

# XIAMEN PRECISE DISPLAY

## *SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY*

*PART NUMBER:*

*PCM2004F-FL-YBW-01*

*DATE:*

*2010.03.25*

## 1.0 MECHANICAL SPECS

1. Overall Module Size	146.0mm(W) x 62.5mm(H) x max 14.5mm(LED Backlight)
2. Dot Size	0.93mm(W) x 1.11mm(H)
3. Dot Pitch	0.98mm(W) x 1.16mm(H)
4. Duty	1/16
5. Controller IC	ST7066U or Equivalent
6. LC Fluid Options	STN
7. Polarizer Options	Yellow-green and Transflective
8. Viewing Angle	6:00 o'clock
9. Backlight Options	LED(Yellow-green)
10. Temperature Range Options	Operating:-20°C ~ +70°C; Storage:-30°C ~ +80°C

## 2.0 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Typ	Max	Unit
Operating temperature (Standard)	Top	0	-	50	°C
Storage temperature (Standard)	Tst	-20	-	70	°C
Operating temperature (Wide temperature)	Top	-20	-	70	°C
Storage temperature (Wide temperature)	Tst	-30	-	80	°C
Input voltage	Vin	Vss		Vdd	V
Supply voltage for logic	Vdd- Vss	4.5	5.0	5.5	V
Supply voltage for LCD drive	Vdd- Vo	4.2	4.5	4.7	V

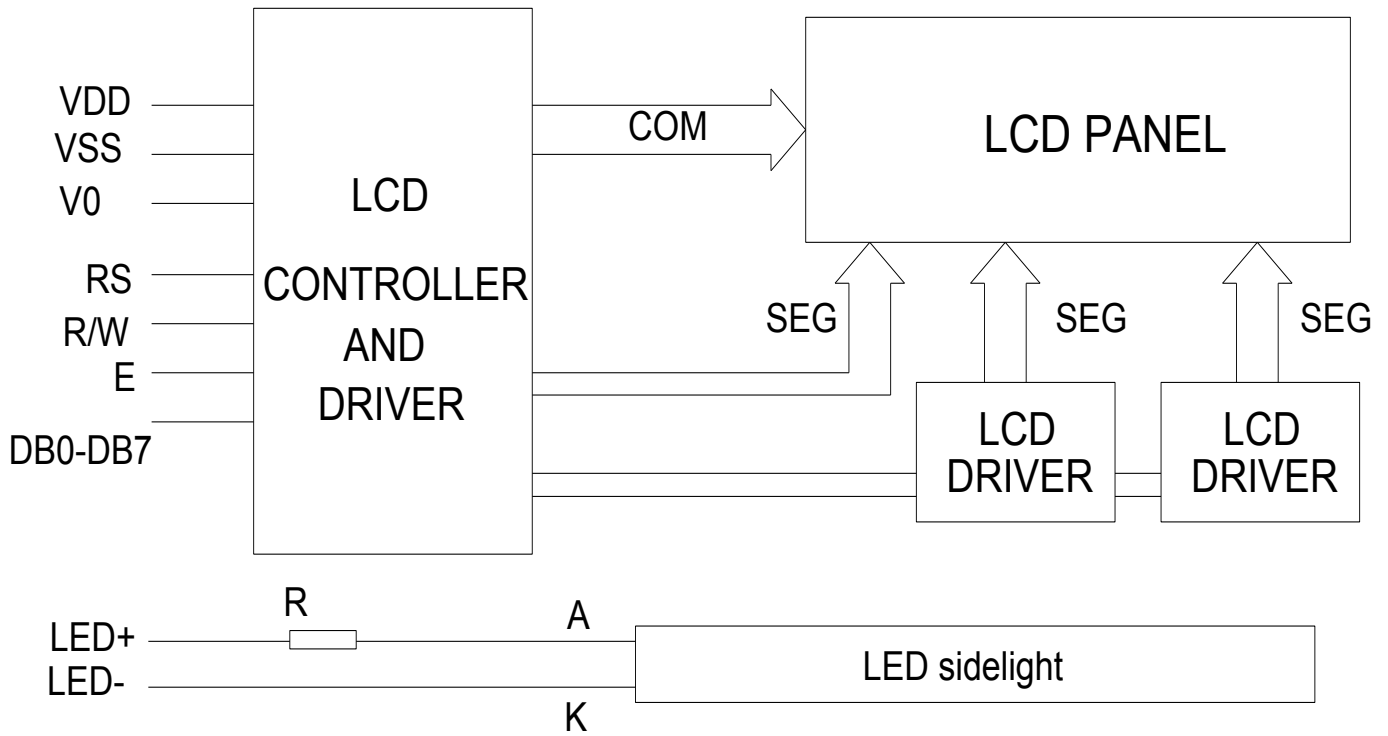
### 3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Power Supply Voltage	Vdd	fosc=270kHz	--	5.0	--	V
Power Supply Current	Idd	Vdd=5.0V, fosc=270kHz	-	3.0	4.0	mA
Recommended LC Driving Voltage (Standard Temp)	Vdd - Vo	0°C	-	4.8	5.4	V
		25°C	4.2	4.5	-	
		50°C	3.9	4.3	-	
Recommended LC Driving Voltage (Wide Temp)	Vdd -Vo	-20°C	-	6.4	7.2	V
		0°C	-	4.8	-	
		50°C	-	4.2	-	
		70°C	3.5	4.0	-	
BackLight Power Supply Voltage	Vf	R=3Ω	-	5.0	5.5	V
BackLight Power Supply Current	If	R=3Ω	-	600	-	mA

