



PALM TECHNOLOGY CO., LTD.

The LCD(M) Specialist

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PART NO. : PMG24321H-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:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)”.

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM

PMG24321H -

S	B	L	W	U
---	---	---	---	---

(2) (3) (4) (5) (6)

(1).LCD TYPE :

“S” : STN TYPE

“F” : FSTN TYPE

(2).LCD COLOR :

“B” : BLUE(STN-NEGATIVE) / BLACK(FSTN-NEGATIVE)

“W” : WHITE(FSTN-POSITIVE)

(3).BACKLIGHT TYPE :

“L” : LED BACKLIGHT

(4).BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN

“A” : AMBER

“B” : BLUE

“G” : PURE GREEN

“O” : ORANGE

“R” : RED

“W” : WHITE

(5).VIEWING ANGLE :

“nil” : 6 O’CLOCK

“U” : 12 O’CLOCK

4. Mechanical data

- (1) NUMBER OF DOTS ----- 240 W * 320 H DOTS
- (2) MODULE SIZE ----- 83.3 W *92.1 H * 8.0 T (max) mm
- (3) EFFECTIVE AREA ----- 60.6 W *79.8 H (min) mm
- (4) ACTIVE AREA ----- 57.585 W * 76.785 H mm
- (5) DOT SIZE ----- 0.225 W * 0.225 H mm
- (6) DOT PITCH-----0.24 W * 0.24 H mm

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}	-0.3	7.0	V	-----	
INPUT VOLTAGE	V _I	-0.3	V _{DD} +0.3	V	-----	
STATIC ELECTRICITY	-----	-----	100	V	NOTE (1)	
POWER SUPPLY FOR LCD	V _O -V _{SS}	-----	30.0	V	-----	
POWER SUPPLY FOR LED	V _{LED} -V _{SS}	-----	6.0	V	LED Color	Amber, Orange Yellow-Green , Red
		-----	5.0	V		White, Blue , Pure Green

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

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	70	-20	70	-----
HUMIDITY	NOTE (2)		NOTE (2)		NO CONDENSATION
VIBRATION NOTE (3)	-----	0.5G	-----	2G	10 300HZ XYZ DIRECTIONS 1 Hr EACH
SHOCK NOTE (3)	-----	3G	-----	50G	10 msec XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		-----

NOTE (2): Ta = 50 : 85% RH MAX.

Ta > 50 : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 50 .

NOTE (3): 1G = 9.8 m/s²

6. Electrical characteristics

Ta = 25

<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 FOR CIRCUIT	VDD-VSS	-----	2.7	-----	5.5	V	
INPUT VOLTAGE, NOTE (1)	V _{IH}	H LEVEL	0.8VDD	-----	VDD	V	
	V _{IL}	L LEVEL	VSS	-----	0.2VDD	V	
POWER SUPPLY CURRENT FOR LOGIC, NOTE (2)	I _{DD}	VDD-VSS=3.3V Vo-VSS=21.5V	-----	-----	1.0	mA	
POWER SUPPLY LCD CURRENT	I _{EE}	VDD-VSS=3.3V Vo-VSS=21.5V	-----	-----	4.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE,NOTE(3)	Vo-VSS	STN/ FSTN DUTY =1/240 =10° NOTE(4)	Ta=-20°C	-----	22.5	-----	V
			Ta= 0°C	-----	22.1	-----	V
			Ta= 25°C	-----	21.5	-----	V
			Ta= 50°C	-----	20.9	-----	V
			Ta= 70°C	-----	20.6	-----	V
FRAME FREQUENCY, NOTE (5)	FLM	-----	70	-----	120	Hz	
POWER SUPPLY CURRENT FOR LED	I _{LED}	VLED=4.0V,NOTE(6)	-----	120	160	mA	
		VLED=5.0V,NOTE(6)	-----	60	80	mA	

NOTE (1): DISPOFF, FLM , CL1 , CL2 , D0~D3

(2): FLM = 75Hz , D0~D3=0,1,0,1....., Vo-VSS=21.5V , Ta=25

(3): RECOMMENDED LCD DIRVING VOLTGE MAY FLUCTUATE ABOUT ±0.5V BY EACH MODULE.

(4): = 0° : VIEWING ANGLE AT 6 O’CLOCK
= 180° : VIEWING ANGLE AT 12 O’CLOCK

(5): NEED TO MAKE SURE OF FLICKING AND RIPPING OF DISPLAY WHEN SETTING THE FRAME FREQUENCY IN YOUR SET .

