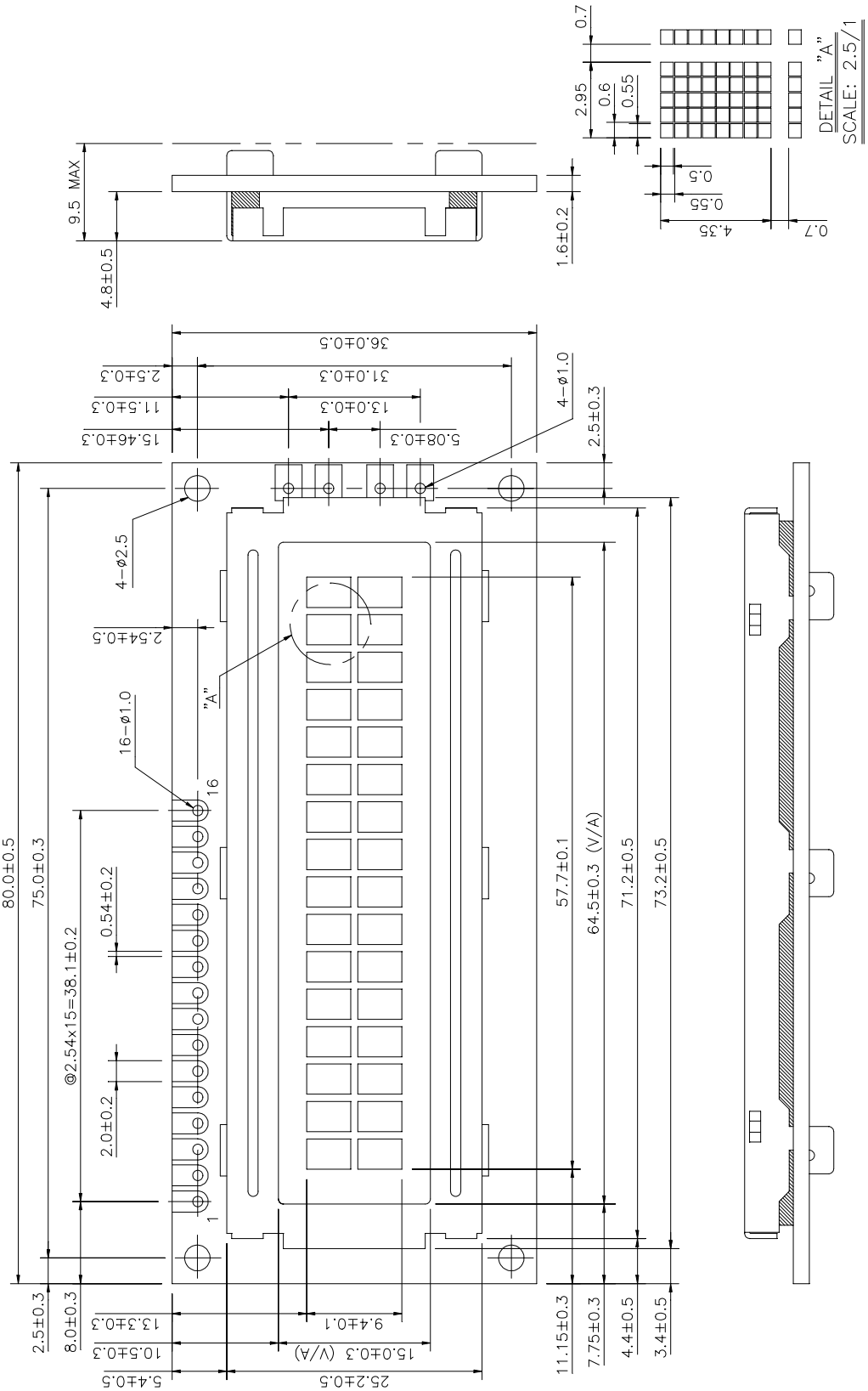


4. Mechanical Specification & Diagram

4.1 Mechanical Specification

ITEM	STANDARD VALUE	UNIT
NUMBER OF CHARACTERS	16 Characters × 2 Lines	-
CHARACTER FORMAT	5 × 8 Dots	-
MODULE DIMENSION	80.0 (W) × 36.0 (H) × 9.5 (T)	mm
EFFECTIVE DISPLAY AREA	64.5 (W) × 15.0 (H)	mm
CHARACTER SIZE	2.95 (W) × 4.35 (H)	mm
CHARACTER PITCH	3.65 (W) × 5.05 (H)	mm
DOT SIZE	0.55 (W) × 0.50 (H)	mm
DOT PITCH	0.60 (W) × 0.55 (H)	mm
APPROX. WEIGHT	36	g
LCD TYPE	STN (Yellow Mode / Reflective Type)	
DRIVE METHOD	Duty cycle: 1/16 Bias: 1/5	
VIEWING DIRECTION	6 O'clock	
BACK LIGHT	---	
USED IC	ST7066U-0A or Equivalent	

4.2 Mechanical Diagram



5. Absolute Maximum Ratings

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
OPERATING TEMPERATURE	T_{OP}	0	-	+50	°C
