

DISPLAYTRONIC

XIAMEN ZETTLER ELECTRONICS CO., LTD

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

ACM1202K SERIES CHARACTER MODULE VER2.0

CUSTOMER APPROVAL			
1.POLARIZER OPTIONS: ☐ R=REFLECTIVE ☒ F=TRANSFLECTIVE ☐ N=TRANSMISSIVE NEGATIVE ☐ M=TRANSMISSIVE POSITIVE			
2.BACKLIGHT OPTIONS: ☐ N=NONE ☐ E=EL ☒ L=LED (Y-G) ☐ C=CCFL			
3. BACKLIGHT COLOR: ☐ A= AMBER ☐ B= BLUE ☐ G= GREEN ☐ W=WHITE ☐ R= RED ☐ RGB= RED+GREEN+BLUE			
4.FLUID OPTIONS: ☐ T=TN ☐ F=FSTN ☒ Y=STN-YELLOW GREEN ☐ G=STN-GRAY ☐ B=STN-BLUE			
5. VIEWING DIRECTION: ☒ B=BOTTOM VIEW(6 O'CLOCK) ☐ T=TOP VIEW(12 O'CLOCK)			
6.TEMPERATURE RANGE: ☐ S=STANDARD TEMPERATURE RANGE ☒ H=DUAL POWER,WIDE TEMPERATURE RANGE ☐ W=SINGLE POWER,WIDE TEMPERATURE RANGE			
7.OTHERS REQUIREMENT:			
※ PART NO. : ACM1202K-FL-YBH-01			
APPROVAL		COMPANY CHOP	
CUSTOMER COMMENTS			

DISPLAYTRONIC ENGINEERING APPROVAL		
DESIGN BY	CHECKED BY	APPROVED BY

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1.0 MECHANICAL SPECS

1. Overall Module Size	54.4mm(W) x 35.3mm(H) x max 7.0mm(D)
2. Dot Size	0.56X0.65 mm
3. Character Pitch	3.5mm
4. Duty	1/16
5. Controller IC	SPLC783A-01 or EQU
6. LC Fluid Options	STN YELLOW-GREEN MODE
7. Polarizer Options	Transflective
8. Backlight Options	LED Yellow-Green
9. Temperature Range Options	Wide(-20°C ~ 70°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	-25	-	75	°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	3.7		5.5	V

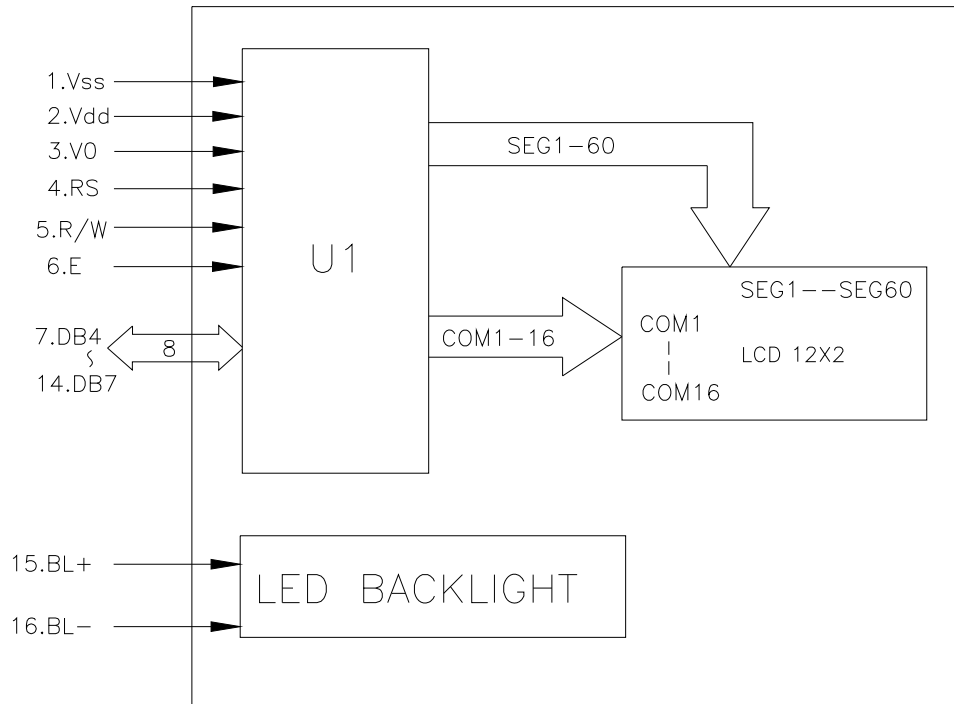
3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	Vih	H level	2.5	-	3.3	V
Input voltage (low)	Vil	L level	0	-	0.6	V
Recommended LC Driving Voltage (Wide Temp)	Vdd -Vo	-20°C	-		5.5	V
		25°C	-	4.5	-	
		70°C	3.7		-	
Power Supply Current	Idd	Vdd=3.3V, fosc=270kHz	-		2.0	mA
Back Light	Vf	If=80mA		2.1	2.3	V

