

# XIAMEN PRECISE DISPLAY CO., LTD.

## *SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY*

*PART NUMBER:*

*PCM1602S-FSA-FBWC-UN*

*DATE:*

*2022.01.05*

## 1.0 MECHANICAL SPECS

1. Overall Module Size	112.0mm(W) x 44.0mm(H) x max 13.5mm(D) for LED backlight version
2. Dot Size	1.00mm(W) x 1.15mm(H)
3. Dot Pitch	1.05mm(W) x 1.20mm(H)
4. Duty	1/16
5. Controller IC	ST7066U or Equivalent
6. LC Fluid Options	FSTN
7. Polarizer Options	FSTN, TRANSFLECTIVE
8. Viewing Angle	6:00 o'clock
9. Backlight Options	LED(AMBER), Vbk=5.0V/145mA
10. Temperature Range Options	WideTemp (Operating: -20°C ~ 70°C, Storage:-30°C ~ 80°C)

## 2.0 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Typ	Max	Unit
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

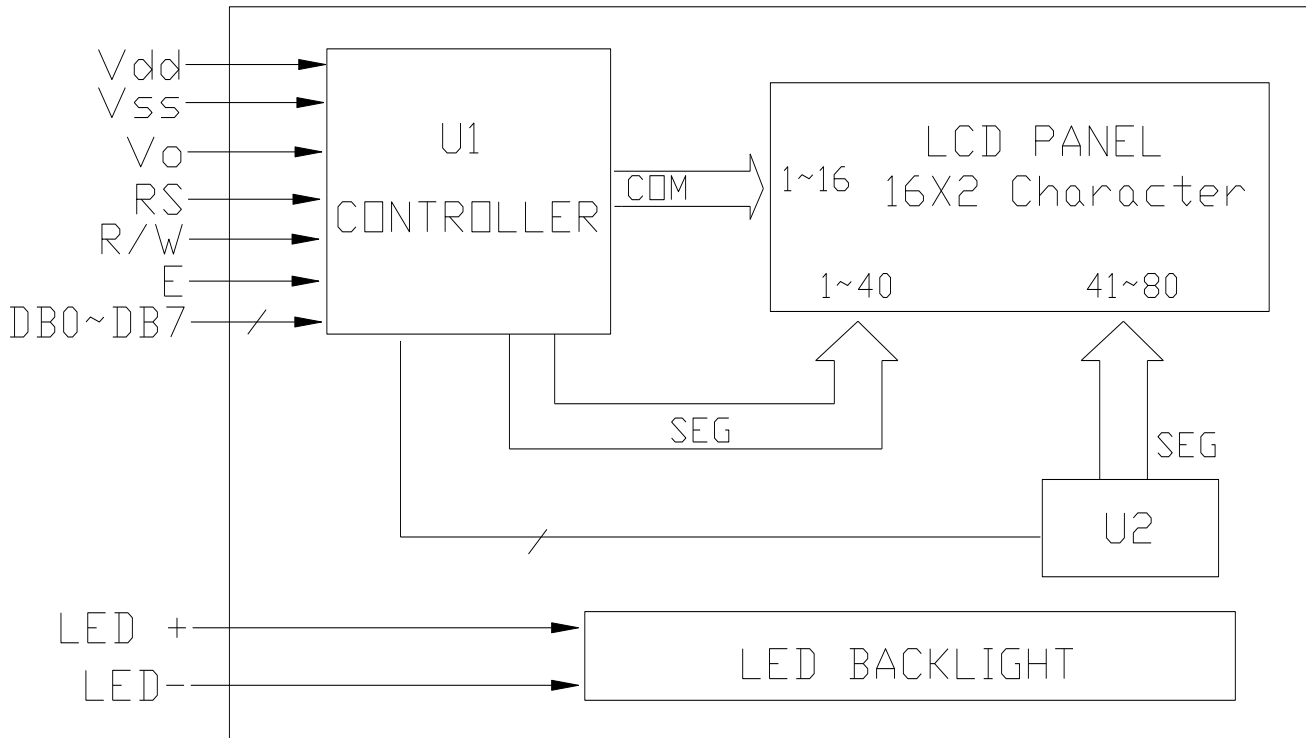
### 3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	Vih	H level	2.2	-	Vdd	V
Input voltage (low)	Vil	L level	0	-	0.6	V
Recommended LC Driving Voltage (Standard Temp)	Vdd - Vo	0°C	-	4.5	4.7	V
		25°C	4.2	4.5	-	
		50°C	4.2	4.5	-	
Recommended LC Driving Voltage (Wide Temp)	Vdd -Vo	-20°C	4.2	4.5	4.7	V
		0°C	4.2	4.5	4.7	
		50°C	4.2	4.5	4.7	
		70°C	4.2	4.5	4.7	
Power Supply Current	Idd	Vdd=5.0V, fosc=270kHz	-	0.8	1.8	mA
BackLight Power Supply Voltage	Vf	R=12Ω	-	5.0		V
BackLight Power Supply Current	If	R=12Ω	-	145	-	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

