User's Guide

GXM12232-4SL

Liquid Crystal Display Module

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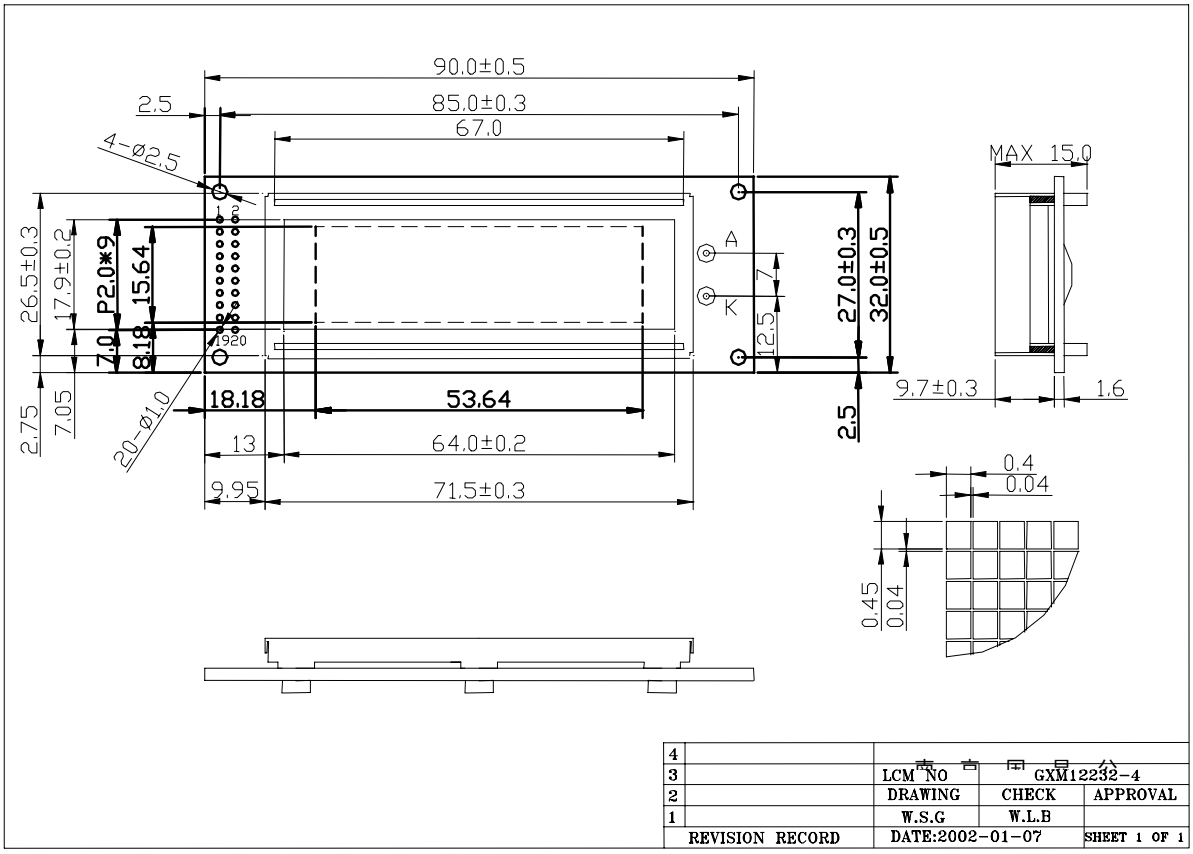
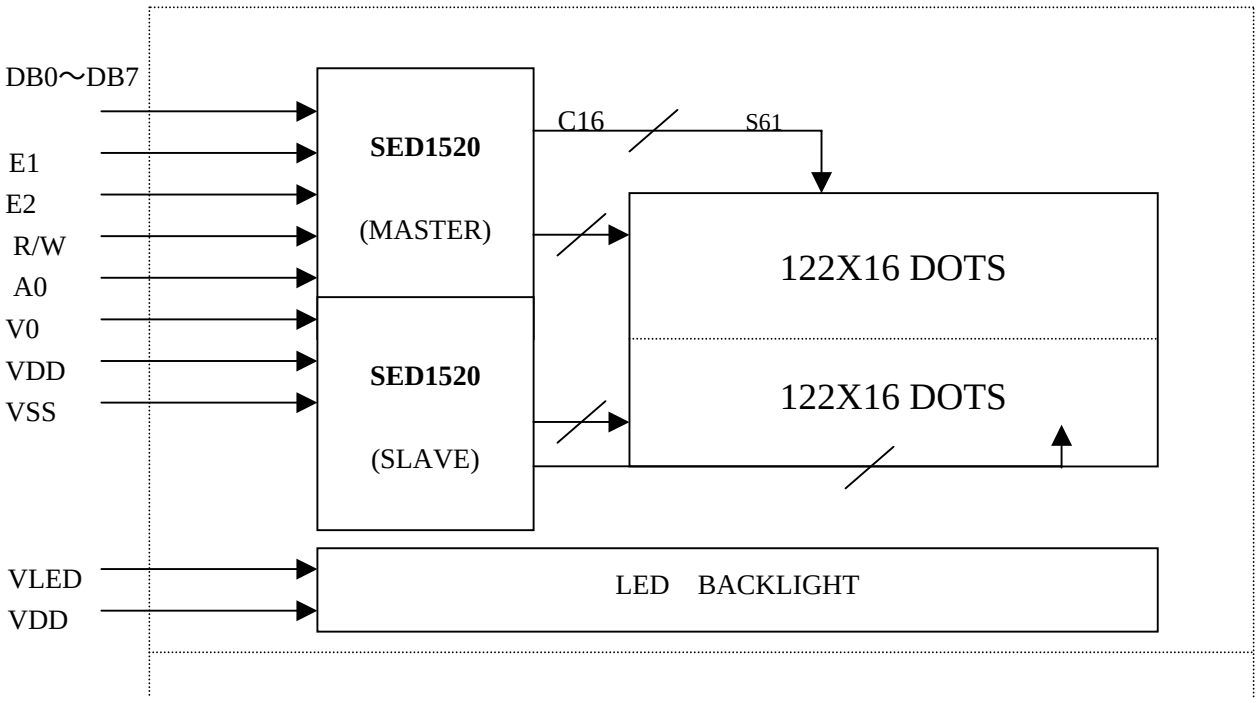
contents

