

PRECISE DISPLAY

XIAMEN PRECISE DISPLAY CO., LTD.

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

PART NUMBER:

PCM1602S-NSW-BBW-02

DATE:

2011.03.28

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-A
6. LC Fluid Options	STN
7. Polarizer Options	Blue Negative and Transmissive
8. Viewing Angle	6:00 o'clock
9. Backlight Options	LED(WHITE)
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 (Standard)	Top	0	-	50	°C
Storage temperature (Standard)	Tst	-10	-	60	°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	2.7	-	5.5	V
Supply voltage for LCD drive	Vdd- Vo	3.0	4.5	6.5	V

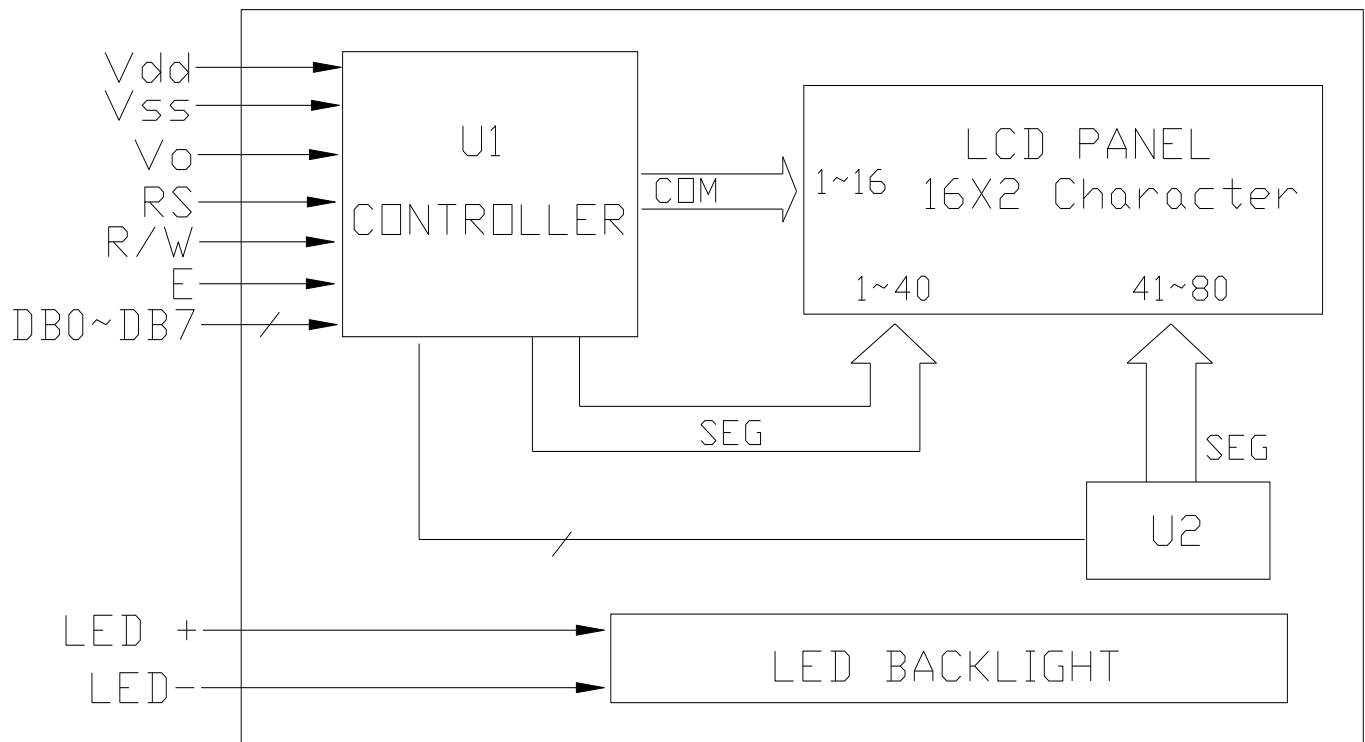
3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	V _{ih}	H level	2.2	-	V _{dd}	V
Input voltage (low)	V _{il}	L level	0	-	0.6	V
Recommended LC Driving Voltage (Standard Temp)	V _{dd} - V _o	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)	V _{dd} - V _o	-20°C	-	6.4	7.2	V
		0°C	-	4.8	-	
		50°C	-	4.2	-	
		70°C	3.5	4.0	-	
Power Supply Current	I _{dd}	V _{dd} =5.0V, f _{osc} =270kHz	-	0.8	1.8	mA
BackLight Power Supply Voltage	V _f	R=0Ω	-	5.0	5.0	V
BackLight Power Supply Current	I _f	R=0Ω	-	40	-	mA