4.0 OPTICAL CHARACTERISTICS (Ta=25°C, Vdd= 3.3V±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°	-	200	300	ms

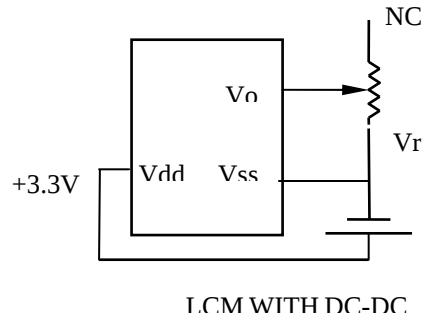
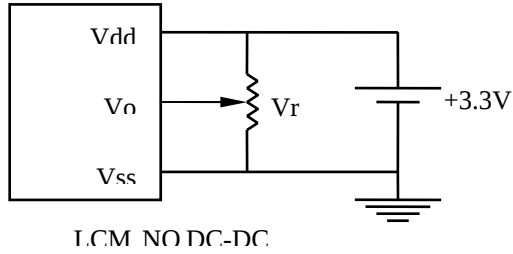
5.BLOCK DIAGRAM



6.0 PIN ASSIGNMENT

Pin No.	Symbol	Function
1	Vss	Ground
2	Vdd	+3.3V
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	BL+	Power Supply for BL+
16	BL-	Power Supply for BL-

7.0 POWER SUPPLY



$V_r = 5K\Omega \sim 10K\Omega$

8.0 TIMING CHARACTERISTICS

Write mode(write data from MPU to SPLC783A)

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
E cycle time	t_c	1400	-	-	ns	Pin E
E pulse width	t_{pw}	400	-	-	ns	Pin E
E rise/fall time	t_R, t_F	-	-	25	ns	Pin E
Address Setup Time	t_{SP1}	60	-	-	ns	Pins: RS ,R/W ,E
Address hold time	t_{HD1}	20	-	-	ns	Pins: RS ,R/W ,E
Data set up time	t_{SP2}	140	-	-	ns	Pins: DB0-DB7
Data hold time	t_{HD2}	10	-	-	ns	Pins: DB0-DB7

Read mode(read data from SPLC783A to MPU)

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
E cycle time	t_c	1400	-	-	ns	Pin E
E pulse width	t_{pw}	400	-	-	ns	Pin E
E rise/fall time	t_R, t_F	-	-	25	ns	Pin E
Address Setup Time	t_{SP1}	60	-	-	ns	Pins: RS ,R/W ,E
Address hold time	t_{HD1}	20	-	-	ns	Pins: RS ,R/W ,E
Data set up time	t_{SP2}		-	-360	ns	Pins: DB0-DB7
Data hold time	t_{HD2}	50	-	-	ns	Pins: DB0-DB7

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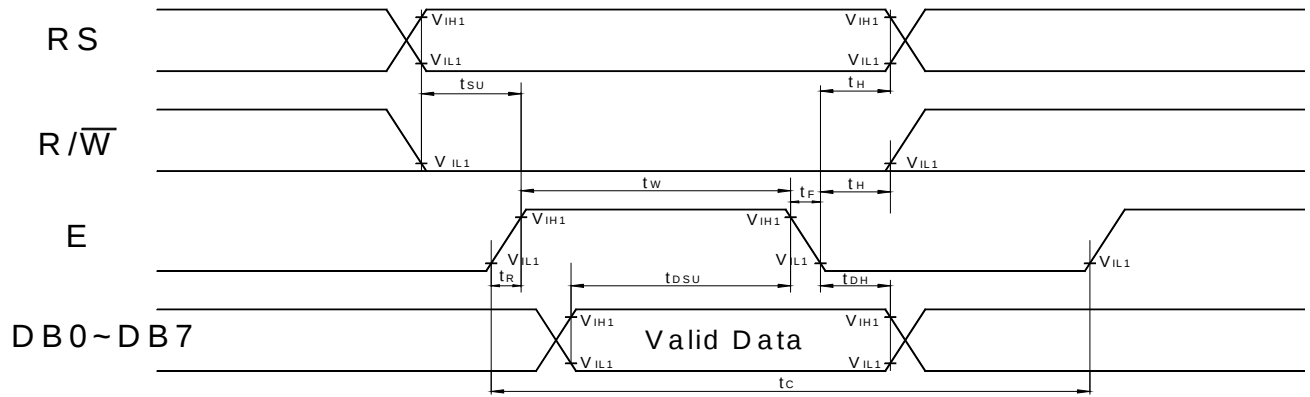