■ Mechanical Diagram



■BLOCK DIAGRAM



■ PIN ASSIGNMENTS

PIN NO.	SYMBOL	FUNCTION
1	VSS	POWER SUPPLY(0V,GND)
2	VDD	POWER SUPPLY FOR LOGIC CIRCUIT
3	VO	POWER SUPPLY FOR LCD
4	A0	L:INSTRUCTION, H:DATA
5	CS1	CHIP ENABLE ACTIVE “L”
6	CS2	CHIP ENABLE ACTIVE “L”
7	CL	EXTERNAL CLOCK
8	/RD(E)	/RD FOR 80 SERIES, E FOR 68SERIES
9	/WR(R/W)	/WR FOR 80 SERIES, R/W FOR 68 SERIES
10-17	DB0-DB7	DATA BUS LINE
18	RES	H:68 SERIES, L:80 SERIES
19-20	LEDA,K	LED SUPPLY VOLTAGE(5V)

■ABSOLUTE MAXIMUM RATINGS(Ta=25℃)

Parameter	Symbol	Min	Max	Unit
Supply Voltage for logic	VDD	0	6.7	V
Supply Voltage for LCD	VDD-V0	0	10	V
Input voltage	VI	0	VDD	V
Operating Temp.	TOP	-10℃	+50℃	℃
Storage Temp.	TST	-20℃	+70℃	℃