4.0 OPTICAL CHARACTERISTICS (T_a=25°C, V_{dd}= 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)	T _r	φ=0°, θ=0°	-	150	250	ms
Response time (fall)	T _f	φ=0°, θ=0°	-	150	250	ms

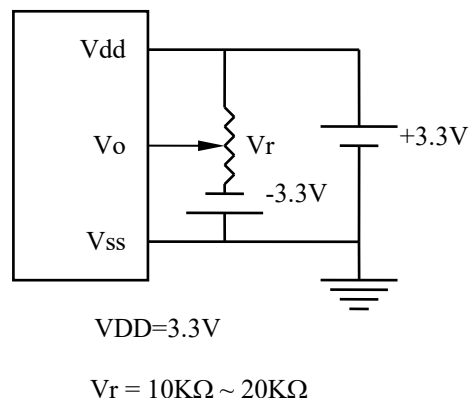
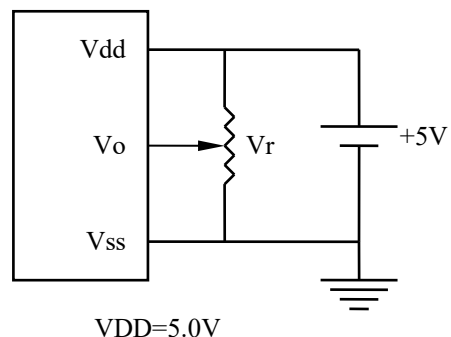
5.0 BLOCK DIAGRAM



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	K	Power Supply for BL-
16	A	Power Supply for BL+

7.0 POWER SUPPLY



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

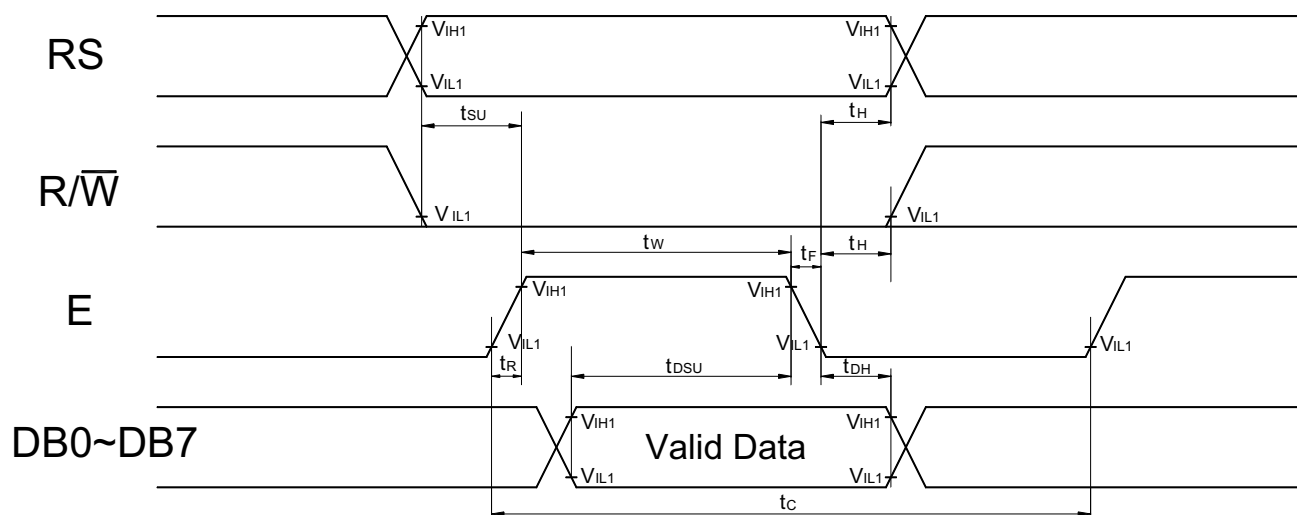


Fig. a Interface timing (data write)