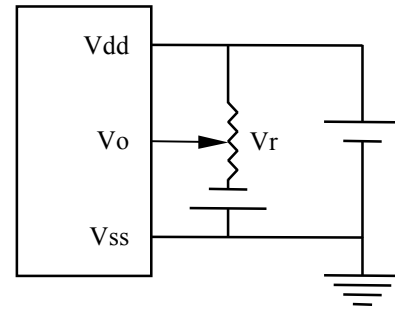
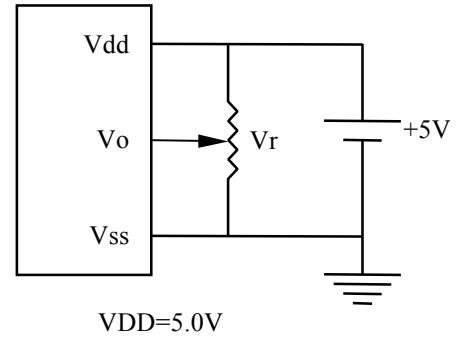
5.0 BLOCK DIAGRAM



**6.0 PIN ASSIGNMENT**

Pin No.	Symbol	Function
1	Vss	Ground
2	Vdd	+5.0V
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	A	Power Supply for BL+5.0V
16	K	Power Supply for BL-

**7.0 POWER SUPPLY**



$V_r = 10K\Omega \sim 20K\Omega$

**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

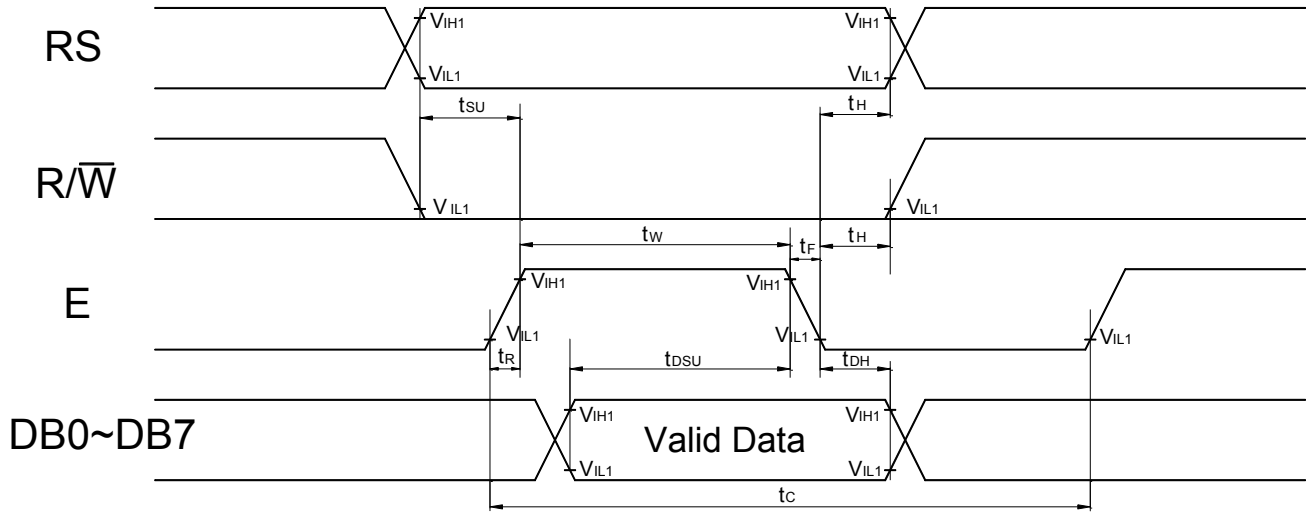


Fig. a Interface timing (data write)