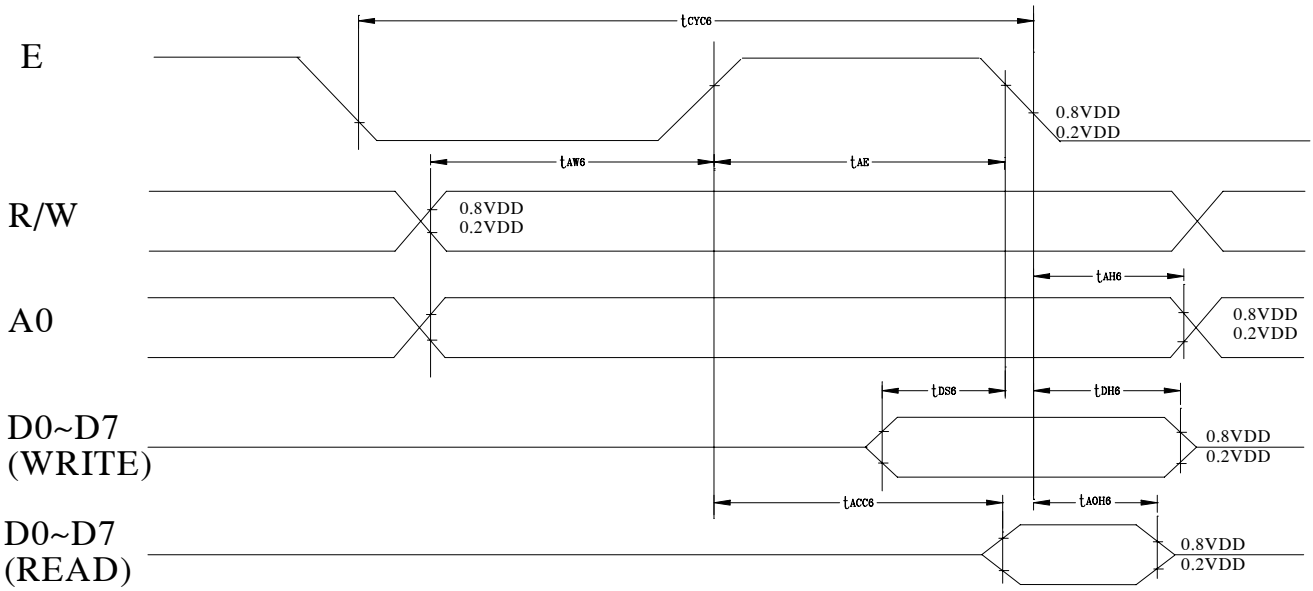
■ELECTRICAL CHRACTERISTICS(VDD=+5V±10%,VSS=0V,Ta=25℃)

▼DC Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Supply voltage for logic	VDD	----	4.5	5.0	5.5	V
Supply current for logic	IDD	----	----	0.8	1.5	mA
Operating voltage for LCD	VDD-V0	25℃	----	4.5	----	V
Supply voltage for LED backlight	V_{LED}	----	----	4.2	----	V
Supply current for LED backlight	I_{LED}	V_{LED}=4.2V	----	110	----	mA

▼AC Characteristics

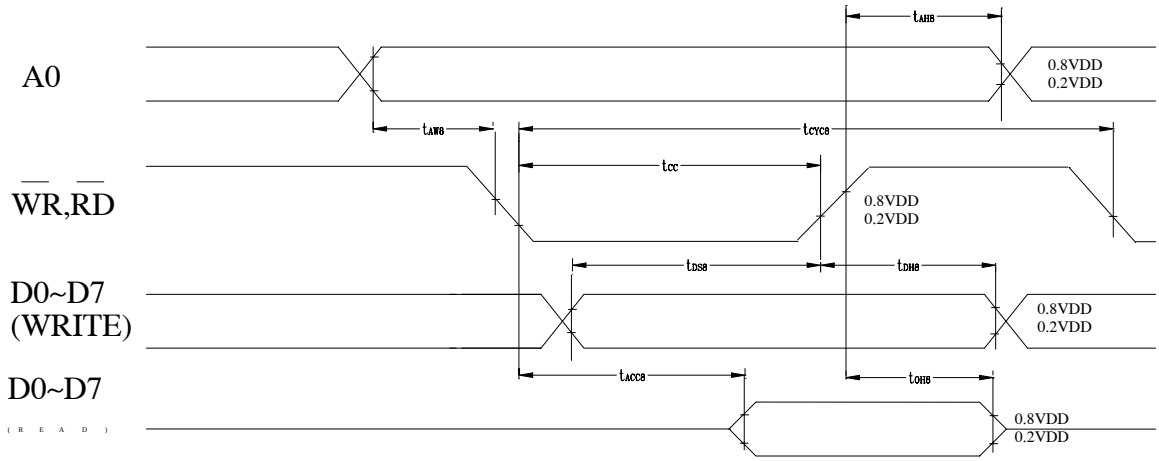
⊙ Read/Write operation sequence(68 Type MPU)