STORAGE TEMPERATURE	T_{ST}	-20	-	+80	°C
INPUT VOLTAGE	V_I	-0.3	-	Vcc+0.3	V
SUPPLY VOLTAGE FOR LOGIC	V_{DD}-V_{SS}	-0.3	-	+7.0	V
SUPPLY VOLTAGE FOR LCD	V_{DD}-V_O	Vcc-10.0	-	Vcc+0.3	V
STATIC ELECTRICITY	Be sure that you are grounded when handing LCM .				

6. Electrical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
SUPPLY VOLTAGE FOR LOGIC	V_{DD}-V_{SS}	Ta=25℃	4.7	5.0	5.3	V
SUPPLY VOLTAGE FOR LCD	V_{DD}-V_O	Ta=25℃	4.3	4.5	4.7	V
INPUT HIGH VOL	V_{IH}	Ta=25℃	0.7Vcc	-	Vcc	V
INPUT LOW VOL	V_{IL}	Ta=25℃	-0.3	-	+0.6	V
OUTPUT HIGH VOL	V_{OH}	Ta=25℃	+3.9	-	Vcc	V
OUTPUT LOW VOL.	V_{OL}	Ta=25℃	-	-	+0.4	V
SUPPLY CURRENT FOR LOGIC	*I_{DD}	V_{DD}=5V	-	2.0	3.0	mA

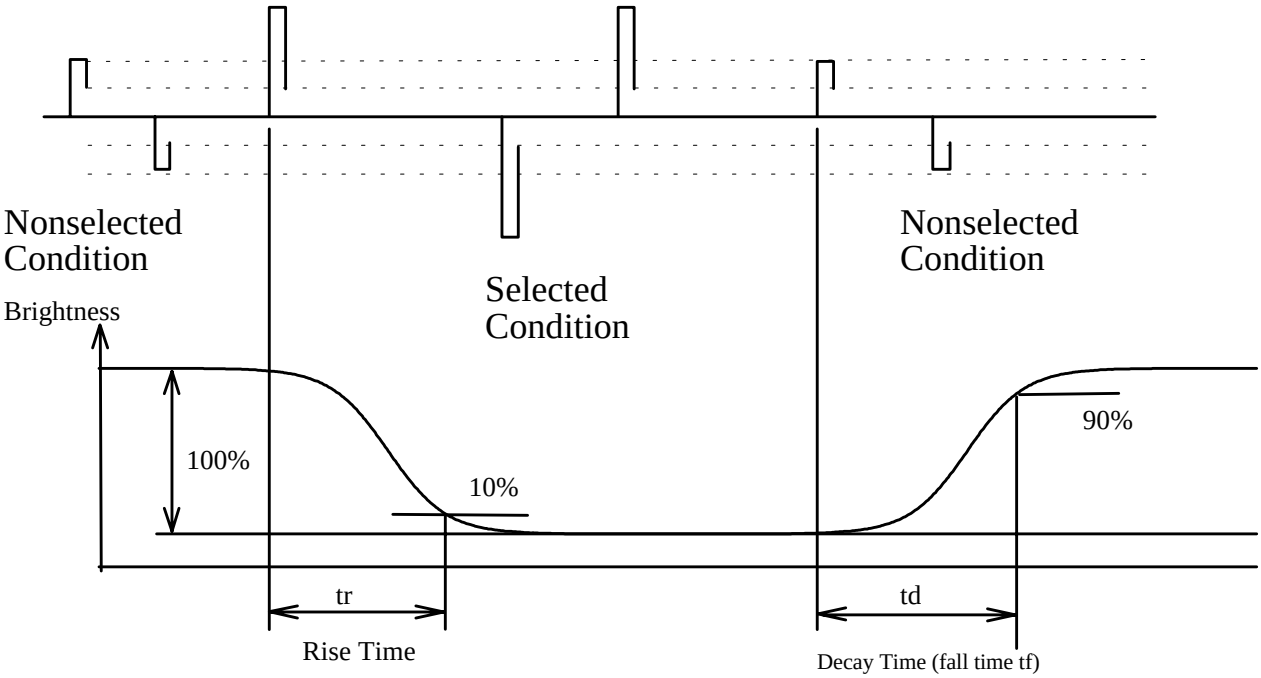
*IDD Measurment condition is for all pixels on display

