



## PRODUCT SPECIFICATION

*Part Number*

PG24064A-O Series

CUSTOMER	
CUSTOMER PART NUMBER	
DESCRIPTION	
APPROVED BY	
DATE	



**MODEL NO.**

**PAGE**

PG24064A-O series

SPEC ONLY

2

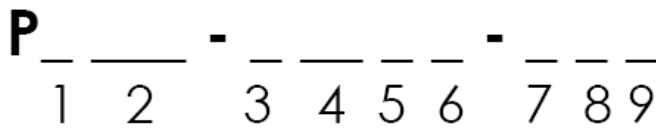
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# 1. Part number breakdown



Replace each Space ( \_ ) with the following letters and or numbers

1. P-tec LCD Type	<b>C</b> = Character <b>G</b> = Graphic <b>COG</b> = Chip On Glass	<b>COF</b> = Chip On Flex <b>TAB</b> = Tape Automated Bonding <b>TFT</b> = Thin-film Transistor
2. LCD Model	Example for Character: <b>2002A</b> = 20 Characters x 2 Lines w/ Pins on Left side and 116mm x 37 x 12.7mm overall size Example for Graphic: <b>12864B</b> = 128 Dots per row x 64 Dots per Column w/ Pins on lower side and 93mm x 70 x 8.8mm overall size	
3. Fluid Type	<b>T</b> = TN/Grey <b>Y</b> = STN/Yellow Green <b>G</b> = STN/ Grey	<b>B</b> = STN/ Blue <b>F</b> = FSTN/ White <b>N</b> = FSTN/ Black
4. Backlight/polorizer	<b>NF</b> = None/Transflective <b>NM</b> = None/Transmissive <b>NR</b> = None/Reflective <b>EF</b> = EL/Transflective <b>EM</b> = EL/Transmissive	<b>LF</b> = LED/Transflective <b>LM</b> = LED/Transmissive <b>CF</b> = CCFL/Transflective <b>CM</b> = CCFL=Transmissive
5. Backlight Color	(If no backlight provided move on to viewing angle [6.]) <b>B</b> = Blue/Green <b>Y</b> = Yellow <b>G</b> = Green	
6. Viewing Angle	<b>D</b> = 6:00 <b>U</b> = 12:00	<b>R</b> = 3:00 <b>L</b> = 9:00
7. Internal Number	Single Letter for internal purposes	
8. Extended Temperature	This space is blank if operating temperature is standard 0°C to 50°C An X will be visible if the LCD is Extended operating temperature	
9. Customer Specials or List of Value-added items	Usually blank unless customer requests some modifications. Can be several Letters long.	

## **2. Precautions in use of LCD Modules**

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.

## **3. General Specification**

<b>Item</b>	<b>Dimension</b>	<b>Unit</b>
Number of Dots	240 x 64	—
Module dimension(None Backlight )	180.0 x 65.0 x 11.0 (MAX)	mm
Module dimension(With Backlight )	180.0 x 65.0 x 16.0 (MAX)	mm
View area	132.2 x 39.2	mm
Active area	127.16 x 33.88	mm
Dot size	0.49 x 0.49	mm
Dot pitch	0.53x 0.53	mm
LCD type	STN	
Duty	1/64	
View direction	6 o'clock or 12 o'clock	
Backlight Type	None, YELLOW-GREEN backlight, WHITE backlight	

## 4. Absolute Maximum Ratings

Item		Symbol	Min	Max	Unit
Input Voltage		$V_I$	-0.3	$V_{DD}+0.3$	V
Supply Voltage For Logic		$V_{DD}-V_{SS}$	-0.3	7.0	V
Supply Voltage For LCD		$V_{DD}-V_0$	0	16	V
Standard Temperature LCM	Operating Temp.	Top	0	50	°C
	Storage Temp.	Tstr	-10	60	°C
Wide Temperature LCM	Operating Temp.	Top	-20	70	°C
	Storage Temp.	Tstr	-30	80	°C