(6):

<i>TYPE</i>	<i>VLED</i>	<i>LED COLOR</i>
A	4.0 V	WHITE、 BLUE、 PURE GREEN
B	5.0 V	AMBER、 YELLOW-GREEN、 ORANGE、 RED

7. Optical characteristics

STN TYPE LCD

Ta = 25

V_O-V_{SS} = 21.5V

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

FSTN TYPE LCD

Ta = 25

V_O-V_{SS} = 21.5V

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

Brightness for backlight

Symbol	Condition	MIN.	TYP.	MAX.	UNIT	Backlight Type	Note
B	= 0°	4.0	-----	-----	cd/m ²	LED (TYPE A , COLOR: WHITE, BLUE, PURE GREEN)	Note(2)
	= 0° Ta = 25						3.0

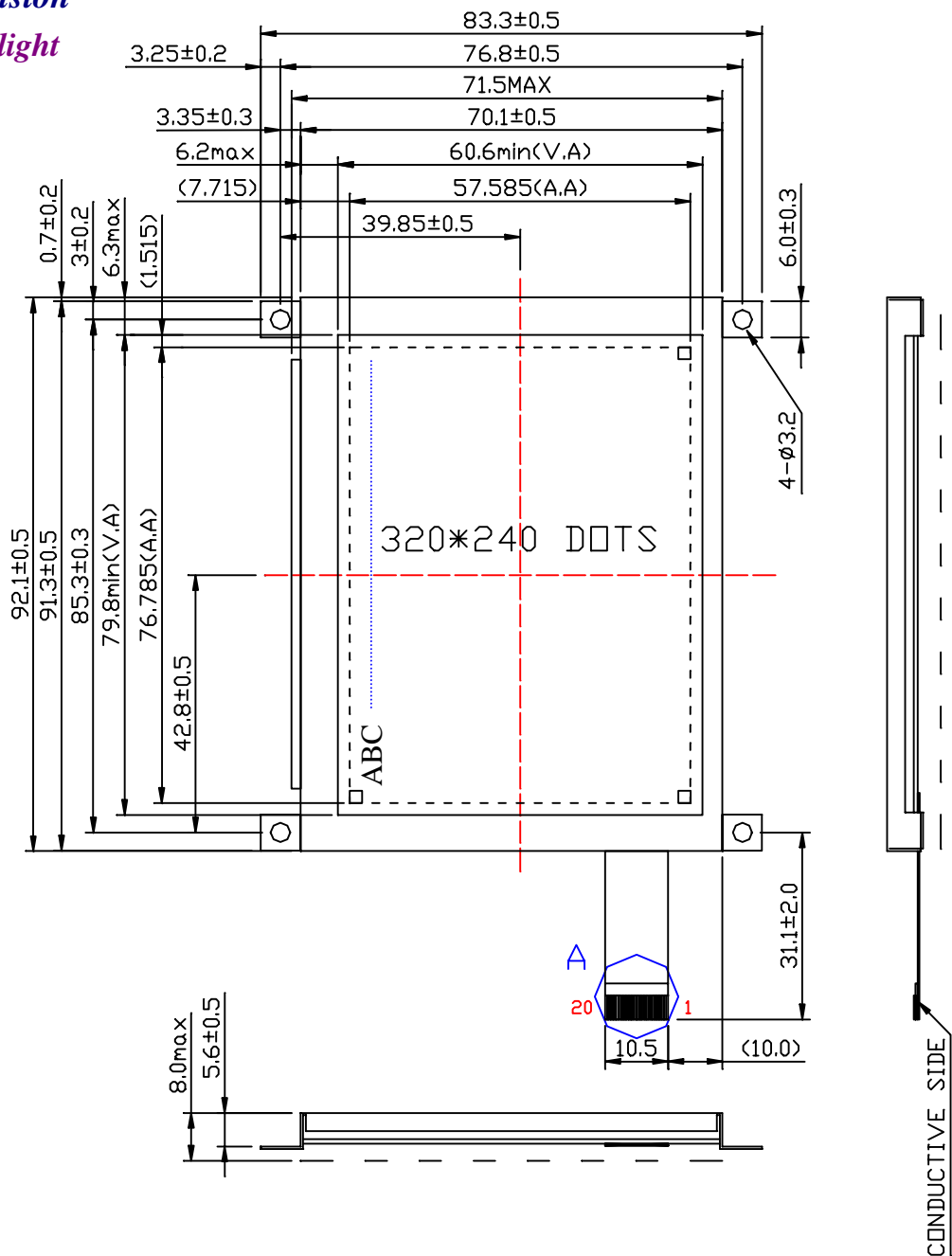
Note (1): = 0° WHEN VIEWING ANGLE AT 6 O'CLOCK
= 180° WHEN VIEWING ANGLE AT 12 O'CLOCK