### 4.0 OPTICAL CHARACTERISTICS (Ta=25°C, Vdd= 5.0V±0.25V, STN LC fluid)

Item	Symbol	Condition	Min	Typ	Max	Unit
Viewing angle (horizontal)	θ	Cr ≥ 2.0	-60	-	35	deg
Viewing angle (vertical)	φ	Cr ≥ 2.0	-40	-	40	deg
Contrast Ratio	Cr	φ=0°, θ=0°	-	6	-	
Response time (rise)	Tr	φ=0°, θ=0°	-	150	250	ms
Response time (fall)	Tf	φ=0°, θ=0°	-	150	250	ms

**5.0 BLOCK DIAGRAM**

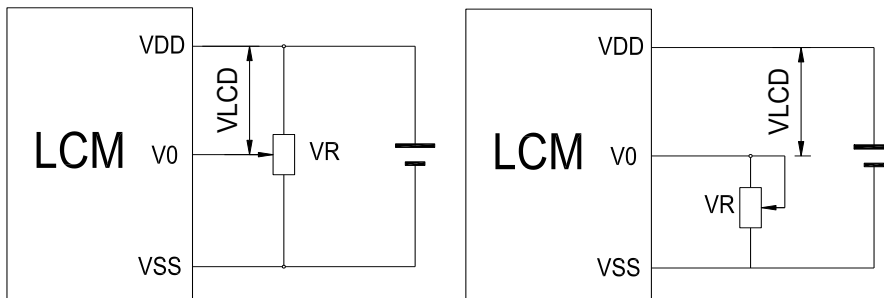


## 6.0 PIN ASSIGNMENT

Pin No.	Symbol	Function
1	Vss	Ground
2	Vdd	+5V
3	Vo	LCD contrast adjust
4	RS	Register select
5	R/W	Read / write
6	E	Enable
7	DB0	Data bit 0
8	DB1	Data bit 1
9	DB2	Data bit 2
10	DB3	Data bit 3
11	DB4	Data bit 4
12	DB5	Data bit 5
13	DB6	Data bit 6
14	DB7	Data bit 7
15	LED+	Power Supply for +5.0V
16	LED-	Power Supply for GND

## 7.0 CONTRAST ADJUST

A) For Single Source



For Module with Normal Temperature Range Fluid

$V_{DD}-V_0$ : LCD Driving voltage

VR: 10k~20k

**8.0 TIMING CHARACTERISTICS**

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Enable cycle time	$t_c$	Fig. a, Fig. b	500	-	-	ns
Enable pulse width	$t_w$	Fig. a, Fig. b	220	-	-	ns
Enable rise/fall time	$t_r, t_f$	Fig. a, Fig. b	-	-	25	ns
RS, R/W set up time	$t_{su}$	Fig. a, Fig. b	40	-	-	ns
RS, R/W hold time	$t_h$	Fig. a, Fig. b	10	-	-	ns
Data delay time	$t_d$	Fig. b	-	-	120	ns
Data set up time	$t_{dsu}$	Fig. a	60	-	-	ns
Data hold time	$t_{dh}$	Fig. a, Fig. b	20	-	-	ns

