



# ***PALM TECHNOLOGY CO., LTD.***

***The LCD(M) Specialist***

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PART NO.: PMC24021A9-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-10-0069)”.

#### 3.2 This individual specification is prior to general specifications

#### 3.3 NUMBERING SYSTEM

PMC24021A 

B	W
---	---

 9- 

S	Y	M	L	O	U	N
---	---	---	---	---	---	---

(1) (2) (3) (4) (5) (6) (7) (8) (9)

##### (1). CHARACTER FONTS :

PLEASE REFER TO

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)”

##### (2). LCM TEMPERATURE :

“nil” : NORMAL TEMP

“W” : WIDE TEMP

##### (3). LCD TYPE :

“T” : TN TYPE

“S” : STN TYPE

“H” : HTN TYPE

“F” : FSTN TYPE

##### (4). LCD COLOR :

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

“G” : GRAY “W” : WHITE(FSTN/POSITIVE)

##### (5). LCD POLARIZE TYPE

“nil” : TRANSFLECTIVE

“M” : TRANSMISSIVE

##### (6). BACKLIGHT TYPE :

“L” : LED BACKLIGHT

##### (7). BACKLIGHT COLOR :

LED TYPE :

“nil” : YELLOW-GREEN

“A” : AMBER

“B” : BLUE

“G” : PURE GREEN

“O” : ORANGE

“R” : RED

“W” : WHITE

##### (8). VIEWING DIRECTION :

“nil” : 6 O’CLOCK

“3” : 3 O’CLOCK

“U” : 12 O’CLOCK

“9” : 9 O’CLOCK

##### (9). BACKLIGHT TYPE :

“nil” : LED(+),LED(-)---NORMAL

“N” : LED(+),LED(-)---CHANGE

#### 4. Mechanical data

- (1) NUMBER OF CHARACTERS-----24 CH \* 2 LINE
- (2) MODULE SIZE -----118.0 W \* 36.0 H \* 10.0 T (Max) mm
- (3) EFFECTIVE AREA -----96.0 W \* 18.8 H mm
- (4) CHARACTER PATTERN -----5 \* 7 DOTS + CURSOR
- (5) CHARACTER SIZE-----3.20 W \* 4.85 H mm
- (6) CHARACTER PITCH-----3.70 mm
- (7) DOT SIZE-----0.60 W \* 0.65 H mm
- (8) DOT PITCH -----0.70 W \* 0.65 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	6.0	V	-----
INPUT VOLTAGE	$V_I$	$V_{SS}$	$V_{DD}$	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>	$V_{LED}$ MAX.	<i>LED TYPE</i>
$V_{LED}$	5.5V	YELLOW-GREEN,AMBER,ORANGE,RED
	5.0V	BLUE,PURE GREEN,WHITE

### 5.2 Environmental absolute maximum ratings

<i>I T E M</i>	<i>CONDITION</i>	<i>OPERATING</i>		<i>STORAGE</i>		<i>COMMENT</i>
		<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
AMBIENT TEMPERATURE	NORMAL	0	50	-20	70	-----
	WIDE	-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):  $T_a$  50 : 90% RH MAX.

$T_a > 50$  : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90% RH AT 50 . (80%RH AT 60 )

NOTE (3): 1G = 9.8 m/s<sup>2</sup>

**6. Electrical characteristics** $T_a = 25$  $V_{DD} = 5.0 \pm 0.25 V$ 

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	
INPUT VOLTAGE	$V_{IH}$	-----	2.2	-----	-----	V	
	$V_{IL}$		-----	-----	0.6	V	
OUTPUT VOLTAGE	$V_{OH}$	$-I_{OH} = 0.2 \text{ mA}$	2.4	-----	-----	V	
	$V_{OL}$	$I_{OL} = 1.6 \text{ mA}$	-----	-----	0.4	V	
POWER SUPPLY CURRENT	$I_{DD}$	$V_{DD} = 5.0V$	-----	1.8	3.0	mA	
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	$V_{DD} - V_O$	STN/ FSTN DUTY =1/16 =10° NOTE(2)	$T_a = -20^\circ\text{C}$	-----	4.8	-----	V
			$T_a = 0^\circ\text{C}$	-----	4.7	-----	V
			$T_a = 25^\circ\text{C}$	-----	4.5	-----	V
			$T_a = 50^\circ\text{C}$	-----	4.3	-----	V
			$T_a = 70^\circ\text{C}$	-----	4.2	-----	V
		TN DUTY =1/16 =25° NOTE(2)	$T_a = -20^\circ\text{C}$	-----	4.5	-----	V
			$T_a = 0^\circ\text{C}$	-----	4.4	-----	V
			$T_a = 25^\circ\text{C}$	-----	4.2	-----	V
			$T_a = 50^\circ\text{C}$	-----	4.0	-----	V
			$T_a = 70^\circ\text{C}$	-----	3.9	-----	V
POWER SUPPLY CURRENT FOR LED	$I_{LED}$	NOTE(3)	-----	NOTE(3)	NOTE(3)	mA	

