

XIAMEN PRECISE DISPLAY

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

PART NUMBER:

PCM2004D-NSW-BBWC-01

DATE:

2010.06.21

1.0 MECHANICAL SPECS

1. Overall Module Size	98.0mm(W) x 60.0mm(H) x max 9.5mm(D)
2. Dot Size	0.55mm(W) x 0.55mm(H)
3. Dot Pitch	0.60mm(W) x 0.60mm(H)
4. Duty	1/16
5. Controller IC	ST7066U-0T
6. LC Fluid Options	STN
7. Polarizer Options	Negative BLUE and Transmissive
8. Viewing Angle	6:00 o'clock
9. Backlight Options	LED (WHITE)
10. Temperature Range Options	Wide temp.: (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
Input voltage	Vin	Vss		Vdd	V
Operating temperature (Wide temperature)	Top	-20	-	70	°C
Storage temperature (Wide temperature)	Tst	-30	-	80	°C
Supply voltage for logic	Vdd- Vss	2.7	-	3.5	V
Supply voltage for LCD drive	Vdd- Vo	3.0	3.3	3.5	V

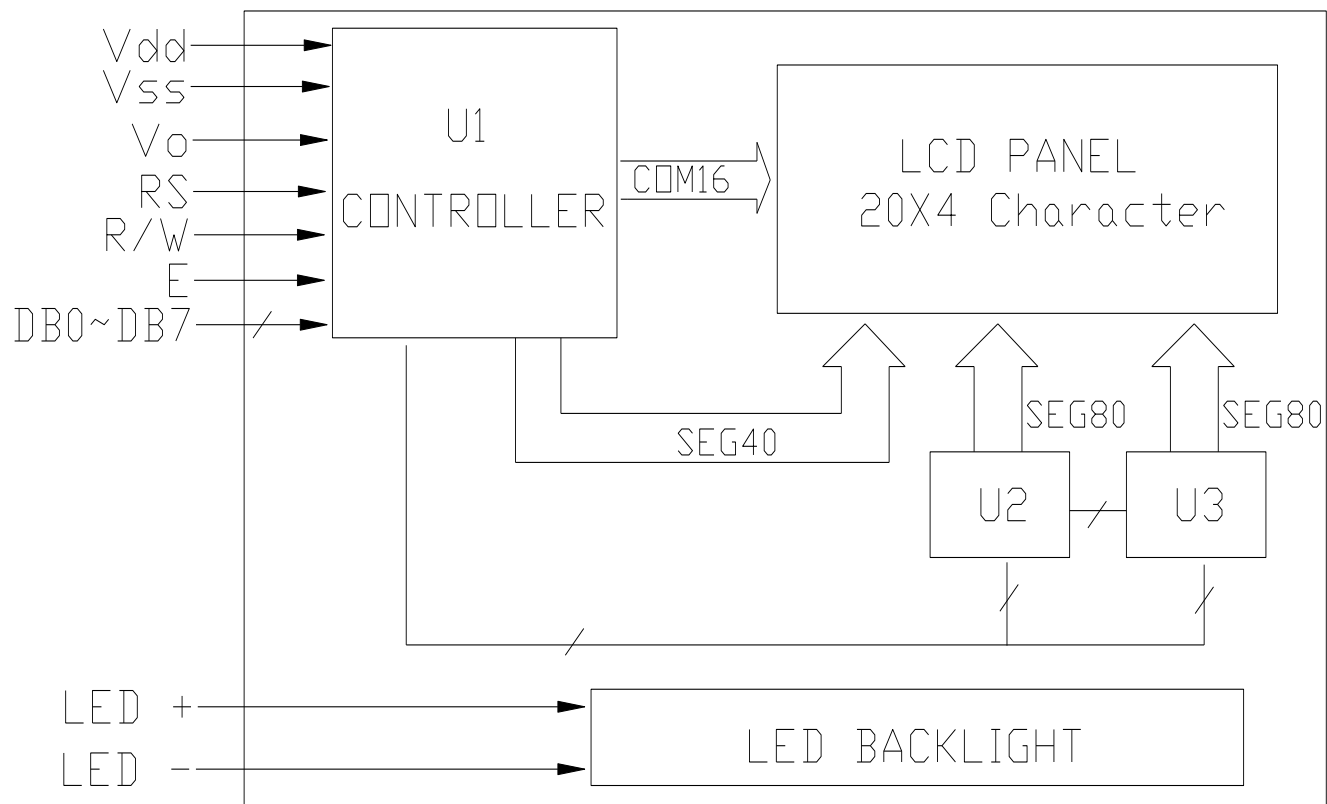