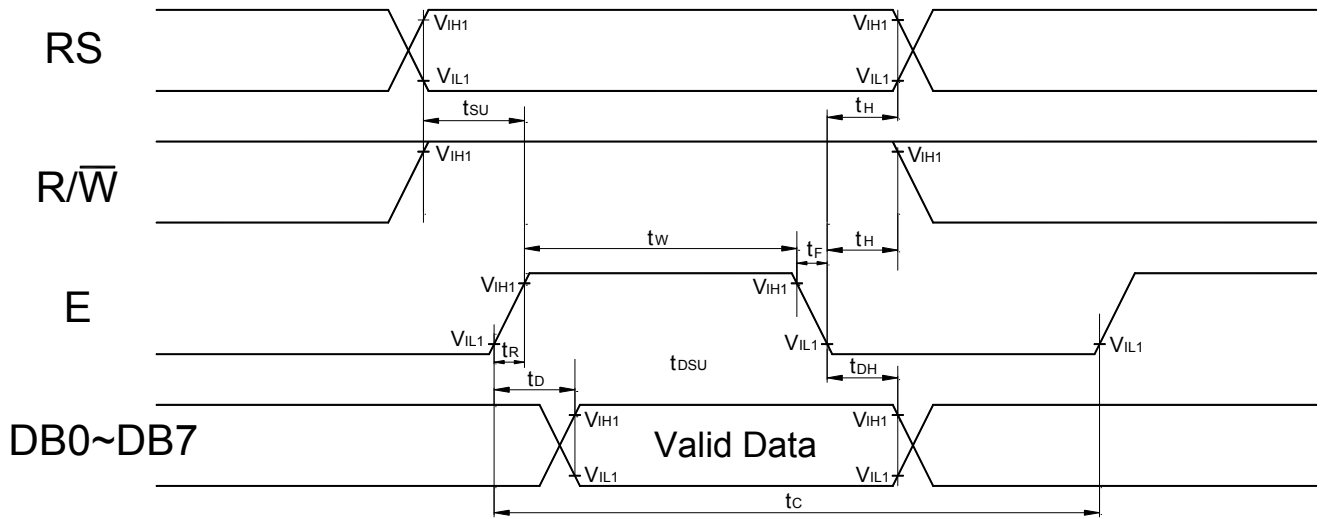
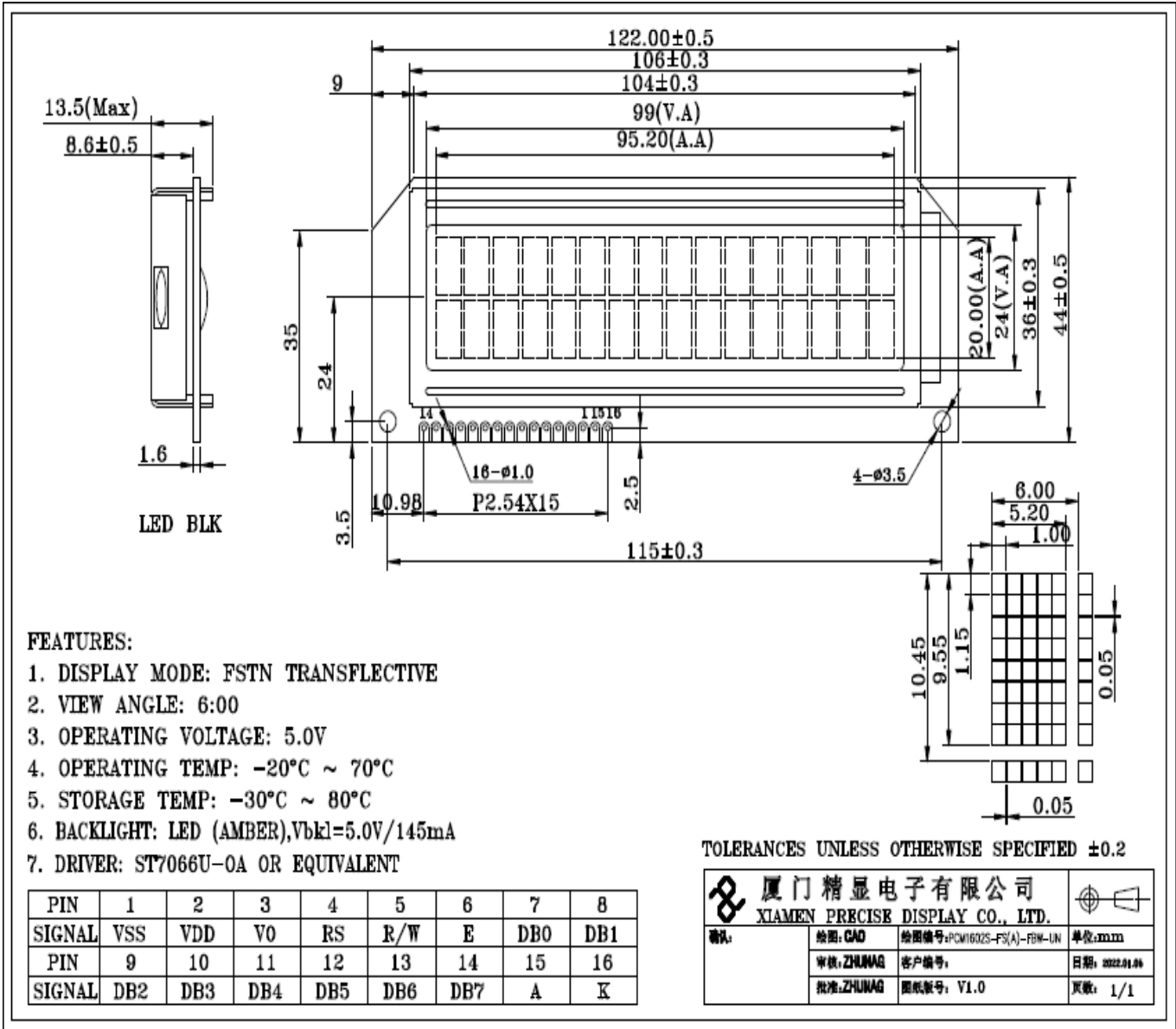