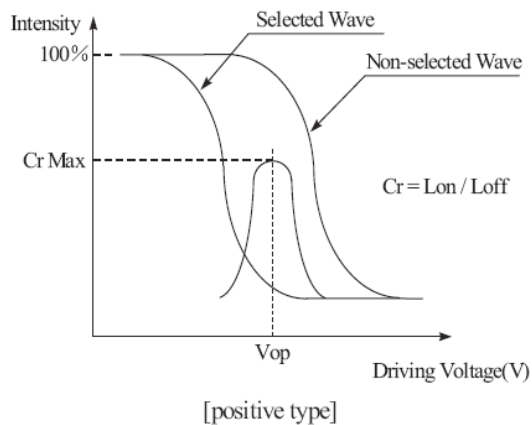
## 5. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	$V_{DD}-V_{SS}$	—	4.5	5.0	5.5	V
Supply Voltage For LCD	$V_{DD}-V_0$	$T_a=25^{\circ}\text{C}$	12.0	12.5	13.2	V
Input High Volt.	$V_{IH}$	—	$0.7 V_{DD}$	—	$V_{DD}$	V
Input Low Volt.	$V_{IL}$	—	$V_{SS}$	—	$0.3 V_{DD}$	V
Supply Current	$I_{DD}$	$V_{DD}=5\text{V}$	9.0	9.9	12.0	mA
Supply Voltage of Yellow-green backlight	$V_{LED}$	Forward current =630 mA  Number of LED die $2 \times 63 = 126$	3.8	4.2	4.3	V
Supply Voltage of White backlight	$V_{LED}$	Forward current =60 mA  Number of LED die 4	2.8	3.1	3.3	V

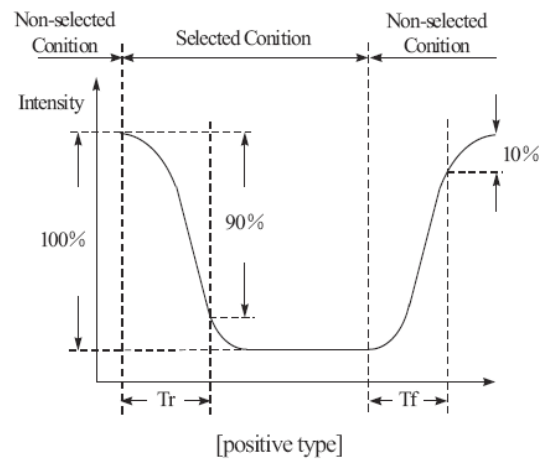
## 6. Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V) $\theta$	$CR \cong 2$	-20	—	35	deg
	(H) $\phi$	$CR \cong 2$	-30	—	30	deg
Contrast Ratio	CR	—	—	3	—	—
Response Time	T rise	—	—	—	250	ms
	T fall	—	—	—	250	ms