3.0 ELECTRICAL CHARACTERISTICS

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	-	2.0	3.0	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=0Ω	-	5.0	5.5	V
BackLight Power Supply Current	If	R=0Ω	-	40	-	mA

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

Item	Symbol	Condition	Min	Typ	Max	Unit
Viewing angle (horizontal)	θ	Cr ≥ 4.0	-25	-	-	deg
Viewing angle (vertical)	φ	Cr ≥ 4.0	-30	-	30	deg
Contrast Ratio	Cr	φ=0°, θ=0°	-	2	-	
Response time (rise)	Tr	φ=0°, θ=0°	-	120	150	ms
Response time (fall)	Tf	φ=0°, θ=0°	-	120	150	ms

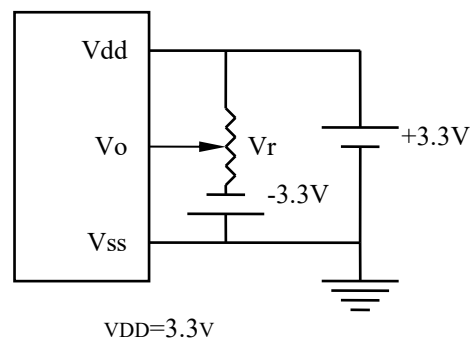
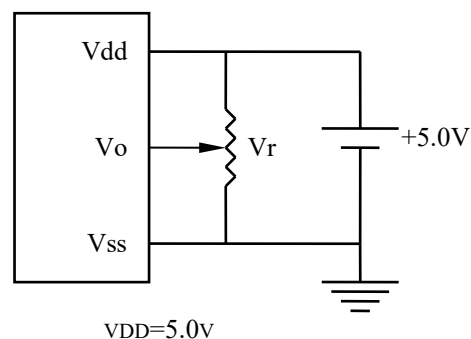
5.0 BLOCK DIAGRAM



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 +5.0V
16	K	Power Supply for VSS

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

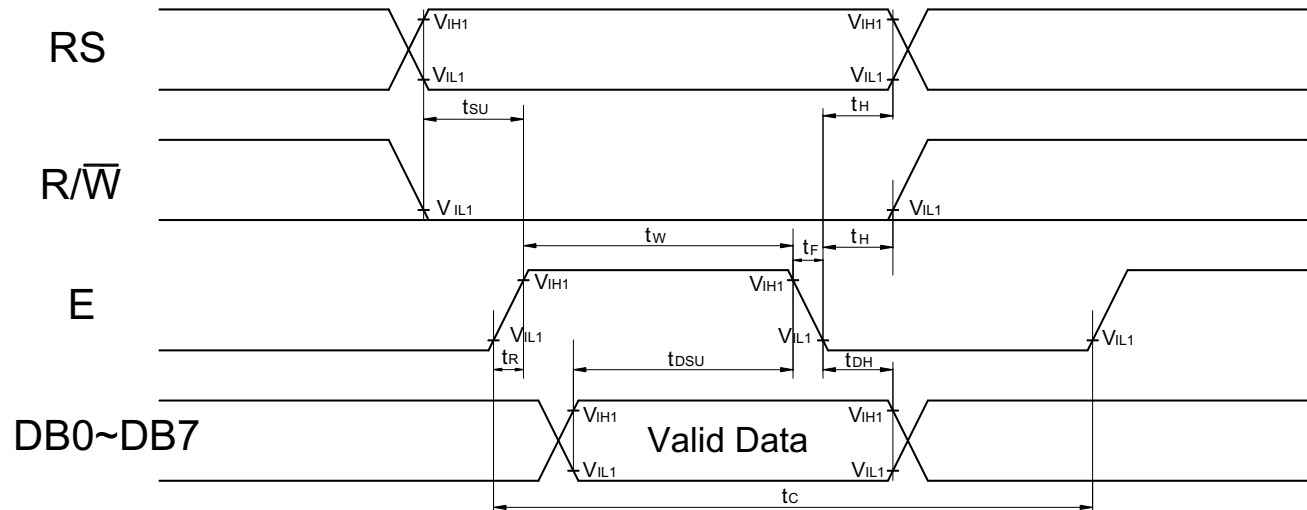


Fig. a Interface timing (data write)