Ta=-20 to +75 ,VDD=5.0V±10%,VSS=0V

Parameter		Symbol	Min	Max	unit	Condition
System cycle time		t_{CYC6}	1000	-----	ns	
Address setup time		t_{AW6}	20	-----	ns	
Address hold time		Tah6	10	-----	ns	
Enable pulse width	Read	t_{EW}	100	-----	ns	
	Write	t_{EW}	80	-----	ns	
Data setup time		t_{DS6}	80	-----	ns	
Data hold time		t_{DH6}	10	-----	ns	
Access time		t_{ACC6}	----	90	ns	CL=100Pf
Output disable time		t_{OH6}	10	60	ns	
Input wave form rise time		t_r	----	15	ns	

⊙ Read/Write operation sequence(80 Type MPU)



Ta=-20 to +75 ,VDD=5.0V±10%,VSS=0V

Parameter	Symbol	Min	Max	unit	Condition
System cycle time	t_{CYC8}	1000	-----	ns	
Address setup time	t_{AW8}	20	-----	ns	
Address hold time	t_{AH8}	10	-----	ns	
Control pulse width	t_{CC}	200	-----	ns	
Data setup time	t_{DS8}	80	-----	ns	
Data hold time	t_{DH8}	10	-----	ns	
RD access time	t_{ACC8}	----	90	ns	CL=100Pf
Output disable time	t_{CH8}	10	60	ns	

■OPERATING PRINCIPLES & METHODS

▼Control and Display Command

ommand	R/W	RD	A0	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0/1	Whole display ON/OFF 1: ON , 0: OFF(Power Save mode if the static drive on)
Display start line	0	1	0	1	1	0	Display start line (0 to 31)					Determine the display line correspond to the com0.
Set page address	0	1	0	1	0	1	1	1	0	Page(0 to 3)		Set the page of display .Data RAM to the Column Register
Set column address	0	1	0	0	Column address (0 to 79)							Set the Column Address of Display data RAM to the column register
Read status	0	0	1	Busy	ADC	On/ Off	Reset	0	0	0	0	Read the status. BUSY 1: Working 0: Ready ADC 1: Clockwise output 0: Counter clockwise ON/OFF 1: Display off 0: Display on RESET 1: Reset 0: Normal
Write display data	1	1	0	Write data								Write data from data bus into display RAM
Read display data	1	0	1	Read data								Read data from display RAM onto data bus
Select ADC	0	1	0	1	0	1	0	0	0	0	0/1	Determine the clockwise or counterclockwise reading of the display data RAM 0: Clockwise Output 1: Counterclockwise Output
Static drive ON/OFF	0	1	0	1	0	1	0	0	1	0	0/1	Select the dynamic or static driving 1: Static driving(Power save) 0: Dynamic driving
Select duty	0	1	0	1	0	1	0	1	0	0	0/1	Select the duty ratio 1: 1/32 duty 0: 1/16 duty

Read-Modify-Write	**0**	**1**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**Increment the column address register when writing but no-change when reading.**
Reset	**0**	**1**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**1**	**0**	**Set the display start line register to 1st line ,Column add. Counter and page add. register to "0".**
End	**0**	**1**	**0**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**0**	**Release from the Read Modify Write Mode.**

■ DIAPLAY DATA RAM ADDRESS MAP

Page	Data			Com NO.	Driver
1	DB0 …… DB7	**122×16 Pixels**		0 | | | | 15	Master
2	DB0 …… DB7				
3	DB0 …… DB7	**122×16 Pixels**		16 | | | | 31	Slave
4	DB0 …… DB7				
	Seg NO.	0 ---------- 60	0---------- 60		
	Driver	Master	Slave		