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

- (2):  $= 0^\circ$  : VIEWING DIRECTION AT 6 O'CLOCK  
 $= 180^\circ$  : VIEWING DIRECTION AT 12 O'CLOCK

(3): LED CURRENT OF DEFFERENT 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	4.8V	-----	30	40	mA	YELLOW-GREEN, AMBER, ORANGE, RED
B	4.0V	-----	30	40	mA	BLUE, WHITE, PURE GREEN

## 7. Optical characteristics

### TN TYPE LCD

 $T_a = 25$        $V_{DD}-V_O = 4.2V$ 

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
VIEWING ANGLE	2- 1	K = 1.4 NOTE(1)	20	30	----	deg.	NOTE(2)
CONTRAST RATIO	K	= 25° NOTE(1)	2.0	3.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	= 25° NOTE(1)	----	150	250	ms	NOTE(2)
	tf (fall)	= 25° NOTE(1)	----	150	250	ms	NOTE(2)

### STN TYPE LCD

 $T_a = 25$        $V_{DD}-V_O = 4.5V$ 

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
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, STN BLUE TYPE LCD

 $T_a = 25$        $V_{DD}-V_O = 4.5V$ 

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
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 LED backlight

<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>LED TYPE</i>	<i>NOTE</i>
B	= 0°	5.0	----	----	cd/m <sup>2</sup>	YELLOW-GREEN, RED AMBER, ORANGE	NOTE(2)
	= 0°	6.0	----	----		BLUE, WHITE, PURE GREEN	NOTE(3)