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

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

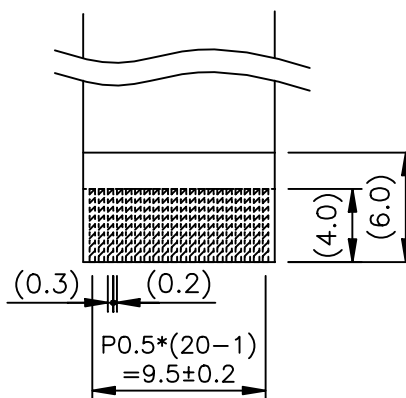
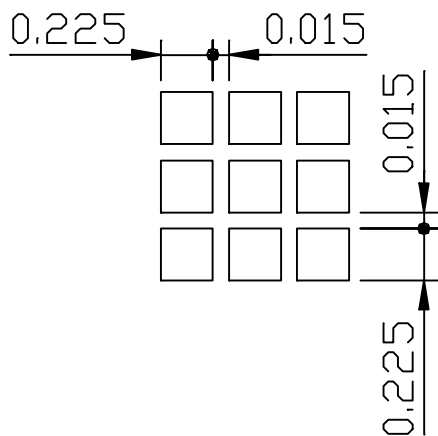
8. Outline dimension

(a) LED Backlight



(a) Dot size:

(b) Detail of A:



Note:

1. SCALE: NTS

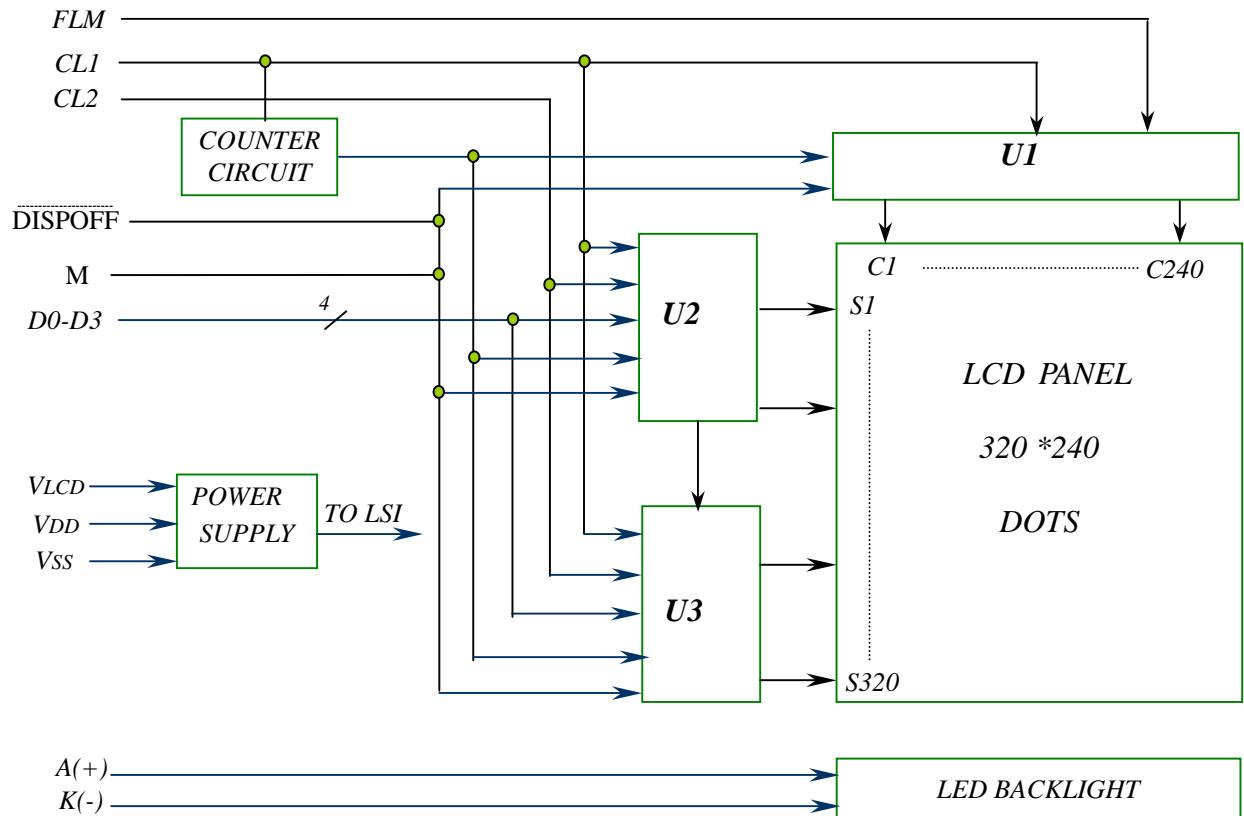
2. UNIT: mm

8.1 Interface

(a) Pin Assignment

<i>PIN NO.</i>	<i>SYMBOL</i>	<i>FUNCTION</i>
1	V _{DD}	POWER SUPPLY FOR LOGIC
2	F.G	FRAME GROUND
3	V _{LCD}	POWER SUPPLY FOR LCD (+V)
4	FLM	FRAME SIGNAL
5	DISP OFF	H:DISPLAY ON,L:DISPLAY OFF
6	M	AC SIGNAL FOR LIQUID CRYSTAL DRIVER
7	CL1	DATA LATCH CLOCK SIGNAL
8	CL2	DATA SHIFT CLOCK SIGNAL
9	V _{SS}	GND
10	D0	DATA INPUT SIGNAL
11	D1	DATA INPUT SIGNAL
12	D2	DATA INPUT SIGNAL
13	D3	DATA INPUT SIGNAL
14	V _{SS}	GND
15	A(+)	POWER SUPPLY FOR LED (+)
16	K(-)	POWER SUPPLY FOR LED (-)
17	N.C	NO CONNECTION
18	N.C	NO CONNECTION
19	N.C	NO CONNECTION
20	N.C	NO CONNECTION