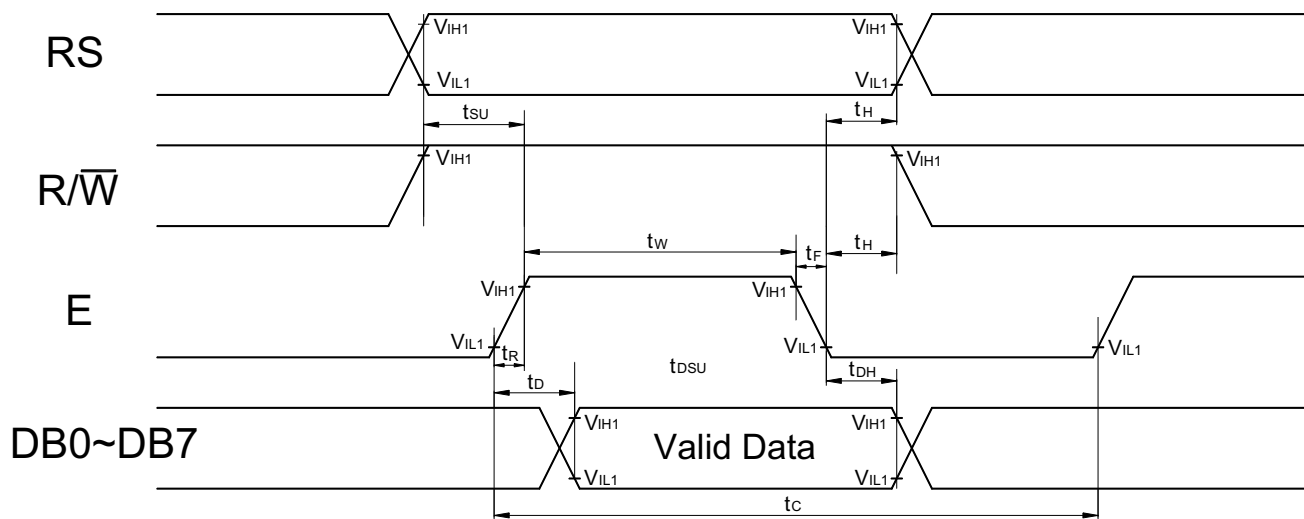
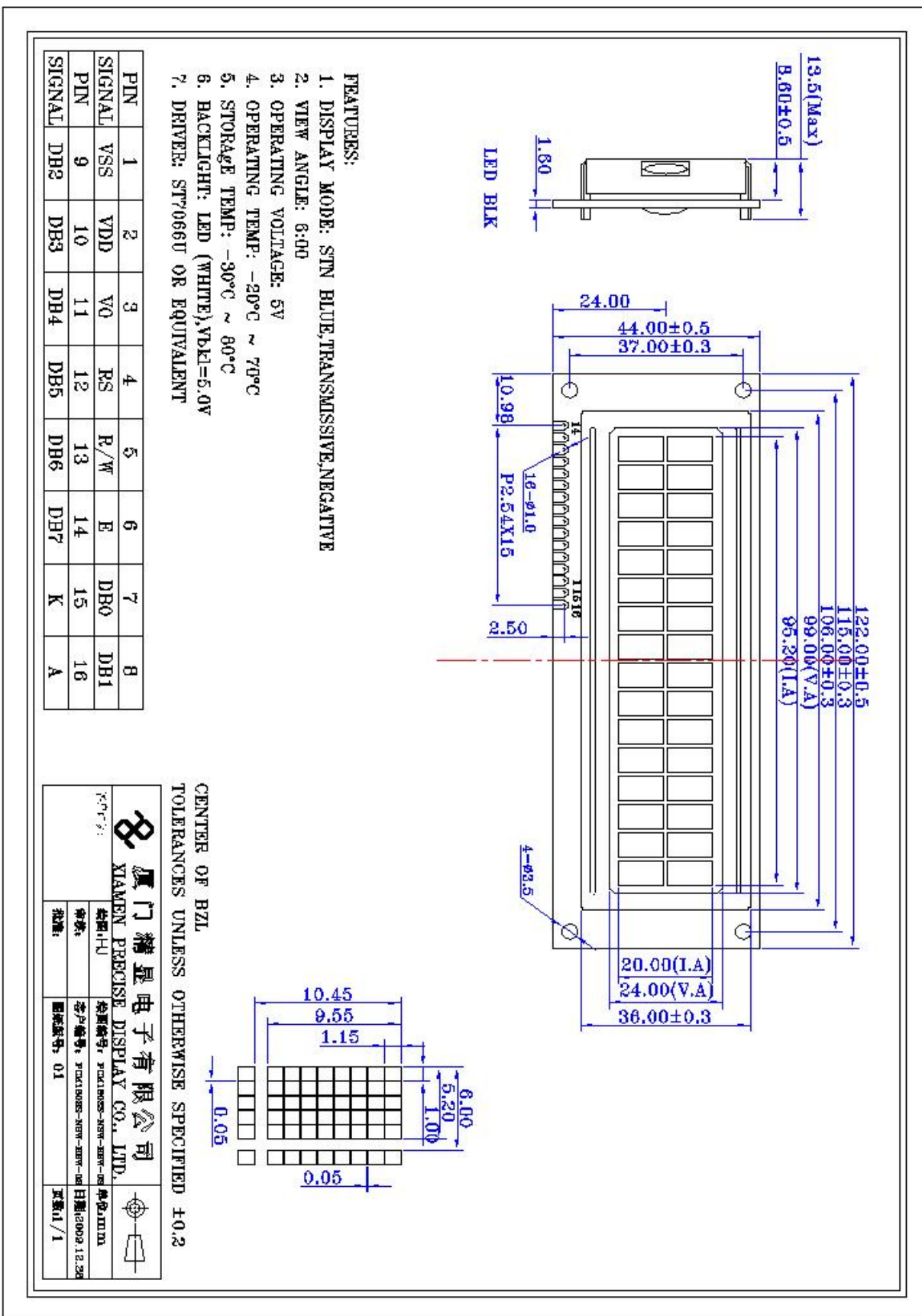