Fig. b Interface timing (data read)

**9.0 MECHANICAL DIAGRAM**



## 10.0 RELIABILITY TEST

Storage Condition	Content	Evaluations and Assessment*			
		Current Consumption	Oozing	Contrast	Other Appearances
Operation at high temperature and humidity	70°C,90% RH,240hrs	Twice initial value or less	none	More than 80% of initial value	No abnormality
High temperature storage	80°C, 240hrs	Twice initial value or less	none	More than 80% of initial value	No abnormality
Low temperature storage	-30°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.

## 11.0 DISPLAY CHARACTER ADDRESS

### 16\*2 Module DDRAM Address:

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



## 12.0 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

x: Don't Care

**13.0 STANDARD CHARACTER PATTERNS**

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	2	3	4	5	6	7	8	9	.	:	;
0001	(2)	!	@"	#	\$	%	&	'	(	)	*	+	,	-	.	/
0010	(3)	"	#	\$	%	&	'	(	)	*	+	,	-	.	/	
0011	(4)	#	\$	%	&	'	(	)	*	+	,	-	.	/		
0100	(5)	\$	%	&	'	(	)	*	+	,	-	.	/			
0101	(6)	%	&	'	(	)	*	+	,	-	.	/				
0110	(7)	&	'	(	)	*	+	,	-	.	/					
0111	(8)	'	(	)	*	+	,	-	.	/						
1000	(1)	(	)	*	+	,	-	.	/							
1001	(2)	)	*	+	,	-	.	/								
1010	(3)	*	+	,	-	.	/									
1011	(4)	+	,	-	.	/										
1100	(5)	,	-	.	/											
1101	(6)	-	.	/												
1110	(7)	.	/													
1111	(8)	/														

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