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**

REVISION RECORD

REVISION	REVISION DATE	PAGE	CONTENTS
VER1.1	**15/6-2006**		**MODIFY THE COVER,ADD CONTENT AND REVISION RECORD.**

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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(-20ºC ~ 70ºC)

2.0 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min	Typ	Max	Unit
Operating temperature (Wide temperature)	Top	-20	-	70	ºC
Storage temperature (Wide temperature)	Tst	-25	-	75	ºC
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

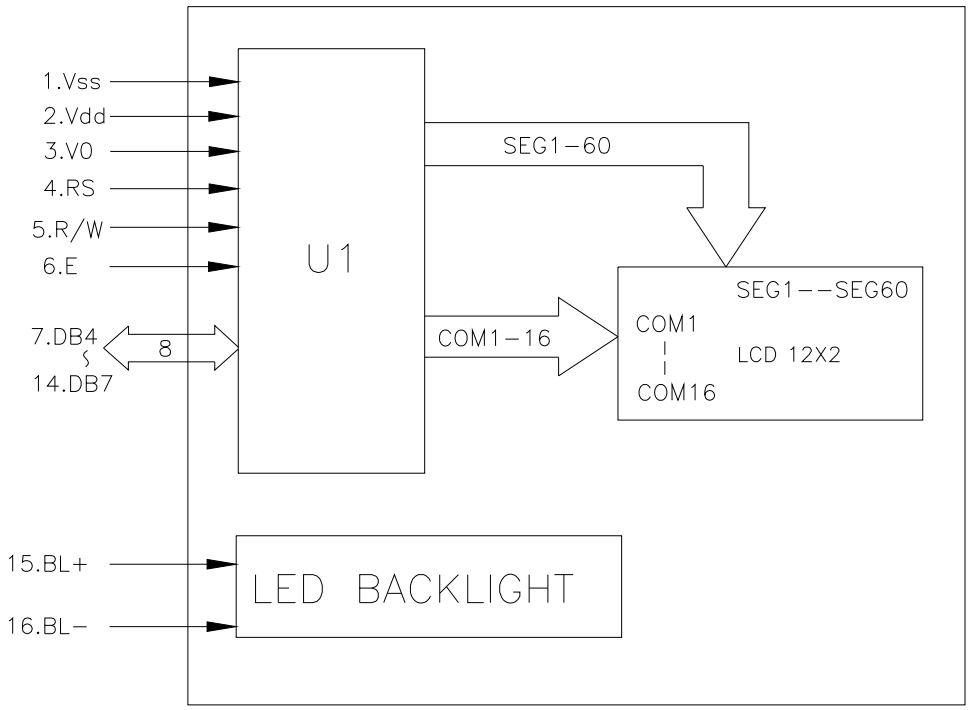
3.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit
Input voltage (high)	V_{ih}	H level	2.5	-	3.3	V
Input voltage (low)	V_{il}	L level	0	-	0.6	V
Recommended LC Driving Voltage (Wide Temp)	V_{dd} -V_o	-20ºC	-		5.5	V
		25ºC	-	4.5	-	
		70ºC	3.7		-	
Power Supply Current	I_{dd}	Vdd=3.3V, fosc=270kHz	-		2.0	mA
Back Light	Vf	If=80mA		2.1	2.3	V

4.0 OPTICAL CHARACTERISTICS (Ta=25ºC, 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

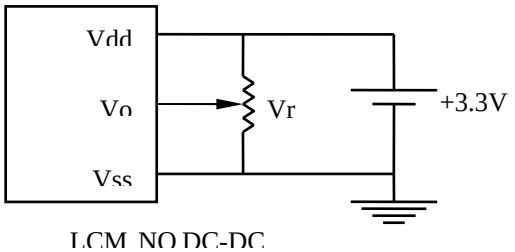
5.BLOCK DIAGRAM



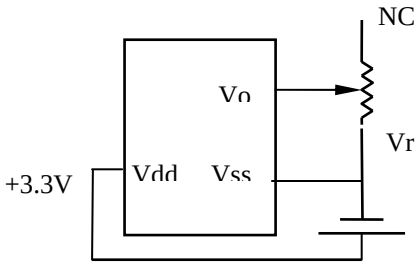
6.0 PIN ASSIGNMENT

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



LCM NO DC-DC



LCM WITH DC-DC

Vr = 5KΩ ~ 10KΩ

8.0 TIMING CHARACTERISTICS

Write mode(write data from MPU to SPLC783A)

Item	Symbol	Min.	Typ.	Max.	Unit	Tes tCondition
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	Tes tCondition
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