7.Optical Characteristics

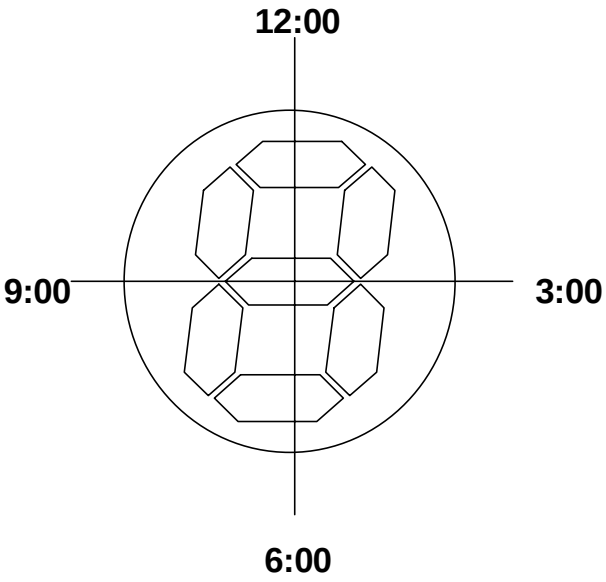
STN

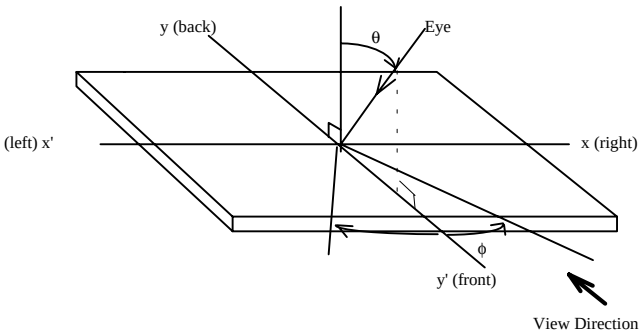
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
VIEW ANGLE (V)	θ	CR≧2	-40	-	+40	deg.
VIEW ANGLE (H)	ϕ	CR≧2	-40	-	+40	deg.
CONTRAST RATIO	CR	Ta=25℃	-	6	-	-
RESPONSE TIME	tr	Ta=25℃	-	200	300	ms
RESPONSE TIME	td	Ta=25℃	-	200	300	ms