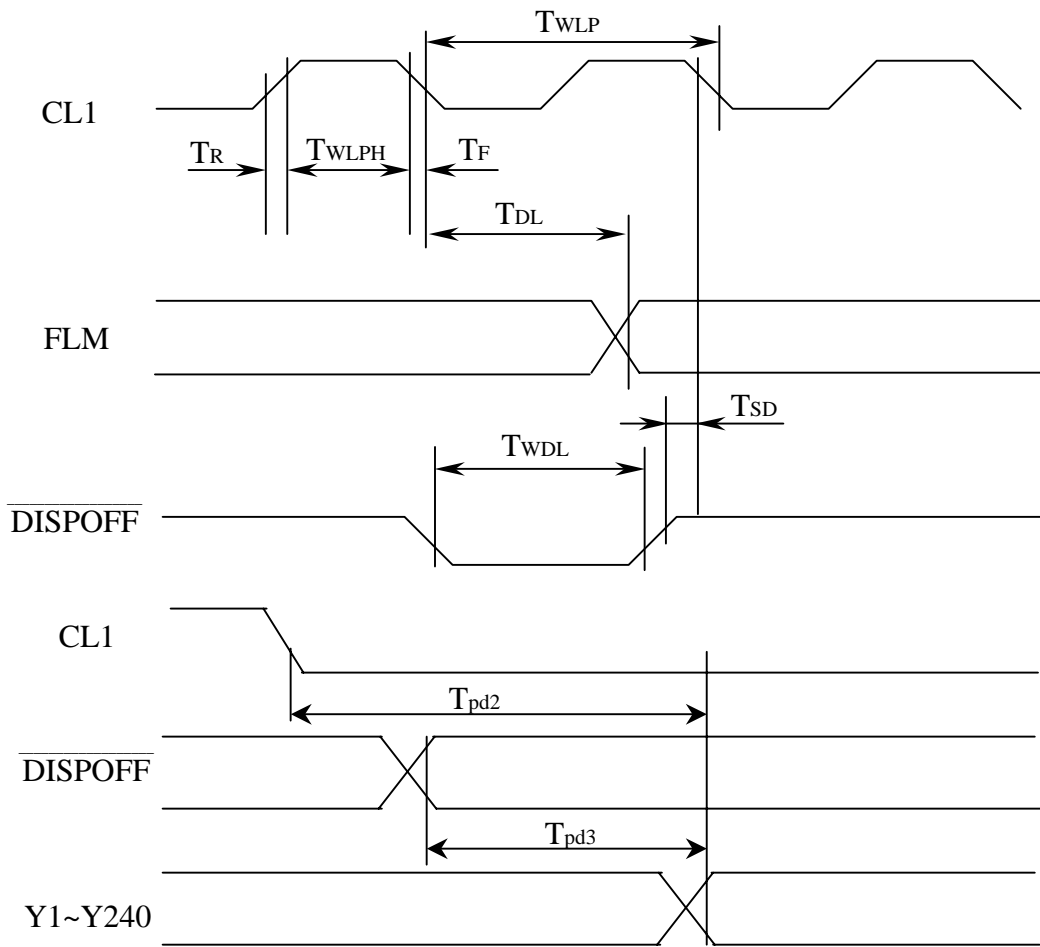
9. Block diagram



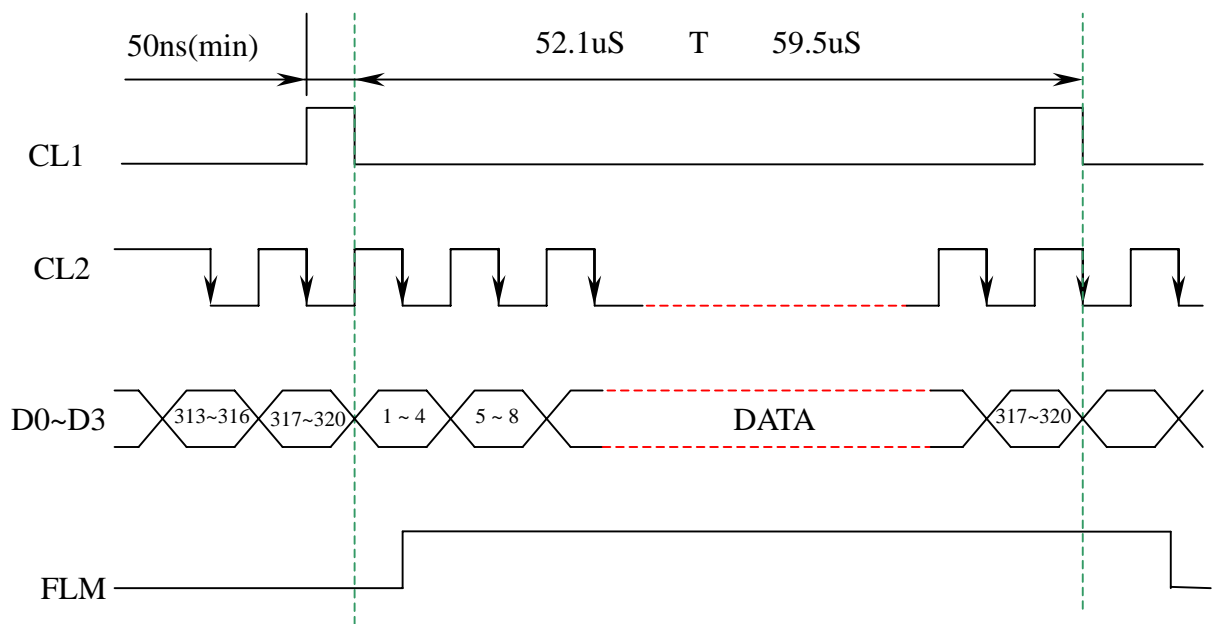
10. Timing characteristic

ITEM	SYMBOL	MIN.	MAX.	UNIT
SHIFT CLOCK PERIOD	T _{WLP}	250	-----	ns
SHIFT CLOCK 'H' PULSE WIDTH	T _{WLPH}	30	-----	ns
INPUT SIGNAL RISE TIME	T _R	-----	50	ns
INPUT SIGNAL FALL TIME	T _F	-----	50	ns
$\overline{\text{DISPOFF}}$ REMOVAL TIME	T _{SD}	100	-----	ns
$\overline{\text{DISPOFF}}$ ENABLE PULSE WIDTH	T _{WDL}	1.2	-----	us
OUTPUT DELAY TIME (1)	T _{DL}	-----	200	ns
OUTPUT DELAY TIME (2)	T _{pd2}	-----	1.2	us
OUTPUT DELAY TIME (3)	T _{pd3}	-----	1.2	us