Fig. b Interface timing (data read)

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

Lower 4 Bits	Upper 4 Bits	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)			0	@	P	`	P					—	タ	ミ	α	P
xxxx0001	(2)			!	1	A	Q	a	q				。	ア	チ	△	△
xxxx0010	(3)			"	2	B	R	b	r				「	イ	ツ	×	θ
xxxx0011	(4)			#	3	C	S	c	s				」	ウ	テ	モ	ε
xxxx0100	(5)			\$	4	D	T	d	t				、	エ	ト	ハ	μ
xxxx0101	(6)			%	5	E	U	e	u				・	オ	ナ	1	℃
xxxx0110	(7)			&	6	F	V	f	v				ヲ	カ	ニ	ヨ	ρ
xxxx0111	(8)			'	7	G	W	g	w				ア	キ	ヌ	ウ	π
xxxx1000	(1)			(	8	H	X	h	x				イ	ク	ネ	リ	℄
xxxx1001	(2)			)	9	I	Y	i	y				ウ	ケ	ノ	ル	℄
xxxx1010	(3)			*	:	J	Z	j	z				エ	コ	ハ	レ	℄
xxxx1011	(4)			+	:	K	[	k	(				オ	サ	ヒ	ロ	℄
xxxx1100	(5)			,	<	L	¥	l	l				ヤ	シ	フ	ワ	℄
xxxx1101	(6)			—	=	M	]	m	)				ユ	ズ	ハ	ン	℄
xxxx1110	(7)			.	>	N	^	n	→				ヨ	セ	ホ	°	℄
xxxx1111	(8)			/	?	O	_	o	←				ッ	リ	マ	□	■

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