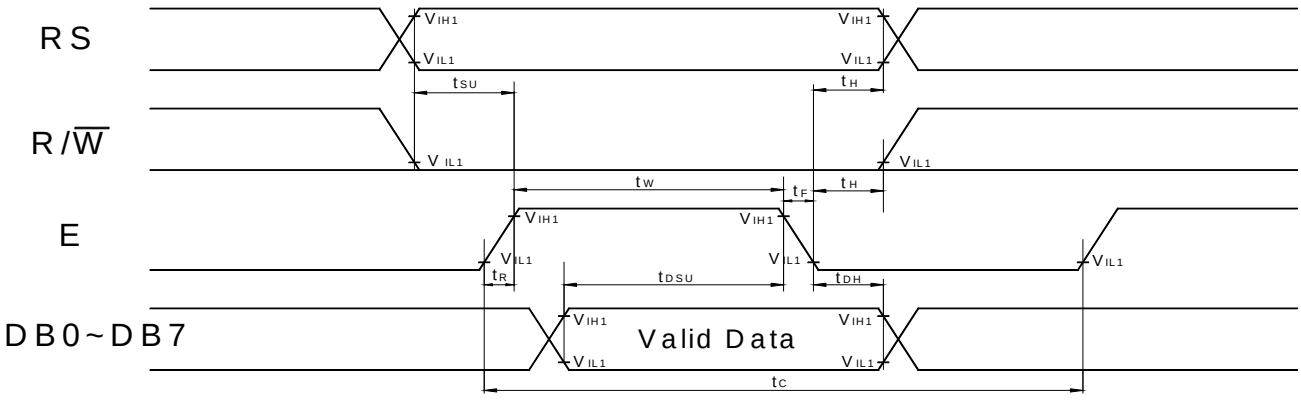


Fig. a Interface timing (data write)