8.Optical Definitions

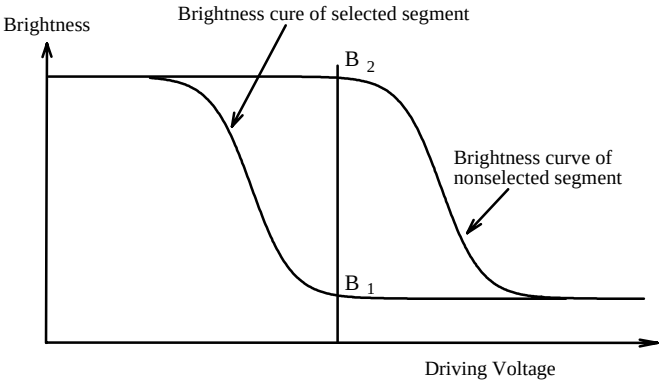


Response Time





View Angle



Perpendicular line (θ=90°)

$$\text{Contrast ration} = \frac{\text{Brightness at nonselected segment (B2)}}{\text{Brightness at selected segment (B1)}}$$

Contrast ration (CR)

9.Interface Pin Function

NO	SYMBOL	LEVEL	FUNCTION
1	V_{SS}	-	GND (0V)
2	V_{DD}	-	VCC (+5V ± 5%)
3	V_O	-	CONTRAST ADJUSTMENT
4	RS	H/L	REGISTER SELECT SIGNAL
5	R/W	H/L	READ / WRITE SELECTION
6	E	H,H→L	ENABLE SIGNAL
7	DB0	H/L	DATA BIT 0
8	DB1	H/L	DATA BIT 1
9	DB2	H/L	DATA BIT 2
10	DB3	H/L	DATA BIT 3
11	DB4	H/L	DATA BIT 4
12	DB5	H/L	DATA BIT 5
13	DB6	H/L	DATA BIT 6
14	DB7	H/L	DATA BIT 7
15	NC	-	-
16	NC	-	-

10.Display Address

Relations between DD RAM addresses and positions on the LCD are shown below.
The DD RAM address (ADD)is set in the address counter (AC) and is represented in hexadecimal.

16 × 2 Line Display

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

→ Display Position

→ DD RAM Address

11.Block Diagram

a. **Data Resistor (DR) :** DR is a register used for temporary storage of the date read/write from/into DD RAM and CG RAM.

b. **Instruction Register (IR) :** IR is a register available for storing the instruction codes and address information of display data (DD) RAM and character generator (CG) RAM.

c. **BUSY FLAG (BF) :** When the BUSY FLAG is "1", it shows that LCM is in internal operation and it can not accept the next instruction.

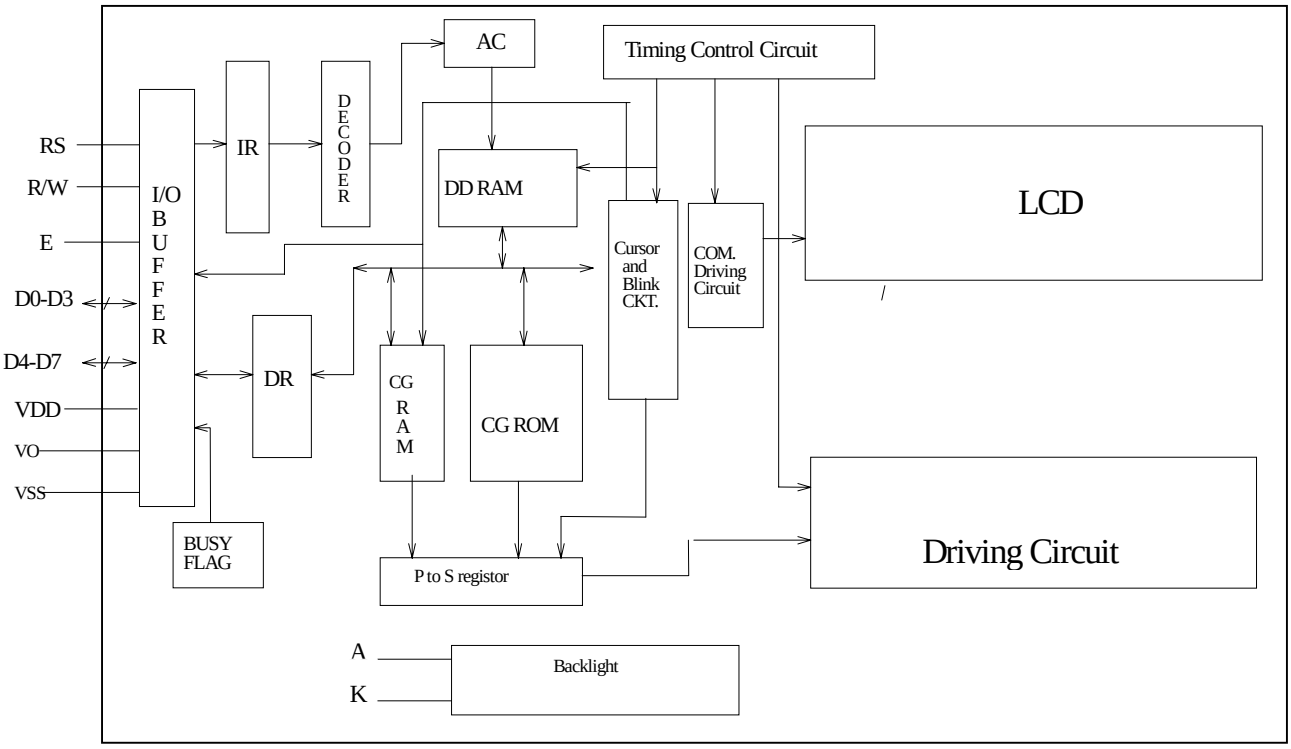
d. **Character Generator (CG) ROM :** This ROM generates character pattern from 8 -bit character code and provides 192 character patterns.