### Definition of Operation Voltage (Vop)



### Definition of Response Time (Tr, Tf)



### Conditions :

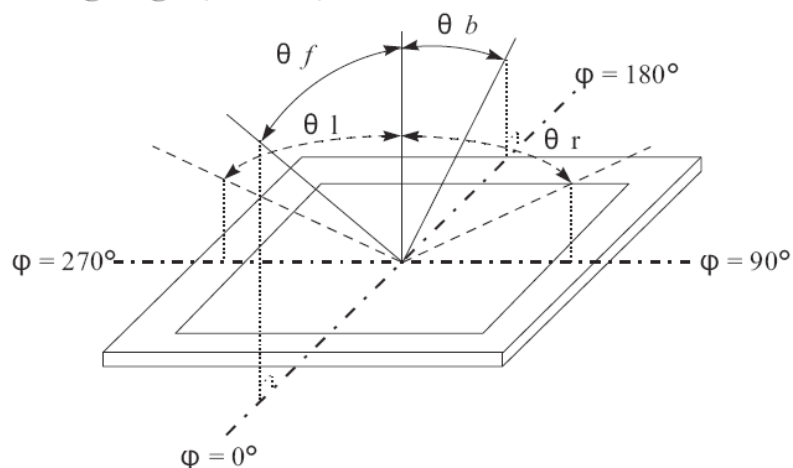
Operating Voltage : Vop

 Viewing Angle( $\theta$ ,  $\phi$ ) :  $0^\circ$ ,  $0^\circ$ 

Frame Frequency : 64 HZ

Driving Waveform : 1/N duty, 1/a bias

### Definition of viewing angle( $CR \cong 2$ )



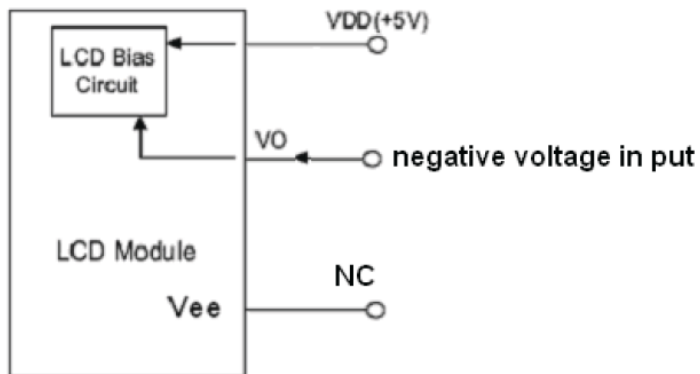
## 7. Interface Pin Function

Pin No.	Symbol	Level	Description
1	V <sub>SS</sub>	0V	Ground
2	V <sub>DD</sub>	5.0V	Supply Voltage for logic
3	V <sub>0</sub>		Supply voltage for LCD
4	RS	H/L	Command/Data select
5	RW	H/L	Data Read/Write
6	E	H/L	Chip Enable
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	/CS	H/L	Chip enable for T6963C
16	/RST	H/L	Reset signal
17	V <sub>ee</sub>		Negative Voltage Output/input
18	NC		NC
19	LED(+)		Anode of LED Backlight
20	LED(-)		Cathode of LED Backlight