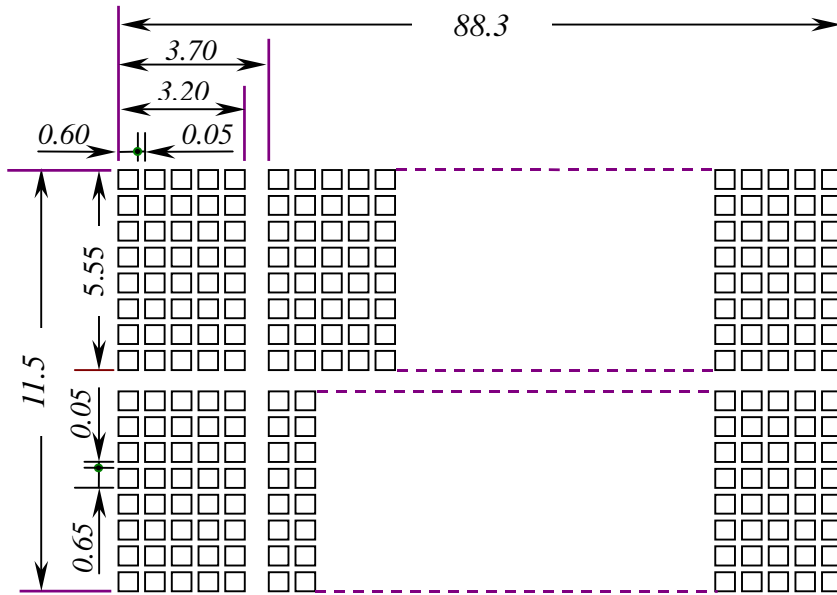
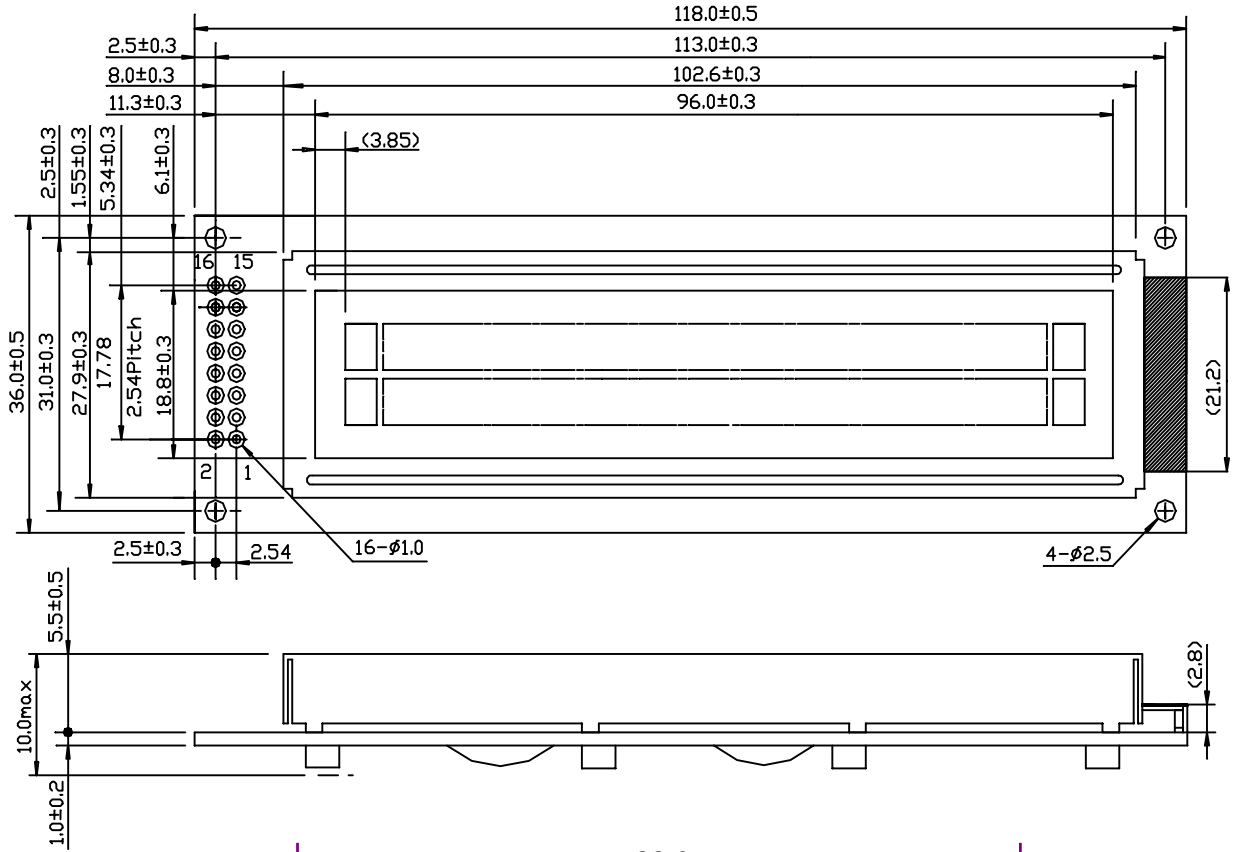
NOTE (1):      = 0°      :      VIEWING DIRECTION AT 6 O'CLOCK