Fig. a Interface timing (data write)

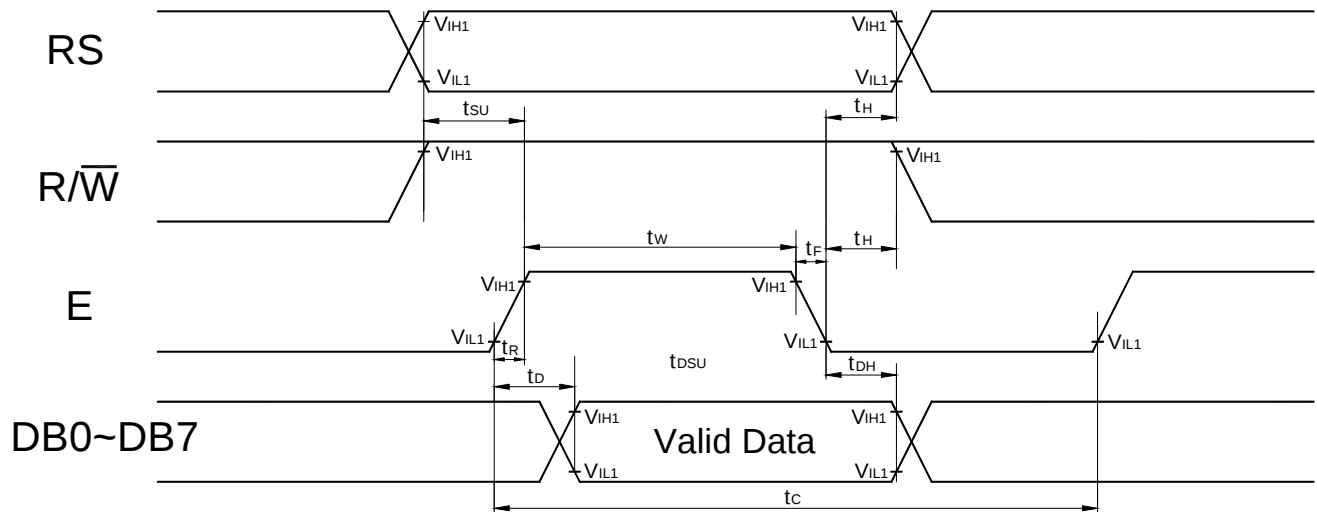
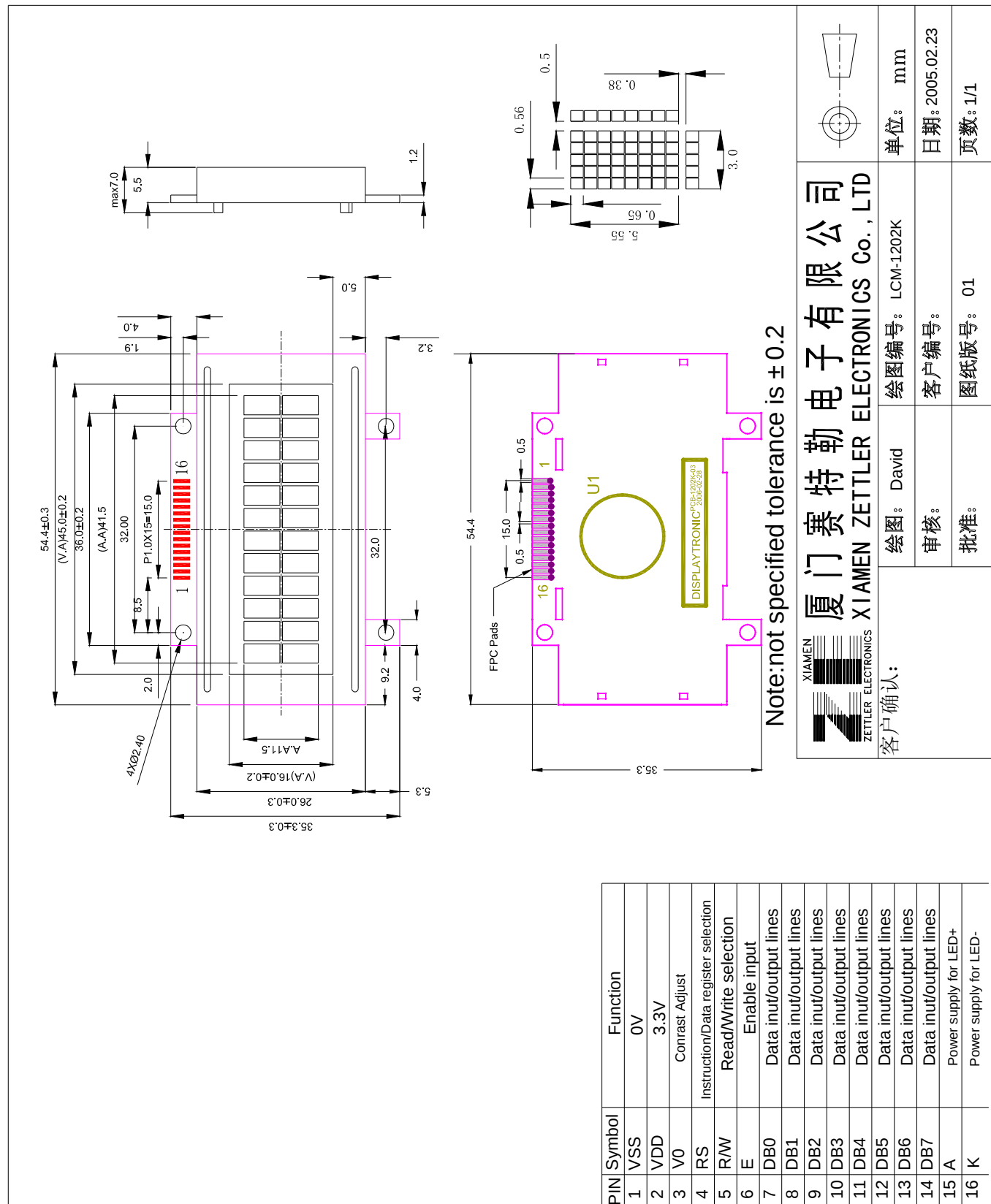