e. **Character Generator (CG) RAM :** This RAM allows the user to rewrite the character patterns freely according to the program.

f. **Address Counter (AC) :** This address counter is used to give the address information of DD RAM and CG RAM.

g. **Display Data (DD) RAM :** This display data RAM is used to store the display data expressed by 8 - bit character code. The capacity is 80×8 bits and data for 80 characters can be storage.

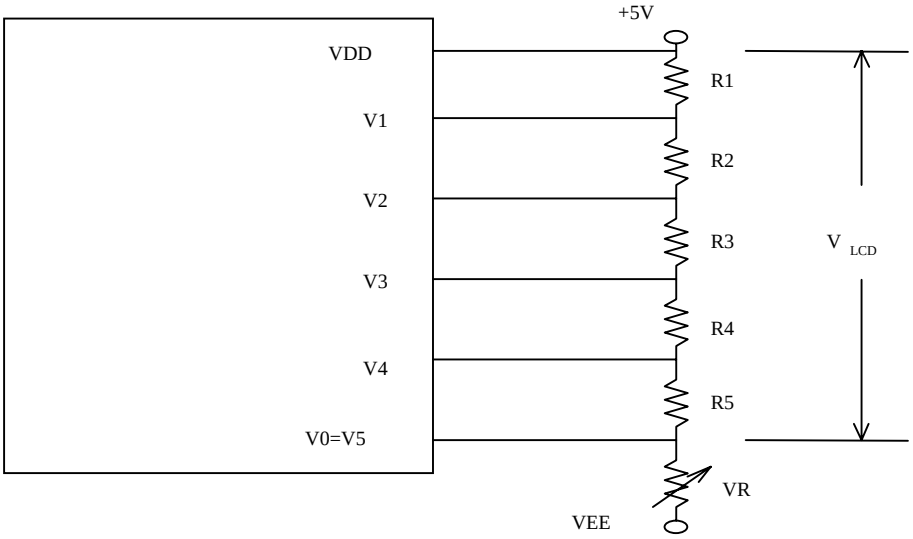
h. **Cursor and Blink Control Circuit :** This circuit generates the cursor and blink.