                 = 180°      :      VIEWING DIRECTION AT 12 O'CLOCK

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

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

### 8. Outline dimension



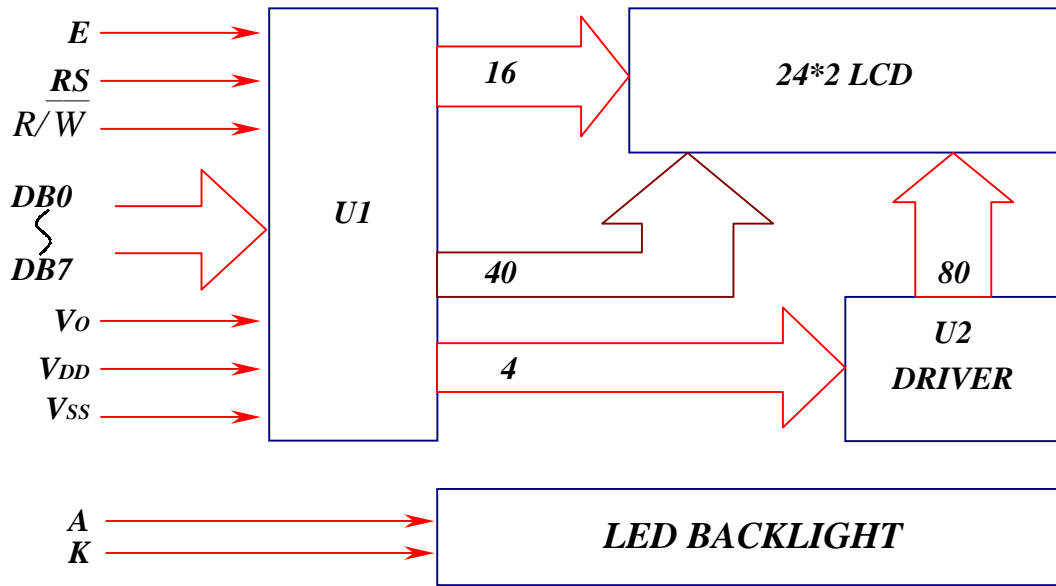
UNIT:mm  
SCALE:NTS

#### Interface pin connection

<b>PIN NO.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
SYMBOL	V <sub>SS</sub>	V <sub>DD</sub>	V <sub>o</sub>	RS	R/W	E	DB0	DB1
<b>PIN NO.</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>	<b>16</b>
SYMBOL	DB2	DB3	DB4	DB5	DB6	DB7	A(+)	K(-)



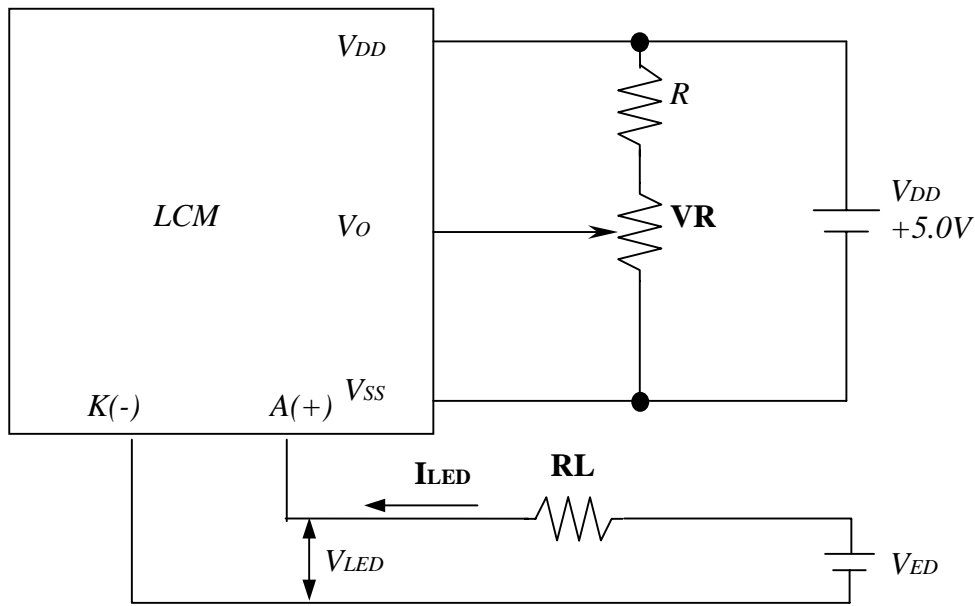
### 9. Block diagram



### Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LINE 1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
LINE 2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53
	21	22	23	24																
LINE 1	14	15	16	17																
LINE 2	54	55	56	57																

### 10. Power supply for LCM



#### 10.1 Power supply for backlight

<i>LED B.L TYPE</i>	<i>CONDITION</i>
<b>A</b>	$RL = ((V_{ED}-4.8V) / I_{LED})$ , $I_{LED} = 40mA$
<b>B</b>	$RL = ((V_{ED}-4.0V) / I_{LED})$ , $I_{LED} = 40mA$