Fig. b Interface timing (data read)

9.0 MECHANICAL DIAGRAM



10.0 RELIABILITY TEST

Test Item	Content	Evaluations and Assessment*			
		Current Consumption	Oozing	Contrast	Other Appearances
Operation at high temperature	70°C,96hrs	Twice initial value or less	none	More than 50% of initial value	No abnormality
Operation at low temperature	-20°C,96hrs	Twice initial value or less	none	More than 50% of initial value	No abnormality
High temperature storage	75°C, 96hrs	Twice initial value or less	none	More than 50% of initial value	No abnormality
Low temperature storage	-25°C, 96hrs	Twice initial value or less	none	More than 50% 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 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

12.0 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					一	夕	ミ	α	ρ	
xxxx0001	(2)			!	1	A	Q	a	q				。	ア	チ	厶	ä	q
xxxx0010	(3)			"	2	B	R	b	r				「	イ	ツ	×	ƒ	θ
xxxx0011	(4)			#	3	C	S	c	s				」	ウ	テ	モ	ε	∞
xxxx0100	(5)			\$	4	D	T	d	t				、	エ	ト	ㇿ	μ	Ω
xxxx0101	(6)			%	5	E	U	e	u				・	オ	ナ	1	ε	ü
xxxx0110	(7)			&	6	F	V	f	v				ヲ	カ	ニ	ヨ	ρ	Σ
xxxx0111	(8)			'	7	G	W	g	w				ア	キ	ヌ	ウ	g	π
xxxx1000	(1)			(	8	H	X	h	x				イ	ク	ネ	リ	フ	⌘
xxxx1001	(2)			)	9	I	Y	i	y				ウ	ケ	ル	ル	´	y
xxxx1010	(3)			*	:	J	Z	j	z				エ	コ	ン	レ	j	〒
xxxx1011	(4)			+	;	K	[	k	(				オ	サ	ヒ	ロ	*	厶
xxxx1100	(5)			,	<	L	¥	l	l				ヤ	シ	フ	ワ	¢	厶
xxxx1101	(6)			-	=	M	]	m	}				ユ	ズ	ハ	ン	も	÷
xxxx1110	(7)			.	>	N	^	n	÷				ヨ	セ	ホ	ゝ	ñ	
xxxx1111	(8)			/	?	O	_	o	+				ッ	リ	マ	°	ö	■

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