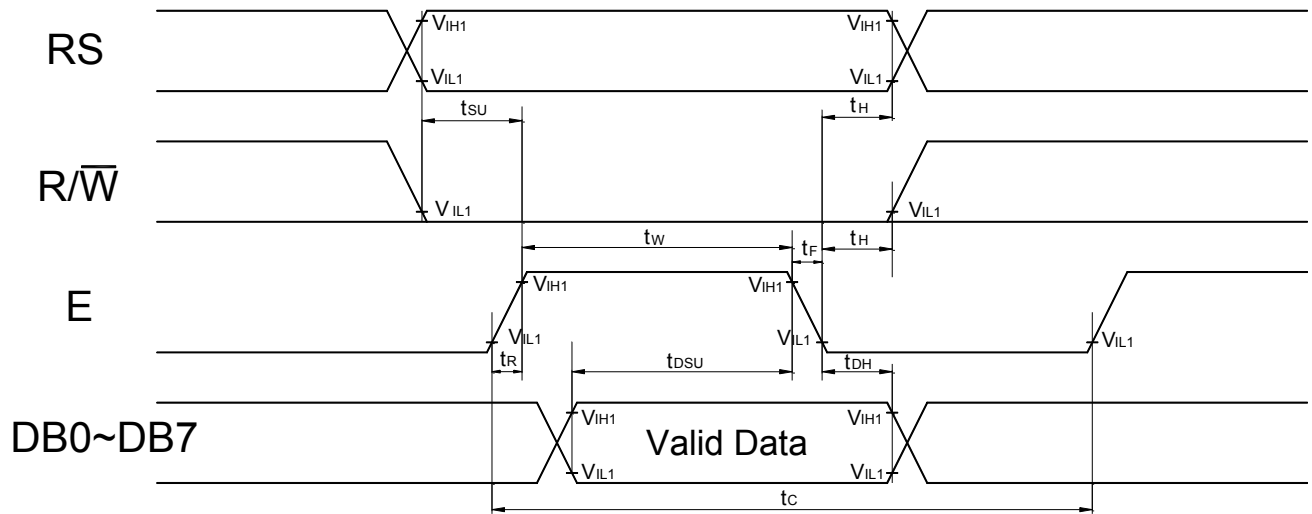


Fig. a Interface timing (data write)