Block Diagram

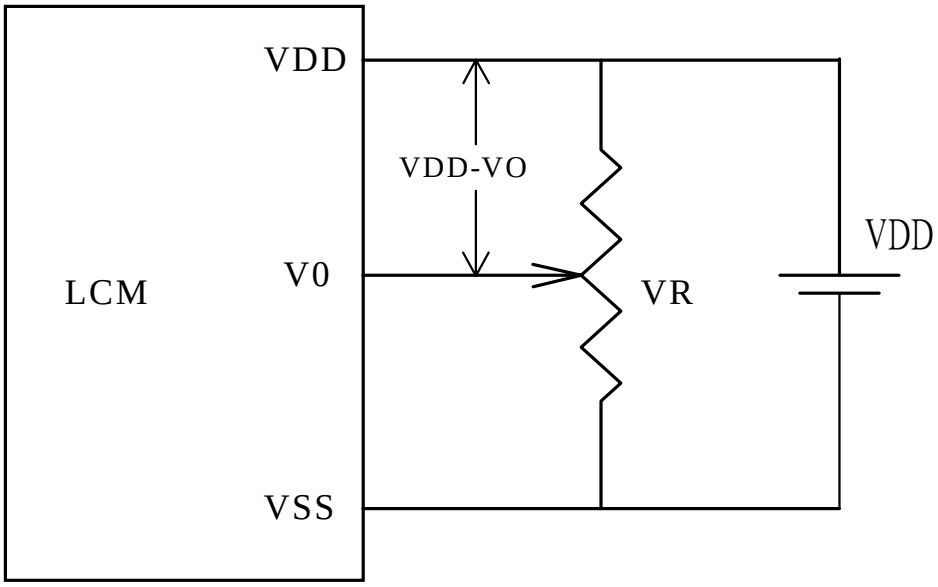
12.Power Supply for LCD Module

12.1 LCD Driving Source (1/5 Bias)



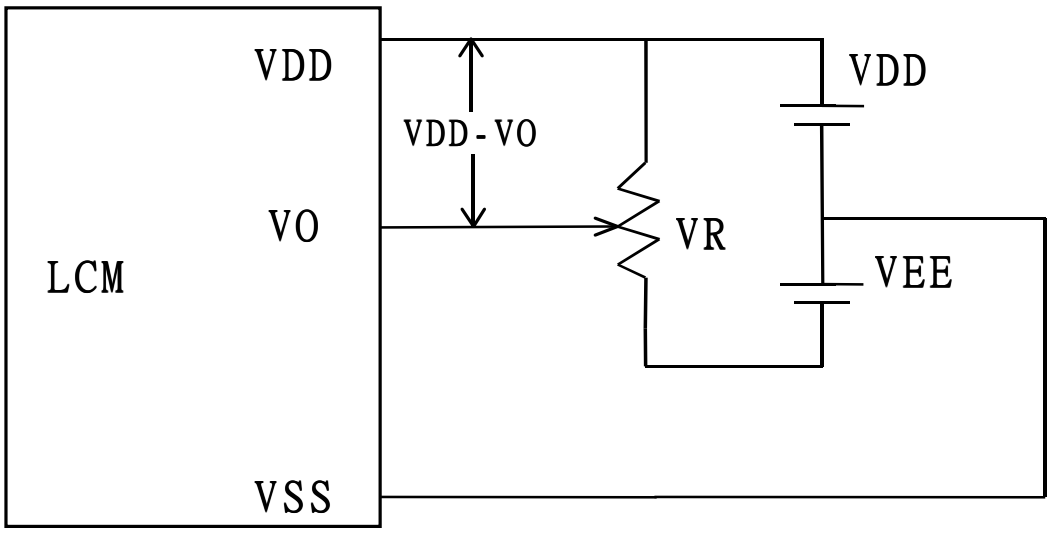
$$V_1 = V_{DD} - \frac{1}{5}V_{LCD}$$
$$V_2 = V_{DD} - \frac{2}{5}V_{LCD}$$
$$V_3 = V_{DD} - \frac{3}{5}V_{LCD}$$
$$V_4 = V_{DD} - \frac{4}{5}V_{LCD}$$
$$V_5 = V_{DD} - V_{LCD}$$

12.2 Signal Supply Voltage Types



V_{DD}-V_O：LCD Driving Voltage

12.3 Dual Supply Voltage Types



V_{DD}-V_O：LCD Driving Voltage

13.Character Generator ROM Mop