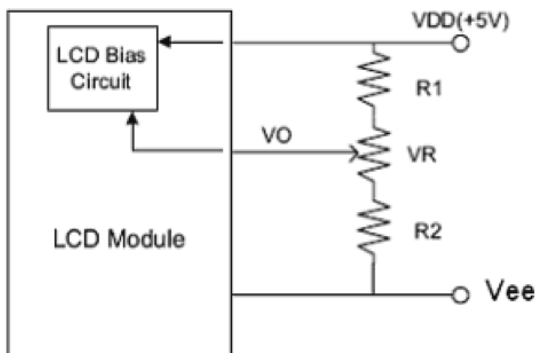
## 8. POWER SUPPLY

### Without Negative Power on PCB



without DC-DC converter

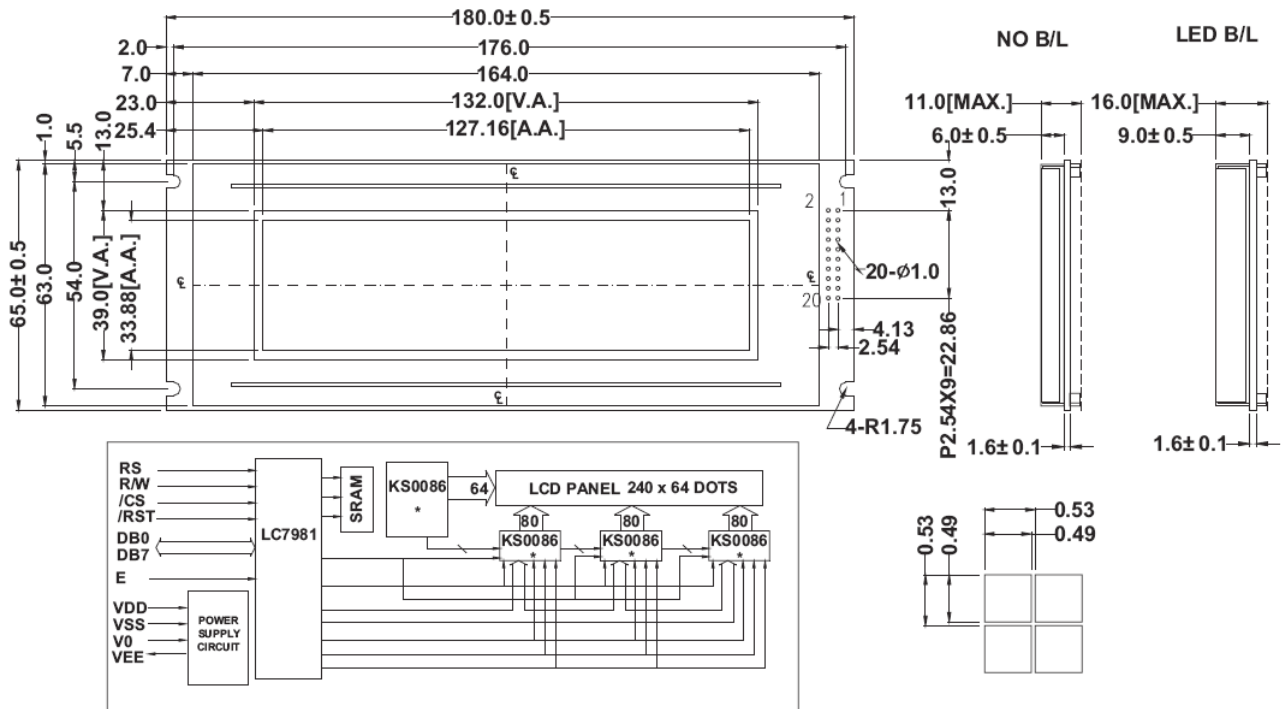
### With Negative Power on PCB



with DC-DC converter

VR:10K-20K

## 9. Contour Drawing & Block Diagram



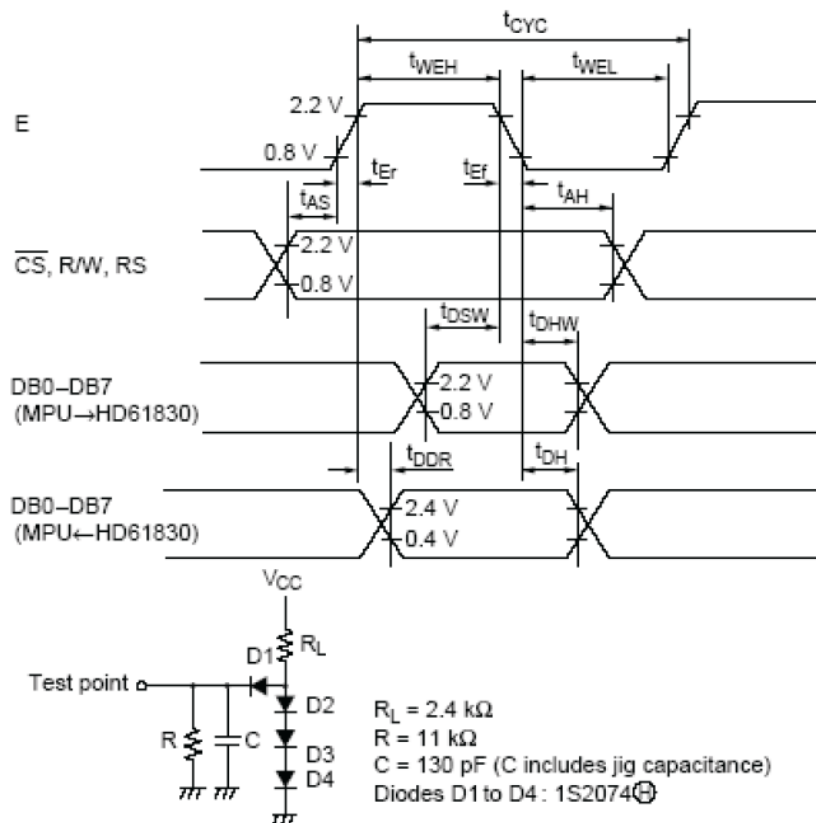
\* OR EQUIVALENT

## 10. Timing Characteristics (equivalent to HD61830)

HD61830 MPU Interface ( $V_{CC} = 5\text{ V} \pm 10\%$ ,  $GND = 0\text{ V}$ ,  $T_a = -20\text{ to }+75^\circ\text{C}$ )

Item		Symbol	Min	Typ	Max	Unit
Enable cycle time		$t_{CYC}$	1.0	—	—	$\mu\text{s}$
Enable pulse width	High level	$t_{WEH}$	0.45	—	—	$\mu\text{s}$
	Low level	$t_{WEL}$	0.45	—	—	$\mu\text{s}$
Enable rise time		$t_{Er}$	—	—	25	ns
Enable fall time		$t_{Ef}$	—	—	25	ns
Setup time		$t_{AS}$	140	—	—	ns
Data setup time		$t_{DSW}$	225	—	—	ns
Data delay time		$t_{DDR}$	—	—	225	ns *
Data hold time		$t_{DHW}$	10	—	—	ns
Address hold time		$t_{AH}$	10	—	—	ns
Output data hold time		$t_{DH}$	20	—	—	ns

Note: \* The following load circuit is connected for specification:



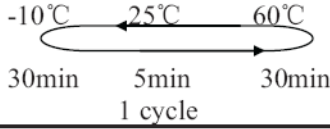
## 11. Quality Assurance

### Screen Cosmetic Criteria

Item	Defect	Judgment Criterion	Partition
1	Spots	A)Clear <u>Size: d mm</u> <u>Acceptable Qty in active area</u> $d \leq 0.1$ Disregard $0.1 < d \leq 0.2$ 6 $0.2 < d \leq 0.3$ 2 $0.3 < d$ 0 Note: Including pin holes and defective dots which must be within one pixel size. B)Unclear <u>Size: d mm</u> <u>Acceptable Qty in active area</u> $d \leq 0.2$ Disregard $0.2 < d \leq 0.5$ 6 $0.5 < d \leq 0.7$ 2 $0.7 < d$ 0	Minor