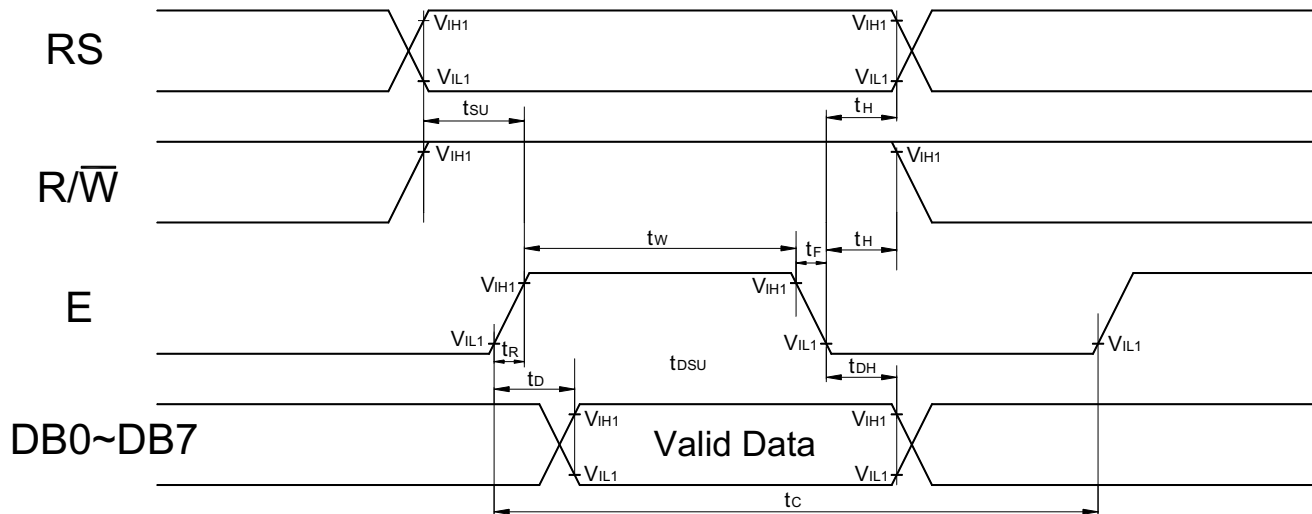
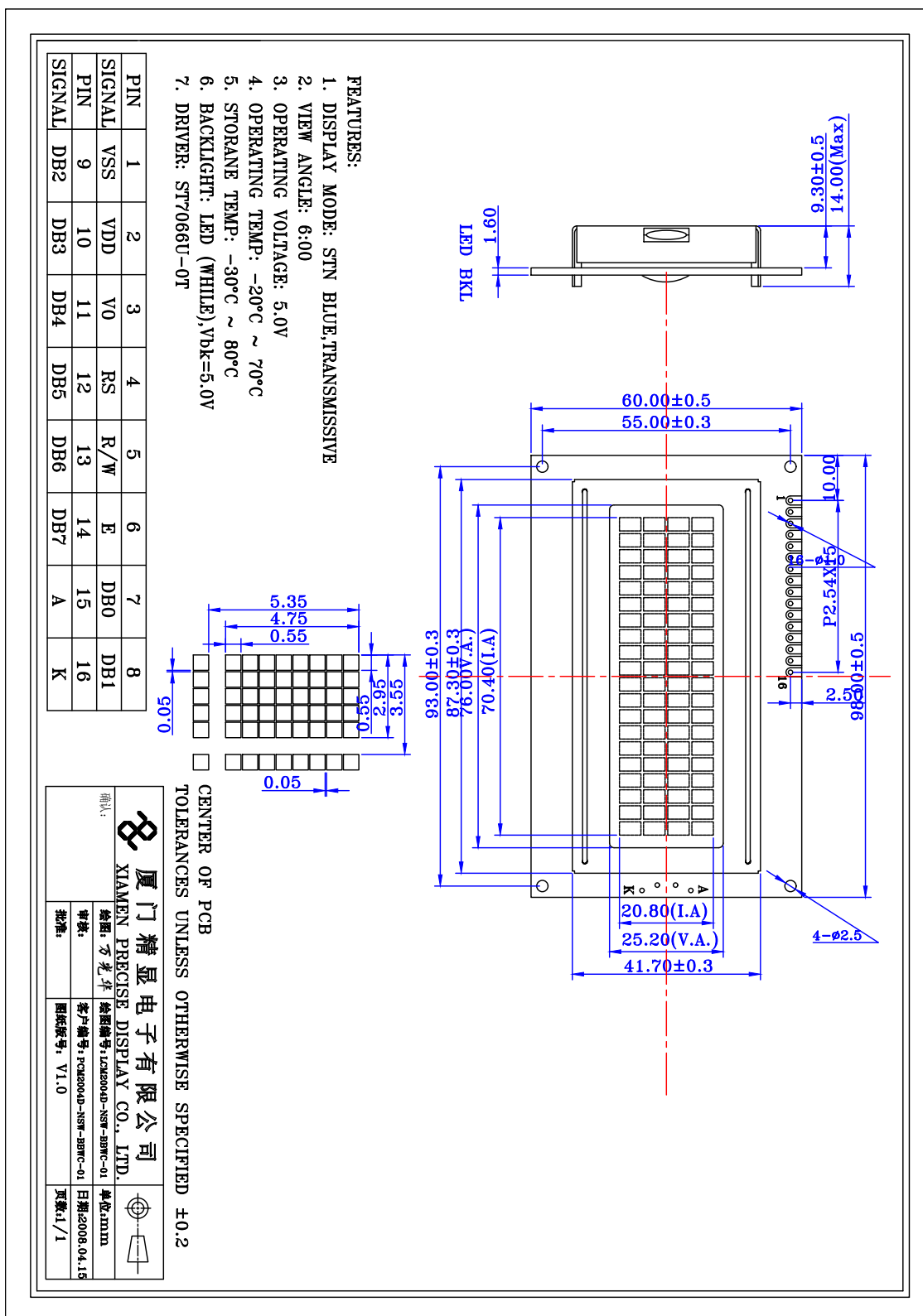