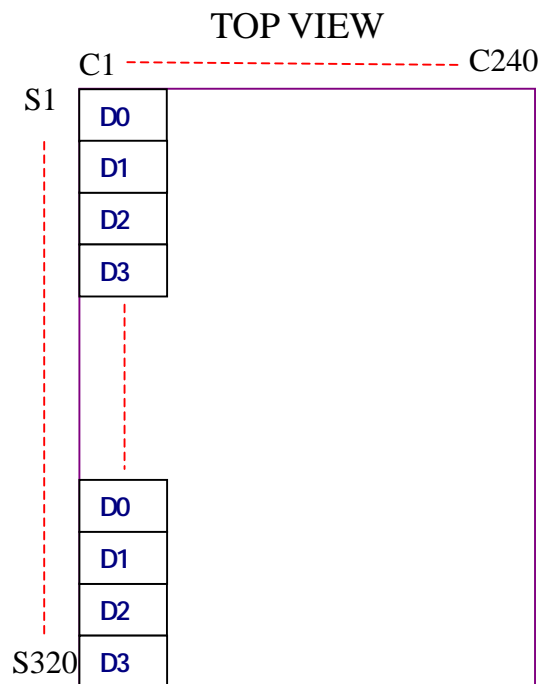
10.1 Timing characteristic of common mode



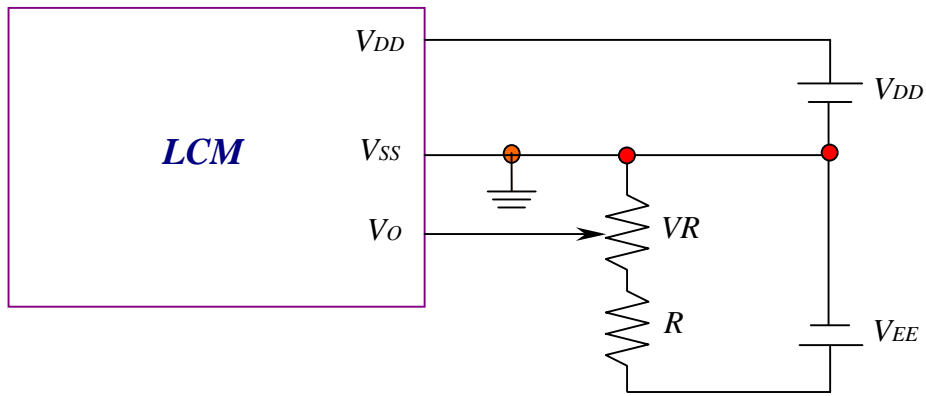
11. Interface timing chart



11.1 Comparison between display and data

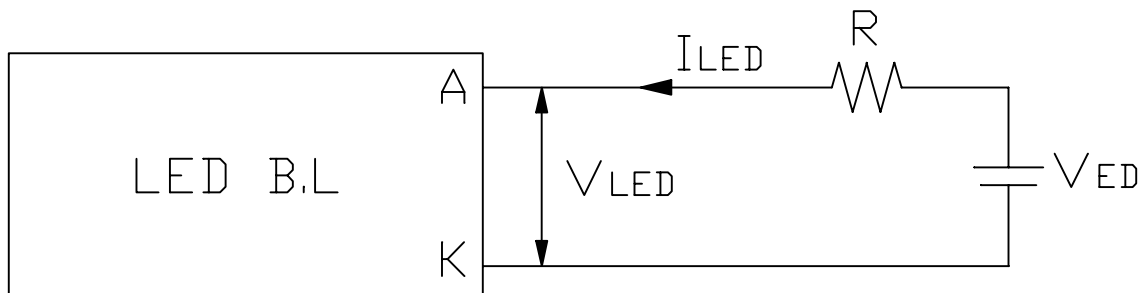


12. Power supply for LCM



$V_o - V_{ss}$: LCD DRIVING VOLTAGE
 RECOMMEND RESISTOR R: $V_o - V_{ss} \quad 1.5V$
 V_R : $10K\Omega \sim 20K\Omega$

12.1 Power supply for backlight



TYPE	VLED	ILED (max)	THE VALUE OF R
A	4.0 V	160 mA	$(V_{ED} - V_{LED}) / I_{LED}$
B	5.0 V	80 mA	