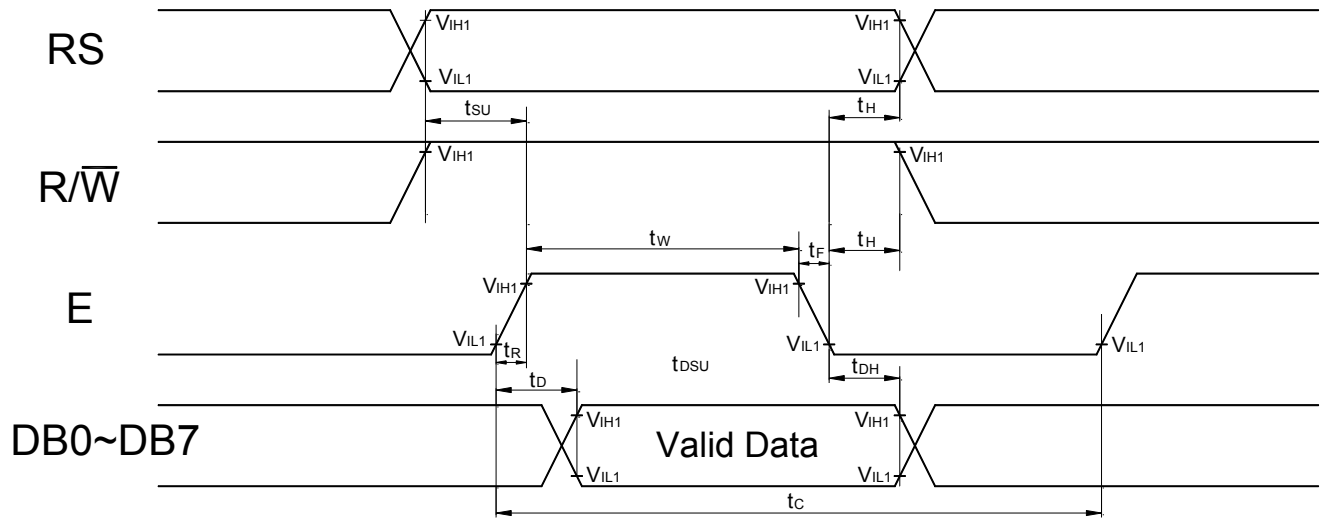
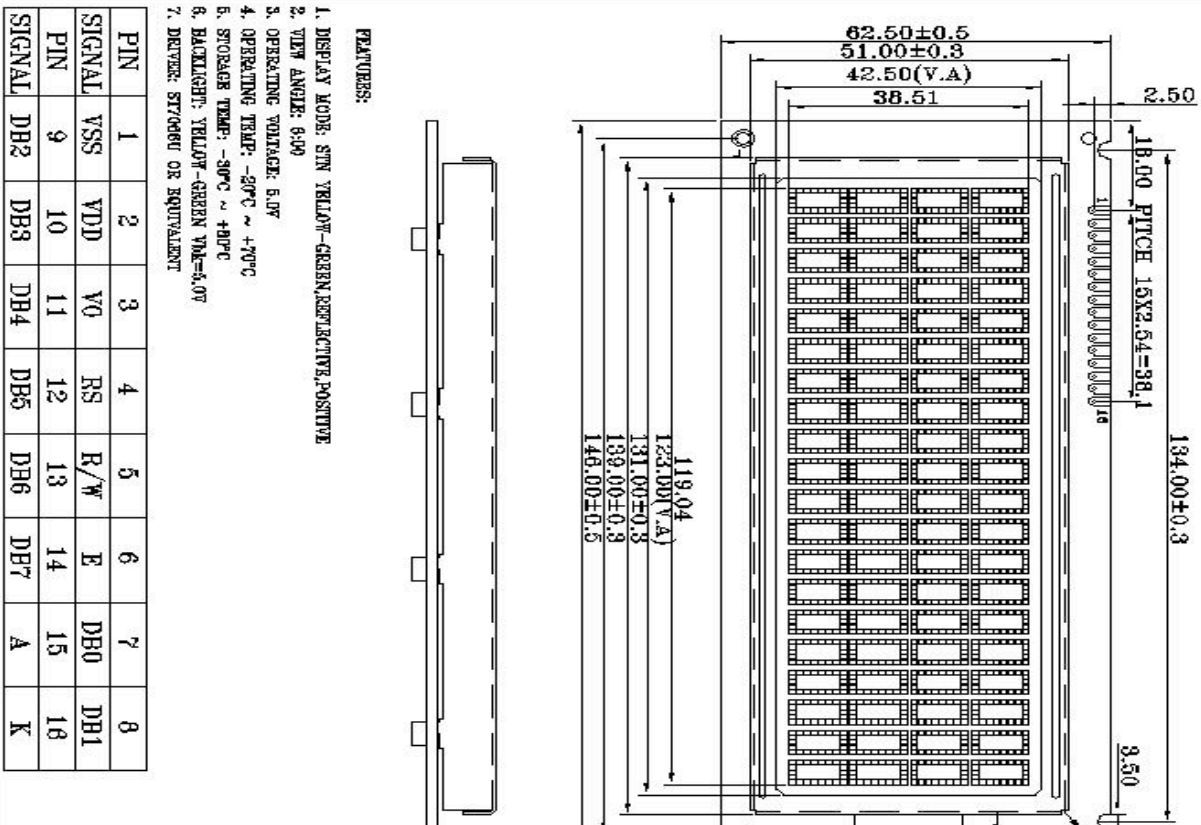


Fig. b Interface timing (data read)

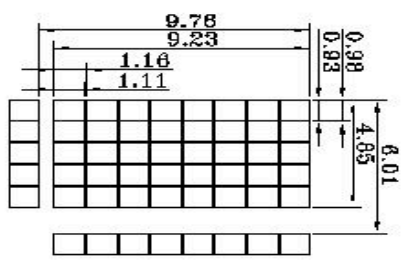
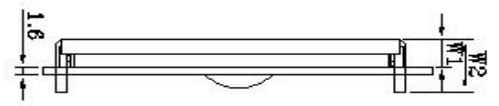
**9.0 MECHANICAL DIAGRAM**



**FEATURES:**

1. DISPLAY MODE: STN YELLOW-GREEN,REFLECTIVE,POSITIVE
2. VIEW ANGLE: 6:00
3. OPERATING VOLTAGE: 5.0V
4. OPERATING TEMP: -20°C ~ +70°C
5. STORAGE TEMP: -30°C ~ +90°C
6. BACKLIGHT: YELLOW-GREEN VML=4.0V
7. DRIVER: ST7066 OR EQUIVALENT

PIN	1	2	3	4	5	6	7	8
SIGNAL	VSS	VDD	VO	RS	R/W	E	DB0	DB1
PIN	9	10	11	12	13	14	15	16
SIGNAL	DB2	DB3	DB4	DB5	DB6	DB7	A	K



TOLERANCES UNLESS OTHERWISE SPECIFIED ±0.2

Version	W1	W2
LCD REV.	9.40±0.5	14.50

**厦门精显电子有限公司**  
 XIAMEN PRECISE DISPLAY CO., LTD.

地址: 厦门市湖里区... 邮编: 361021  
 电话: 0592-2610325 传真: 0592-2610325

日期: 2010.03.25



## 10.0 RELIABILITY TEST

Storage Condition	Content	Evaluations and Assessment*			
		Current Consumption	Oozing	Contrast	Other Appearances
Operation at high temperature and humidity	40°C,90% RH,240hrs	Twice initial value or less	none	More than 80% of initial value	No abnormality
High temperature storage	60°C, 240hrs	Twice initial value or less	none	More than 80% of initial value	No abnormality
Low temperature storage	-20°C, 240hrs	Twice initial value or less		More than 80% of initial value	No abnormality

\*Evaluations and assessment to be made two hours after returning to room temperature (25°C±5°C).