Fig. b Interface timing (data read)

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	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.

11.0 DISPLAY CHARACTER ADDRESS

20*4 Module DDRAM Address:

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	56	58	59	5A	5B	5C	5D	5E	5F	60	61	62	63	64	65	66	67

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	a	P		P				B	W	4	.	2	X
0001	(2)		!	1	A	Q	a	q				Г	Я	ш	.	Ц	Х
0010	(3)		"	2	B	R	b	r				E	6	ь	u	Ш	Х
0011	(4)		#	3	C	S	c	s				Ж	В	ы	и	з	4
0100	(5)		\$	4	D	T	d	t				З	Г	ь	х	ф	В
0101	(6)		%	5	E	U	e	u				И	е	а	х	ц	Г
0110	(7)		&	6	F	V	f	v				Й	ж	ю	х	ш	Ф
0111	(8)		'	7	G	W	g	w				Л	з	я	и	Г	Е
1000	(1)		<	8	H	X	h	x				П	и	о	и	Г	Е
1001	(2)		>	9	I	Y	i	y				У	а	о	Г	Г	Е
1010	(3)		*	:	J	Z	j	z				О	к	а	Г	Е	Е
1011	(4)		+	;	K	C	k	c				Ч	а	"	ж	о	Е
1100	(5)		,	<	L	Q	l	q				Ш	н	ж	ж	Г	Е
1101	(6)		-	=	M	I	m	i				Б	н	з	ж	*	Г
1110	(7)		.	>	N	^	n	e				Ы	н	г	х	о	Г
1111	(8)		/	?	O	_	o	e				Э	т	е	.	о	Г

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