2	Bubbles in Polarizer	<u>Size: d mm</u> <u>Acceptable Qty in active area</u> $d \leq 0.3$ Disregard $0.3 < d \leq 1.0$ 3 $1.0 < d \leq 1.5$ 1 $1.5 < d$ 0	Minor
3	Scratch	In accordance with spots cosmetic criteria. When the light reflects on the panel surface, the scratches are not to be remarkable.	Minor
4	Allowable Density	Above defects should be separated more than 30mm each other.	Minor
5	Coloration	Not to be noticeable coloration in the viewing area of the LCD panels. Back-light type should be judged with back-light on state only.	Minor

## 12. Reliability

### Content of Reliability Test

Environmental Test			
Test Item	Content of Test	Test Condition	Applicable Standard
High Temperature storage	Endurance test applying the high storage temperature for a long time.	60°C 96hrs	—
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-10°C 96hrs	—
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50°C 96hrs	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0°C 96hrs	—
High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	60°C, 90%RH 96hrs	—
High Temperature/ Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	50°C, 90%RH 96hrs	—
Temperature Cycle	Endurance test applying the low and high temperature cycle. 	-10°C/60°C 10 cycles	—
Mechanical Test			
Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	—
Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msdc 3 times of each direction	—

\*\*\*Supply voltage for logic system=5V. Supply voltage for LCD system =Operating voltage at 25°C