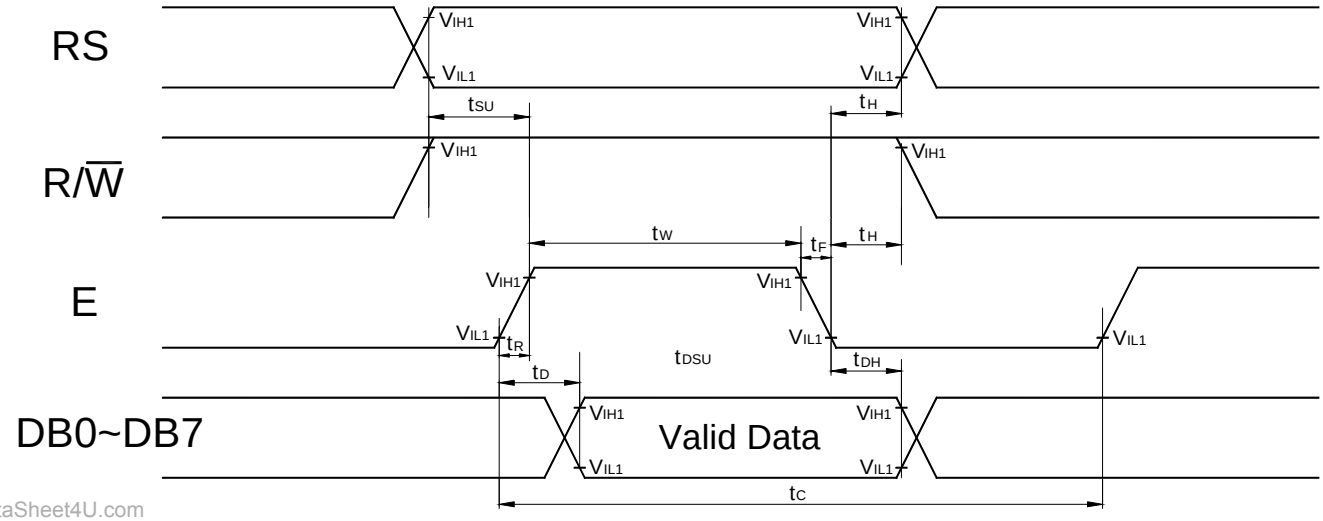
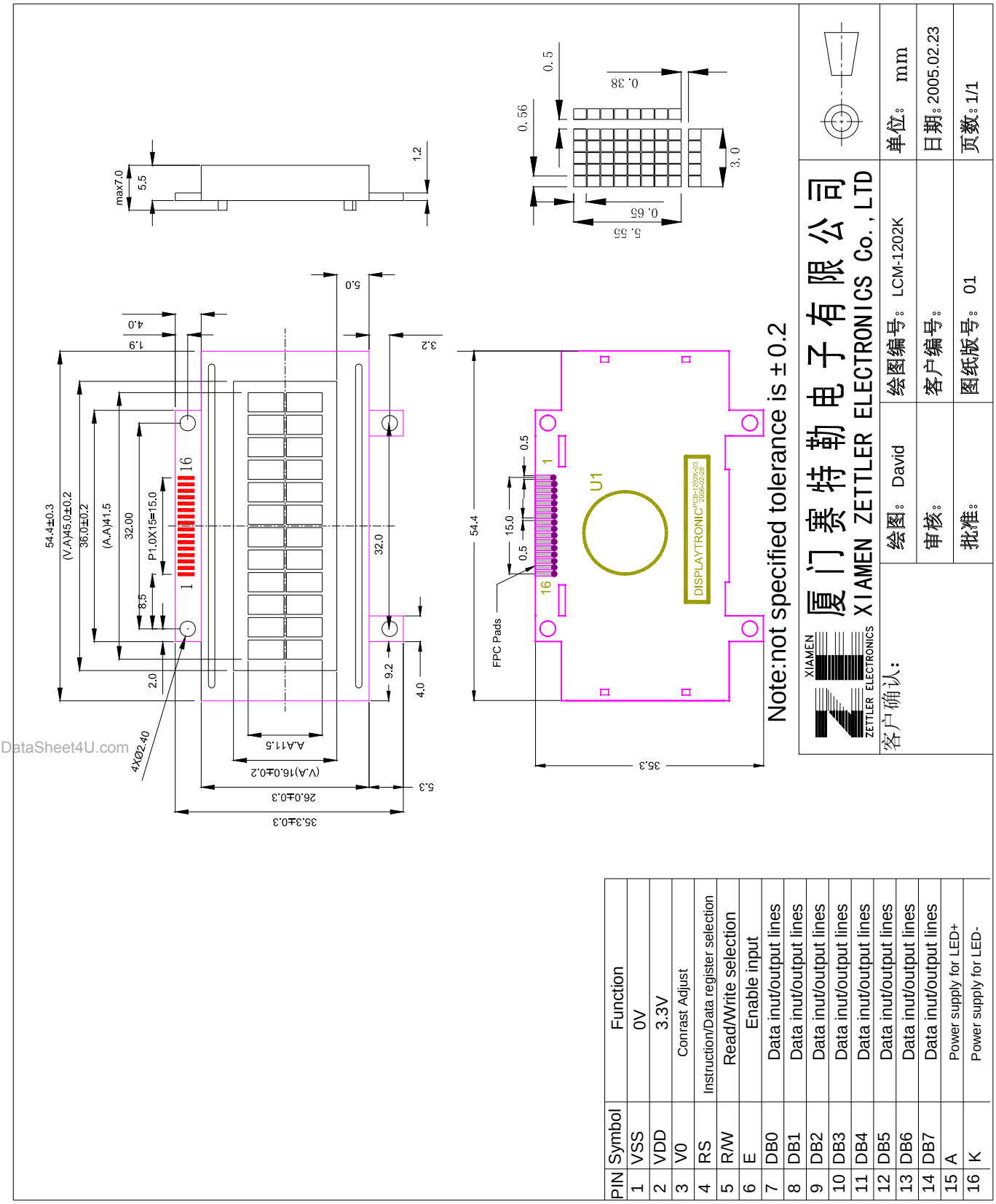


Fig. b Interface timing (data read)

9.0 MECHANICAL DIAGRAM



PIN	Symbol	Function
1	VSS	0V
2	VDD	3.3V
3	V0	Conrast Adjust
4	RS	Instruction/Data register selection
5	R/W	Read/Write selection
6	E	Enable input
7	DB0	Data inut/output lines
8	DB1	Data inut/output lines
9	DB2	Data inut/output lines
10	DB3	Data inut/output lines
11	DB4	Data inut/output lines
12	DB5	Data inut/output lines
13	DB6	Data inut/output lines
14	DB7	Data inut/output lines
15	A	Power supply for LED+
16	K	Power supply for LED-

10.0 RELIABILITY TEST

Test Item	Content	Evaluations and Assessment*			
		Current Consumption	Oozing	Contrast	Other Appearances
Operation at high temperature	70ºC,96hrs	Twice initial value or less	none	More than 50% of initial value	No abnormality
Operation at low temperature	-20ºC,96hrs	Twice initial value or less	none	More than 50% of initial value	No abnormality
High temperature storage	75ºC, 96hrs	Twice initial value or less	none	More than 50% of initial value	No abnormality
Low temperature storage	-25ºC, 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 (25ºC±5ºC).

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

11.0 DISPLAY INSTRUCTION TABLE

COMMAND	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	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	BF	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

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