\*The LCDs subjected to the test must not have dew condensation.

### ➤ Display Data RAM (DDRAM)

DDRAM stores display data of maximum 80 x 8 bits (80 characters). DDRAM address is set in the address counter (AC) as a hexadecimal number.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10	11	12	13
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50	51	52	53
14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21	22	23	24	25	26	27
54	55	56	57	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

### 11.0 DISPLAY INSTRUCTION TABLE

COMMAND	R S	R/ W	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	DB 0	DESCRIPTION	Executing time fosc=250khz
Clear Display	0	0	0	0	0	0	0	0	0	1	Clears Display & Returns to Address 0.	1.64ms
Cursor at Home	0	0	0	0	0	0	0	0	1	x	Returns Cursor to Address 0. Also returns the display being shifted to the original position. DDRAM contents remain unchanged.	1.64ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	I/D: Set Cursor Moving Direction I/D=1: Increment I/D=0: Decrement  S: Specify Shift of Display S=1: The display is shifted S=0: The display is not shifted	40µs
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Display D=1: Display on D=0: Display off Cursor C=1: Cursor on C=0: Cursor off Brink B=1: Brink on B=0: Brink off	40µs
Cursor / Display Shift	0	0	0	0	0	1	S/C	R/L	x	x	Moves cursor or shifts the display w/o changing DD RAM contents S/C=0: Cursor Shift (RAM unchanged) S/C=1: Display Shift (RAM unchanged) R/L=1: Shift to the Right R/L=0: Shift to the Left	40µs
Function Set	0	0	0	0	1	DL	N	F	x	x	Sets data bus length (DL), # of display lines (N), and character fonts (F). DL=1: 8 bits F=0: 5x7 dots DL=0: 4 bits F=1: 5x10 dots N=0: 1 line display N=1: 2 lines display	40µs
Set CG RAM Address	0	0	0	1	Character Generator (CG) RAM Address						Sets CG RAM address. CG RAM data is sent and received after this instruction.	40µs
Set DD RAM Address	0	0	1	Display Data (DD) RAM Address / Cursor Address						Sets DD RAM address. DD Ram data is sent and received after this instruction.	40µs	
Busy Flag / Address Read	0	1	B F	Address counter used for both DD & CG RAM address						Reads Busy Flag (BF) and address counter contents.	40µs	
Write Data	1	0	Write Data								Writes data into DDRAM or CGRAM.	46µs
Read Data	1	1	Read Data								Reads data from DDRAM or CGRAM.	46µs

**12.0 STANDARD CHARACTER PATTERNS**

NO.7066-0A

b7-b4 b3-b0	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)			0	1	P	^	P				-	9	3	o	p
0001	(2)		!	1	A	Q	a	4			u	7	7	G	3	q
0010	(3)		"	2	B	R	b	r			"	Y	9	X	P	B
0011	(4)		#	3	C	S	c	s			u	9	7	E	E	*
0100	(5)		\$	4	D	T	d	t			v	I	T	P	p	a
0101	(6)		%	5	E	U	e	u			*	7	7	1	o	0
0110	(7)		&	6	F	V	f	v			7	9	2	3	P	Z
0111	(8)		^	7	G	W	g	w			7	7	X	7	g	π
1000	(1)		(	8	H	X	h	x			4	9	*	U	J	X
1001	(2)		)	9	I	Y	i	y			o	7	J	L	Y	U
1010	(3)		*	:	J	Z	j	z			z	o	n	l	j	7
1011	(4)		+	:	K	L	k	l			*	7	E	o	*	π
1100	(5)		,	<	L	*	l	l			o	9	o	o	o	π
1101	(6)		-	=	M	I	m	l			u	X	o	o	o	÷
1110	(7)		.	>	N	^	n	*			3	E	o	*	π	
1111	(8)		/	?	O	_	o	*			u	U	7	"	o	■

Note:

The character generator RAM is the RAM with which the user can rewrite character patterns by program.